The following list consists of competencies that have been identified by the GEARING UP FOR SAFETY design team as essential for the safe operation of agricultural tractors and machinery and the performance of other farm/ranch tasks recognized as particularly hazardous, especially when performed by youth. The list includes competencies presently required by federally-mandated training programs for youth under the age of 16 who desire to be employed to operate agricultural tractors and machinery (HOOA) and for employees of agricultural operations who fall under the safe work place provisions of OSHA. Additional competencies have been included that should help prevent the primary types of injuries reported in findings from recent studies of agricultural workplace injuries involving children and youth under the age of 16. The list was reviewed and validated through a formal process involving professionals in the fields of agricultural safety and health, agricultural education, engineering, and youth development.

The curriculum design team does not suggest that the list is inclusive of all competencies required to safely or efficiently operate all types of agricultural equipment or perform all types of agricultural work under all circumstances and in all environments. The curriculum, however, is appropriate for training youth who desire to be employed to operate agricultural tractors and machinery and who must comply with existing federal regulations.

Since the required training has specific time restraints, a process of prioritizing competencies was conducted and those considered most relevant to preventing the most serious types of commonly reported work-related injuries were included in the core list of desired competencies. In contrast to prior agricultural tractor and machinery operator certification curriculums, the list of core competencies reflects a substantial reduction in the emphasis on the maintenance and repair of agricultural tractors and machinery except where these activities contribute to the likelihood of serious injury.

The competencies are organized under each of 15 lessons and are included in the instructor notes for each lesson for easy reference. The first 15 lessons identify the desired knowledge-based competencies. Lesson 16 provides competencies for the hands-on components of the program; the visual pre-operational check of an agricultural tractor and the operation of a tractor and two-wheels trailer through a prescribed course.

In addition to being used to design the curriculum, the core competencies were also used to develop a set of review/test questions that could be used to assess the knowledge of the participants in the program concerning safe work practices.
1.1 Compare the ranking of farm/ranch work-related fatalities with other hazardous industries, such as:

- Mining
- Construction
- Fire fighting
- Truck driving

1.2 Identify at least five of the following reasons why farm/ranch work is so hazardous.

- Exposure to hazardous machinery
- Isolated worksites
- Workers often work alone
- Diversity of workforce, especially age
- Exposure to large and/or aggressive animals
- Exposure to toxic chemicals, dusts, and gases
- Exposure to adverse weather
- Worksite and homesite (usually the same location)
- Limited access to emergency services

1.3 Identify the following types of hazards that are most frequently involved in fatal and disabling farm/ranch injuries.

- Tractor operation
- Machinery operation
- Livestock handling
- Operating or being transported in trucks, ATVs, utility vehicles, and other vehicles

1.4 Identify at least five types of agricultural equipment, excluding the tractor, that are most frequently involved in serious farm-related injuries.

- Balers
- Rotary mowers
- Combines
- Auger-elevators
- Manure spreaders
- Grain grinder-mixers Total Mixed Ration (TMR)

1.5 Compare the similarities and differences in safety features found on agricultural tractors versus pick-up trucks.

- ROPS (Rollover Protective Structures) on some trucks and tractors
- Seat belts
- Horn
- Lights
- Mirrors
- Neutral start safety switch
- Shielding
- Slip resistant surfaces
- Environmentally controlled operator station
- Operator’s manual

1.6 Identify at least five characteristics of youth that cause them to be at greater risk of injury while performing farm/ranch work.

- Knowledge of hazards
- Coordination
- Experience
- Size
- Maturity
- Strength
- Endurance
1.7 Identify at least three of the following operator characteristics that contribute to an increased risk of injury when operating agricultural tractors and machinery.

- Extreme emotions
- Lack of knowledge/experience
- Fatigue
- Influence of drugs or alcohol
- Preoccupation

1.8 Identify at least five of the following characteristics of agricultural equipment that can increase the risk of operator or bystander injury.

- High operating speed
- Aggressive components
- Power
- Size and weight of equipment
- Exposed functional components
- Potential to throw material
- Energized components
- Unstable

1.9 Identify and locate the following basic types of potential machine hazards found on agricultural tractors and machinery.

- Pinch points
- Crush points
- Wrap points
- Cutting points
- Shear points
- Pull-in points
- Free-wheeling components
- Thrown objects
- Stored energy
- Slips and falls
- Thermal energy
- Chemical energy

1.10 Identify at least five of the following environmental hazards that can increase the likelihood of injury or disease while performing farm/ranch work.

- Darkness
- Sunlight
- Heat and cold
- Noise
- Adverse weather (snow, rain, wind)
- Dust and toxic fumes
- Vibration

1.11 Explain at least three of the following basic characteristics of a safe tractor and machinery operator.

- Knowledge of hazards
- Patience
- Civility/courtesy
- Self-control
- Confidence
- Cautious
- Consideration of self, others, animals, property, and the environment

1.12 Describe the following characteristics of clothing or dress appropriate for the safe tractor and machinery operator.

- Close-fitting material
- No loose strings
- Protection for the feet
- Protection from sun
- Temperature appropriate
1.13 Explain the applicable state and federal regulations that employers must comply with when hiring youth under the age of 16 to perform farm and ranch-related work, including the following:

- Required to pay minimum wage for work performed
- Restricted hours of employment
- Work assigned cannot interfere with school attendance
- Youth cannot be assigned to perform certain hazardous tasks without certification of appropriate training
- Required supervision
- Prohibited exposure to toxic chemicals

1.14 Identify the 11-specific farm/ranch tasks that have been identified by the Fair Labor Standards Act (FLSA) as being particularly hazardous for youth under 16 and identify which can be performed with training and which are considered too hazardous for any youth under 16.

Can be performed with appropriate training:

- Operating tractors over 20 PTO hp (exemption available)
- Operating PTO-operated machinery (exemption available)

Cannot be performed for hire until age 16:

- Operating specialized powered machines, including trencher, earthmoving equipment, fork lift, potato combine, powered circular, band, or chainsaw
- Working with breeding livestock including bulls, boars, and stallions
- Working in wood lots with logs over 6 inches in butt diameter
- Working on ladders and scaffolds at heights over 20 feet
- Operating a vehicle to transport passengers or riding on a tractor as a passenger or helper
- Working inside toxic atmospheres or confined spaces including silos, grain bins, manure pits, and fruit storage
- Handling or applying chemicals classified as Category I or II
- Handling or using a blasting agent (explosive)
- Transporting, transferring, or applying anhydrous ammonia
2.1 Identify the following ten basic components or systems of the tractor and briefly explain their functions.

- Engine
- Fuel system
- Cooling system
- Electrical system
- Hydraulic system
- Transmission
- Operator station (ROPS/cab)
- Hitching system
- Traction system (tires and tracks)
- Operator’s instructions (operator’s manual, warnings)

2.2 Locate and interpret the appropriate section of the operator’s manual that explains the use and function of primary controls found on agricultural tractors and self-propelled equipment.

2.3 Locate and explain the function of each of the primary controls found on typical agricultural tractors and self-propelled equipment, including:

- Brakes
- Steering wheel
- Throttle
- Clutch
- Transmission selector
- Parking brake
- Auto steer
- Turn signals
- PTO-engaging control
- Hydraulic controls
- Windshield wipers
- Battery disconnect switch
- Fuel tank shut-off valve
- Hazard lights

2.4 Explain the reason for using color-coding on primary controls found on agricultural tractors and self-propelled equipment.

2.5 Identify the following applications of color-coding used in a typical operator station.

- Red – controls that stop engine
- Orange – controls that control machine ground motion such as engine speed and transmission levers
- Yellow – controls that engage powered components including the PTO
- Black – controls that adjust machine function

2.6 Locate the appropriate section of the operator’s manual that explains the instruments and their functions, and explain the proper responses to abnormal readings.

2.7 Identify, locate, and explain the function of each of the following instruments found on typical tractors and self-propelled equipment.

- Tachometer
- Oil-pressure gauge/light
- Battery-charge indicator
- Temperature gauge/light
2.8 Recognize and interpret the following audible and visual messages that might be encountered on modern agricultural tractors, combines, other self-propelled equipment, and trucks.

- PTO-engagement warning
- Back-up warning devices
- Warning/hazard lights indicator
- Turn signals
- Seat belt warning
- Parking-brake-engaged warning

2.9 Explain the reasons for the use of universal symbols on agricultural tractors and machinery.

- Enable people to communicate
- Save time
- Prevent incidents that could cause property damage
- Reduce risk of injury
- Remove language barriers

2.10 Locate and interpret the use of specific universal symbols found on agricultural tractors and machinery using the operator’s manual.

2.11 Identify and briefly explain the function of typical safety features found on modern agricultural tractors, including:

- Neutral-start switches
- Field and highway lighting
- ROPS
- Seat belt
- Power steering and brakes
- Safety signs
- Ergonomically designed seat and control layout
- Standardized controls
- Slip-resistant surfaces
- Mirrors and cameras
- Handholds and steps
- Climate control with air filtration

2.12 Explain the importance of being able to use and interpret standard hand signals when working around agricultural equipment.

- Enable people to communicate
- Save time
- Prevent incidents that could cause property damage
- Reduce risk of severe injury or death
- Remove language barriers

2.13 Explain the message associated with each of the following commonly used hand signals.

- Start engine
- Stop engine
- Come to me or come help
- Move toward me or follow me
- Move out or take off
- Speed up
- This far to go
- Slow down
- Lower equipment
- Raise equipment
- Stop
3.1 Locate, read and interpret hazard alerts and safety messages contained in the operator’s manual provided with agricultural tractors.

3.2 Locate, read and interpret the hazard alert warnings on typical agricultural tractors.

3.3 Explain the level of risk associated with each of the following safety messages:
   - CAUTION
   - WARNING
   - DANGER

3.4 Read and interpret special operating instructions found in the operator’s manual for a typical agricultural tractor, including the following:
   - Operating a tractor with a front-end loader
   - Removing a stuck tractor
   - Towing heavy loads
   - Operating a tractor on a public highway
   - Sequence for jump starting a tractor with a discharged battery
   - Towing a disabled tractor
   - Proper fueling

3.5 Explain the process of conducting a pre-operational visual inspection of a typical agricultural tractor including checking for each of the following conditions:
   - Fluid leaks (fuel, hydraulics, coolant)
   - Broken, damaged, or missing components
   - Accumulation of trash, dirt, or flammable material
   - Damaged or non-working lights, reflectors, or SMV emblem
   - Dirty battery
   - Check surroundings
   - Discharged fire extinguisher

3.6 Explain the process used to safely complete each of the following pre-operational maintenance tasks:
   - Check crankcase oil level and add as needed
   - Check coolant level and add as needed
   - Check fuel and Diesel Emission Fluid (DEF) levels and add as needed
   - Check tire inflation pressure
   - Check hydraulic and transmission fluid
   - Check engine and cab air filters
   - Check air cleaner obstruction indicator
   - Clean windows, lights, reflectors, and SMV emblem
   - Replace light bulbs as needed
   - Lubricate grease zerks as needed
   - Replace wiper blades as needed
   - Replace PTO master shield

3.7 Identify the procedure to follow before operating a tractor.
   - Notify supervisor/parent/boss where you will be working
   - Get appropriate instruction on operation of tractor/machinery and how to perform tasks
   - Check your tractor and surroundings for bystanders, obstacles, maintenance issues, animals and adequate ventilation (if operating tractor indoors).
   - Start tractor only from operator seat
3.8 Identify the following design features on a modern agricultural tractor that reduce the potential for injury during mounting and dismounting.

- Steps
- Non-slip surfaces
- Handholds and railings

3.9 Explain the safe way to mount and dismount a tractor.

3.10 List the following adjustments to the operator’s station of an agricultural tractor or self propelled machine that should be made to increase operator safety:

- Adjust seat, steering wheel and mirrors
- Fasten seatbelt
- Make sure there are no bystanders near the tractor
- Verbal or audible warning before starting

3.11 Explain the role of Roll Over Protective Structures (ROPS) in preventing agricultural tractor related fatalities.

3.12 Identify the two basic types of ROPS used on agricultural tractors.

- Protective frames (2 and 4 post, and foldable)
- Protective enclosures (cabs)

3.13 Explain the appropriate use of foldable ROPS in each of the following settings:

- Low clearance buildings
- Vineyards
- Orchards

3.14 Describe the zone of protection on a ROPS-equipped tractor.

3.15 Explain the role of the seat belt in protecting an operator in the event of an overturn.

3.16 Explain the advantages of an environmentally-controlled cab on an agricultural tractor or self propelled machine, including:

- Reduces sound level
- Protects from sun exposure
- Reduces fatigue
- Reduces dust exposure
- Protects from dangerous insects
- Protects from extreme temperatures
- Protects from precipitation (rain, snow, etc.)

3.17 Explain the role of Falling Object Protective Structures (FOPS) on off-highway equipment:

- Provide overhead falling object protection
- Protects from foreign object penetration

3.18 Explain the message associated with each of the following commonly used hand signals.

- Come to me or come help
- Stop engine
- Move out or take off
- Lower equipment
- Move toward me or follow me
- This far to go
- Speed up
- Slow down
- Raise equipment
- Stop
- Start engine
4.1 Explain the following hazards associated with an agricultural tractor.

- Slips and falls
- Rollovers
- Runovers
- Extra riders
- Entanglements
- Hot components
- Pinch points

4.2 Locate and interpret the steps for starting and stopping the tractor engine as outlined in the operator’s manual.

- Shift the transmission in neutral or park
- PTO disengaged
- Hydraulic controls in neutral
- Disengage clutch
- Start engine

4.3 Explain the steps to disengage the clutch, select the appropriate transmission setting or position, and smoothly engage the clutch as outlined in the operator’s manual.

4.4 Explain the steps to engage and disengage the PTO as explained in the operator’s manual.

4.5 Explain the steps to raise and lower the three-point hitch assembly as explained in the operator’s manual.

4.6 Explain the function of the parking brake and when it should be used.

4.7 Describe how the following forces contribute to tractor upset.

- Gravity/Center of gravity
- Centrifugal force
- Rear-axle torque
- Force on drawbar
- Forces on high hitch points

4.8 Explain how each of the following design features can reduce the potential for tractor upset.

- Wide front end versus narrow front-end
- Adjustable rear wheel width
- Use of rear wheel weights
- Duals and/or wider tires
- Tire ballasting
- Width of rear tires
- Front end weights
- Ability to lock brakes together
- Fixed drawbar height

4.9 Explain how each of the following operating procedures can reduce the potential for tractor upset.

- Driving at an appropriate speed
- Driving in appropriate gear
- Setting wheel base as wide as possible
- Staying away from steep slopes, ditches, and riverbanks
- Lowering front-end loader bucket when transporting or turning
- Being a smart/aware operator
- Locking brakes together when traveling at higher speeds and on public roads
- Adding tire ballast and weights
- Hitching towed loads only to the drawbar
- Reducing speed when turning, crossing slopes, and on rough terrain
- Reducing speed when backing up
- Driving forward down steep slopes
- Backing up steep slopes
- Backing out of stuck or mired situations
- Slowing down when operating tractors with rear-mounted equipment
4.10 Identify the following hazards to bystanders of agricultural tractors and machinery and explain appropriate safety measures the operator should take to protect bystanders from each hazard:

- Collapsing components
- Thrown objects
- Runovers
- Blind spots
- Unexpected start-up of machinery
- Excessive noise

4.11 Explain the hazards associated with operating a tractor or other internal-combustion engine-powered machine inside a building:

- Fires
- Carbon monoxide poisoning

4.12 Identify the following locations on the tractor that can potentially lead to severe burns:

- Cooling system
- Exhaust system
- Hydraulic components
- Battery (chemical burns)

4.13 Identify the following hazards associated with using tractor-drawn wagons, carts, and tillage equipment:

- Rollovers
- Runovers
- Falls
- Extra riders
- Contact with utility lines
- Stopping capacity

4.14 Explain the potential electrocution hazard associated with overhead power lines and explain the appropriate safety measures that should be followed by operators of agricultural tractors and equipment to prevent overhead contact with power lines.

4.15 Explain the hazards associated with underground utilities and related safety measures for operators of agricultural tractors and equipment.

4.16 Explain the dangers associated with the recoil energy of tow ropes, chains, and cables.
5.1 Explain the following contributions that increased agricultural technology has made to reduce the number and severity of agricultural related injuries.

- Fewer workers exposed to hazards
- Increased productivity
- Fewer repairs in the field
- Less exposure to livestock
- Increased safety features
- Standardization
- Required and improved training
- More automation/machine monitoring

5.2 Identify hazards when implements are attached to tractors.

- Changed center of gravity
- Added weight
- Overhead clearances may be reduced
- Visibility may be limited for operator
- Equipment is wider

5.3 Identify and explain the following four basic methods used for mounting or connecting powered implements to the tractor and give an example of each.

- Frame-mounted – (i.e. sprayer tank, mower)
- Front-mounted – (i.e. mower, powered tiller)
- Drawbar – (i.e. forage wagon, baler, manure spreader)
- Three-point hitch – (i.e. post-hole digger, plow, back blade)

5.4 Describe the safe procedures for hitching an implement to the drawbar including the following points.

- Hitching only to the drawbar
- Use safety hitch pins and safety chains
- Correct use of jack stands
- Drawbar adjustment
- Not standing between tractor and implement during hitching

5.5 Explain the importance of drawbar adjustment and clevis hitch positioning in preventing PTO-driveline damage or PTO shaft separation.

5.6 List the steps for safely hitching a three-point implement to a typical farm tractor as described in the operator’s manual.

- Check for compatibility of 3-point categories
- Check for bystanders
- Back the tractor as close to the implement as possible
- Secure the tractor
- Hitch on a flat surface
- Connect the tractor’s lower lifting arms to the lifting pins on the implement
- Connect the top (center) link to the implement
- Connect any required hydraulic hoses and/or PTO

5.7 Explain the function of the PTO-driveline system and why it can be a potential hazard to equipment operators and bystanders.

5.8 Identify and explain the difference between the two primary categories of PTO-driveline systems.

- 540 rpm
- 1000 rpm

5.9 Explain why overspeeding PTO-operated equipment can be hazardous.

5.10 Identify the following key components of the PTO-driveline system.

- Shielding
- PTO-stub shaft
- PTO shaft
- Connector
- Universal joints/yokes
- Over-running clutches
- Retaining chain
5.11 Identify the primary types of PTO-driveline shielding.
- PTO stub-shaft guard
- Master shield
- Integral-journal or “spinner” shield
- Fully-shielded universal joint
- Secured “spinner” shield
- Fully-shielded drivelines
- Tunnel shields (on older equipment)

5.12 Explain the correct procedures, as described by the operator’s manual, for safe attachment and removal of a PTO driveline to the stub-shaft of a typical agricultural tractor.
- Completely shut off tractor and power to the PTO system
- Lift the implement PTO driveline to the height of the PTO stub-shaft of the tractor
- Release the locking mechanism
- Connect the implement PTO driveline to the stub-shaft by sliding into place
- Secure and fasten all parts
- Make sure all shields are in place and functional

5.13 Explain the function of the hydraulic system.
- Transfer fluid power
- Provide rotary or linear movement
- Is less efficient

5.14 Identify the location and explain the function of the following components of a remote hydraulic system on a typical tractor-powered implement.
- Couplings
- Cylinders
- Pump
- Conduit/hoses
- Control valves (manual and solenoid)
- Motors

5.15 Describe the following hazards associated with exposure to pressurized hydraulic systems.
- Exposure to hot fluids
- High-pressure skin penetration
- Component failure or collapse
- Residual pressure

5.16 Describe the safe method for examining the hydraulic system for possible leaks.
- Shutdown all equipment
- Release all pressure on the system
- Use cardboard to check for leaks
- Never use hands
- Wear eye protection

5.17 Identify by name and explain the basic function and hazards associated with each of the following types of tractor-powered agricultural machinery.
- Forage harvesters
- Round and square balers
- Manure spreaders
- Rotary cutters/mowers
- Grinders and mixers
- Front-end loaders
- Post-hole diggers
- Chemical sprayers
- Portable augers
- TMR (total mixed ration) wagons
6.1 Identify and describe the function of specialized types of self-propelled agricultural equipment used on farms in the students' geographic area.

- Combines
- Windrowers
- Self-propelled sprayers
- Forage harvesters
- Harvesters (cotton, pea viners, sugar beet, potato, etc.)
- Log-skidders

6.2 Identify the types of equipment that youth under the age of 16 are allowed to operate under the HOOA exemption.

- Corn picker, cotton picker, grain combine, hay mower, forage harvester, hay baler, potato digger, or mobile pea viner
- Feed grinder, crop dryer, forage blower, auger conveyor, self-unloading wagon
- Power post-hole digger, power post-driver, non-walking rotary tiller

6.3 Identify the types of equipment youth under the age of 16 cannot be hired to operate (including starting, stopping, adjusting, feeding, or physical contact with):

- Trencher or earthmoving equipment
- Fork lift
- Potato combine
- Powered circular, band, or chainsaw

6.4 Describe each of the following hazards associated with operating or working around self-propelled agricultural equipment.

- Fires
- Falls
- Entanglement
- Falling header
- Extra riders
- Overturns
- Runovers
- Noise
- Transporting equipment on public roadways
- Contact with overhead power lines

6.5 List the three elements for a fire to occur.

- Oxygen
- Fuel
- Heat

6.6 Explain the following three classes of fires that could occur on self-propelled agricultural equipment.

- Type A – crop residue
- Type B – gasoline, diesel fuel, hydraulic oil
- Type C – electrical fires

6.7 Describe the type, size, and placement of fire extinguishers that should be installed on self-propelled equipment as recommended in the operator’s manual.

6.8 Identify the following locations on a self-propelled agricultural machine where a fire could start.

- Overheated bearings
- Slipping belts
- Exhaust system
- Electrical system
- Accumulated flammable material
- Refueling operation
- Smoking
6.9 Identify at least five of the following operator safety equipment and design features found on modern self-propelled agricultural equipment.

- Environmentally-controlled cab
- Electronic monitoring systems
- Fire extinguishers
- Sealed bearings
- Reversing feed mechanisms
- Operating lights
- Overload clutches
- Safety interlocks
- SMV emblems
- Header or platform safety support locks
- Swing-away shields
- Cameras

6.10 Identify the location and explain the use of the header or platform safety-stop (lock) on a typical self-propelled machine.

6.11 Explain the function of the safety or ignition-switch interlock system found on combines and other self-propelled agricultural machines.

6.12 Identify at least five of the following obstacles found on farm or ranch operations that could lead to an injury while operating self-propelled agricultural equipment.

- Irrigation systems
- Ditches
- Utility poles, guy wires, and powerlines
- Drainage holes
- Low-hanging tree limbs
- Rocks and boulders
- Uneven terrain
- Soft shoulders
- Animals
- Narrow roadways
7.1 Explain the legal, state-specific requirements for agricultural tractors and other self-propelled agricultural equipment operated on public roadways, including restrictions related to:

- Age of operator
- Width of equipment
- Weight of equipment
- Height of equipment
- Lighting and marking
- Hours of transport
- Escort vehicles

7.2 Describe at least five of the following serious hazards associated with operating tractors and self-propelled equipment on public roadways:

- High-speed traffic
- Narrow roadways
- Over-width equipment
- Obstructed view when making left turns
- Roadside obstacles
- Unmarked railroad crossings
- Times of low visibility
- Lack of lighting and marking
- Pedestrians/bikers/animals
- Soft shoulders/ No shoulders
- Narrow or limited-capacity bridges
- Road rage and behavior of other motorists

7.3 Explain the importance of proper placement of SMV emblems and reflective tape on agricultural tractors and machinery that are operated on public roadways.

7.4 Describe the proper use of warning lights found on agricultural equipment transported on public highways.

7.5 Explain the role of safety-hitch pins and safety chains in preventing injuries and property damage during transport of agricultural equipment.

7.6 Describe the function of the transport position on towed agricultural equipment.

7.7 Explain at least five of the following safety procedures to follow when preparing to transport self-propelled agricultural machinery on a public road:

- Empty combine grain tank
- Secure header, platform or feeder house in raised position
- Remove header if wider than machine and transport separately
- Lock brake pedals together
- Move augers, cotton baskets and other components into the transport position
- Check SMV, hazard lights, and mirrors for function and visibility

7.8 Explain safe operating procedures for each of the following circumstances:

- Transporting towed equipment one hour before sundown to one hour after sunrise
- Transporting over-width equipment
- Transporting overweight equipment/loads
- Spilling material on the highway
- Meeting on-coming traffic
- Accumulating traffic in the rear
- Crossing unprotected railroad tracks
- Making left turns
7.9 Identify and describe the meaning of each of the following highway information signs.
- Stop
- Yield
- Railroad crossing
- Weight limit

7.10 List the hazards associated with transporting riders in the cargo area of a pickup truck.
- No means of restraint
- Being thrown from the vehicle in the event of a collision
- Can be ejected from the truck bed
- Excessive speed
- No ROPS
- Being crushed by shifting cargo

7.11 Explain the role that seat belts can play in preventing injuries during a motor-vehicle crash.
- SAVES LIVES
- Allows room for air bag deployment
- Keeps you in zone of protection
- Protect from air bag injuries
- Provides a method of restraint during a crash
- Present impact injuries

7.12 Explain the role that car seats can play in preventing injuries to children transported in farm trucks and pickups.

7.13 Explain the following hazards that are present when a truck with a hydraulic lift is left in the raised position.
- Crushing between truck bed and frame
- Overhead electrical contact
- Overturn if unexpected shift of material
- Overturn if parked on uneven surfaces
- Overturn if truck loaded unevenly

7.14 List of other hazards related to transporting agricultural equipment and materials.
- Overhead clearances
- Hazardous materials
- Sharp turns
8.1 Explain how each of the following characteristics of well-maintained agricultural tractors and machinery make it safer for the operator to use.

- Increased productivity
- Fewer breakdowns
- Less plugging/clogging
- Reduced operator exposure to hazards
- Reduced physical effort
- Reduced stress

8.2 Explain how an operator can use each of his or her senses to warn of potential hazards.

- Hearing – loose components, exhaust leaks, slipping belts
- Smell – overheated components, overcharged battery, smoke, electrical short, coolant leaks
- Sight – leaking fluids; smoke; accumulation of trash; loose, damaged, or missing components; plugged feeder housing
- Taste – electrical short, overcharged battery
- Touch – vibrations, overheated components, wear on components

8.3 Identify and explain the function of the basic types of personal protective equipment (PPE), including:

- Eye protection (safety glasses/goggles)
- Hearing protection (ear plug or muffs)
- Hand protection (chemical and work gloves)
- Feet protection (safety shoes/boots)
- Respiratory protection (dust masks and respirators)
- Broad-brimmed hat
- Sunscreen
- Hard hats
- Long pants and shirt sleeves
- Sunglasses

8.4 Identify and describe at least five of the following characteristics of a safe shop or service area.

- Accessible and convenient location
- Equipped with appropriate personal protective equipment (PPE), fire extinguishers, first-aid supplies, and means of communication in the event of an emergency
- Well maintained and organized
- Non-slip flooring and proper drainage
- Adequate lighting
- Adequate and properly-grounded electrical outlets (three-prong outlets)
- Adequate ventilation
- Appropriate storage for hazardous materials (lockable fire cabinet)
- Tools properly guarded
- Oxygen, acetylene, propane, and other tanks secured
- Eye wash station

8.5 List the correct steps for safe lifting

- Good footing
- Bend at the knees
- Good grip
- Lift straight up – avoid twisting
- Lift with leg muscles
- Reverse the process for lowering the object

8.6 Describe the following safety measures for using jacks and hoisting equipment.

- Identify load capacity of the lifting device
- Do not exceed the load capacity of the lifting device
- Stabilize or secure load with solid blocks or jack stands before working on it
- Lift no higher than is necessary to complete task
- Inspect jack and hoist components for wear or damage before use
- Do not use concrete blocks
8.7 Explain the following basic rules for safe use of hand tools.

- Select the right tool for the job
- Use tools as they were intended
- Keep tools in good condition and sharp
- Store tools when not in use
- Clean and inspect tools after use

8.8 Explain the basic safety procedures for safe power-tool use, including the following:

- Grinders
- Drills
- Saws
- Welders
- Bench grinders
- Reciprocating saws

8.9 Explain the following four ways to prevent electrical shock when using power tools.

- Three-conductor, grounded-type circuits
- Double-insulated tools
- Ground-fault circuit interrupters (GFCI)
- Proper size/gauge extension cord

8.10 Know the following fundamental safety procedures that should always be followed prior to servicing or repairing any piece of powered agricultural equipment.

- Shut off power to the equipment
- Remove the key or lock out the source of power
- Lower or lock raised components into position
- Ensure that all stored energy has been released
- If electricity is involved, use a non-contact voltage detector to insure the flow of current has been stopped

8.11 Locate and interpret the warnings found in the operator’s manual related to completing each of the following tasks:

- Fueling equipment
- Inflating a tire
- Checking air filter
- Checking the cooling system
- Jumpstarting a machine with a discharged battery
9.1 Identify and explain the differences between ATVs and UTVs.

9.2 Explain the appropriate applications of ATVs and utility vehicles in agricultural workplaces.

9.3 Identify the following components of ATVs and UTVs.

ATV UTV
- Parking brake
- Hand brake lever
- Foot brake lever or pedal
- Throttle
- Fuel supply shut-off
- Ignition switch
- Clutch
- Shift lever
- Kill switch
- Winch equipped (optional)
- Parking brake
- Foot brake lever and throttle
- Ignition switch
- Shift level
- Bed dump
- ROPS with seatbelt
- Bench seating (multiple passengers)
- Doors
- Enclosed cabin (optional)

9.4 Describe the most serious hazards associated with ATV and UTV usage on farms and ranches, including the following:
- Underage operators
- Operates at high speeds in forward and reverse
- Rough terrain
- Overturns
- Extra riders
- Obstacles (fences, poles, guide wires, trees)
- Presence of bystanders
- Size of vehicle vs. size of operators
- Roadway collisions
- Unpredictable livestock

9.5 Identify and explain the function of each of the following types of personal protective equipment (PPE) that should be used by ATV operators.
- Head protection - Helmet
- Eye protection
- Protective clothing
- Protective footwear
- Gloves

9.6 Explain the importance of ensuring a proper “fit” for the operator of an ATV.
- Engine size
- Operator size

9.7 Explain the steps used for conducting a pre-operation inspection of an ATV as outlined in the operator’s manual.

9.8 Explain the safe starting procedure for an ATV and UTV as outlined in the operator’s manual.
9.9 Explain the safe operating procedures for an ATV as outlined in the operator’s manual.

9.10 Describe the process of using body movement to maintain ATV stability when doing the following:

- Climbing a hill
- Descending a hill
- Maneuvering over an obstacle
- Turning a corner

9.11 Explain at least five of the following basic safety procedures for operating UTVs on the farm.

- Read the operators manual
- Do not transport extra riders in the cargo area
- Match speed to terrain and conditions
- Slow down for turns
- Do not overload
- Distribute load evenly
- Do not operate on public roadways
- Keep all tires on the ground
- Secure load
10.1 List common uses and tasks performed with skid-steer loaders, telehandlers, and forklifts in agricultural settings.

10.2 Explain the hazards associated with operating or working around skid-steer loaders, telehandlers, and forklifts.
- Crushing by lift arms or attachments
- Thrown objects
- Overhead or underground hazards
- Limited visibility
- Material entering operator station
- Working in unventilated space
- Working in tight areas
- Runovers
- Rollovers
- Extra riders

10.3 Identify operator safety equipment and design features that may be found on modern skid-steer loaders, telehandlers, and forklifts.
- Hydraulic locks
- Lap bar/seatbelt
- ROPS and FOPS
- Unbreakable windshield
- Outriggers (auto-level)
- Warnings (balance)
- Backup alarm
- Mirrors and/or cameras
- Safety guarding
- Removeable rear windshield for emergency exit

10.4 Describe the procedure to follow prior to operating or working around a skid-steer loader, telehandler, or forklift.

10.5 Identify skid-steer attachments available for use in agriculture.

10.6 Explain safe operating procedures for driving and maneuvering skid-steer loaders.

10.7 Describe procedures for safety handling loads when operating a skid-steer loader, telehandler, or forklift.

10.8 Describe visual limitations encountered while operating a skid-steer loader.

10.9 Explain how load position and center of gravity affect handling and stability.

10.10 Explain procedures for securing machine following operation.

10.11 Explain applicable federal regulations limiting youth operation of forklifts.

10.12 List the procedures for safely transporting skid-steer loaders on a trailer.
LESSON 11: Confined Spaces in Agriculture / COMPETENCIES

11.1 Describe the basic characteristics of an agricultural confined space, including those regulated by OSHA.

11.2 Provide a hands-on definition of an agricultural confined space.

11.3 Describe the primary hazards found in and around agricultural confined spaces.

11.4 Identify the basic types of confined spaces that can be found in agricultural workplaces, including:
   - Grain storage facilities
   - Forage storage structures
   - Manure storage facilities
   - Agricultural transport vehicles
   - Food/bulk storage containers

11.5 Describe the characteristics of toxic environments that can be found in forage storage structures such as silos.

11.6 List four of the common gases that can be found in manure storage facilities.

11.7 Identify the confined space-related hazards that are found in and around agricultural transport vehicles.

11.8 Identify the potential entanglement locations that can be found in agricultural confined spaces.

11.9 Describe the current employment restrictions, under the Fair Labor Standards Act, that apply to youth under the age of 16 who work around agricultural confined spaces.

11.10 Explain the differences between OSHA-exempt and OSHA-non-exempt agricultural confined spaces.

11.11 Explain the rights of young and beginning workers to refuse to perform certain hazards tasks for which they have not received training or equipped with the proper personal protective equipment.

11.12 Explain the right of all workers to file a complaint regarding unsafe work practices under the provisions of OSHA.
12.1 Know that young and beginning workers under the age of 21 account for nearly 20% of injuries and fatalities that occur at grain storage and handling facilities.

12.2 Describe the process of how grain flows from either a grain storage structure, such as a grain bin, or a grain transport vehicle.

12.3 List at least three of the following hazards that can be present in and around grain and feed storage structures.

- Engulfment and suffocation in flowing material
- Bridged or crusted out-of-condition grain
- Grain avalanche
- Falls from structure
- Exposure to toxic dusts and molds
- Entanglement in conveying and handling equipment
- Exposure to toxic fumigants

12.4 List the common characteristics of young and beginning workers that increase their risk of injury in and around grain storage and handling facilities.

12.5 Describe the characteristics of a safe and productive worker around grain storage and handling facilities.

12.6 Identify the types of personal protective equipment and clothing that should be worn in and around grain storage and handling facilities to prevent injury.

12.7 Describe the importance of each of the following safety measures in preventing flowing grain engulfments.

- Lockout/Tagout provisions on controls
- Visible warnings
- Restricted access
- Supervised access with outside attendant
- Emergency response plan

12.8 Describe the importance of communication equipment in reducing the risk of injury in and around grain storage and handling facilities.

12.9 Describe the importance of appropriate use of air monitoring equipment in reducing the risk of exposure to toxic gases or insufficient oxygen in and around grain storage and handling facilities.

12.10 Describe basic safe work practices that should be followed to reduce the risk of entanglement at grain storage and handling facilities.

12.11 Describe the potential causes of dust explosions at grain storage and handling facilities, including:

- Smoking
- Welding
- Hot components, slipping belts, and overheated bearings

12.12 List the restrictions found in the Fair Labor Standards Act that apply to youth under 16 who work at grain storage and handling facilities.

12.13 Explain the rights of all workers to be provided a safe and healthy workplace under the provisions of the Occupational Safety and Health Administration (OSHA).
13.1 Identify animals that are considered hazardous for youth under 16 when working for hire on a farm/ranch

- A male breeding animal such as a bull, boar, ram, stud, etc.
- A female animal and newborn (i.e., cow and calf, sow and piglets)

13.2 Identify common Injuries caused by livestock

- Getting stepped on
- Bites
- Kicks
- Pinned to a solid surface
- Nudged/pushed

13.3 Describe/understand hazardous activities encountered while tending to livestock

- Feeding livestock
- Health checks
- Vaccination
- Castration
- Hoof trimming
- Cleaning the pen/stall

13.4 Identify tools used with animal agriculture

- Needles
- Snares
- Chutes
- Lasso
- Bolus Plunger
- Dehorner
- ID
- Hoof trimmers

13.5 List the safety procedures when using the following equipment with livestock

- Trailers
- Chutes/Scales
- Heavy objects
- Livestock feeding systems
- Manure handing equipment
- Electric fence

13.6 Understand how your actions around livestock can affect your safety and wellbeing

- Aggressive behavior
- Stay calm
- Be alert
- Know behavior
- Avoid surprises
- No sneaking
- Pay attention

13.7 Identify at least 5 of the following methods or tools for safely working with livestock

- Fences
- Muzzles
- Correct clothing
- Carry tools in a safe manner
- Working in groups
- Aware of surroundings
- Never turn your back
13.8 Understand laws for different ages of youth working on farms/ranches in livestock-related jobs
- Youth 16 years of age and older
- Youth 14 and 15 years of age
- Youth 12 and 13 years of age
- Youth under 12 years of age

13.9 Identify precautions to take with common pets and livestock

13.10 Describe the procedure for entering/visiting a farm
- Approaching a farm/working dog
- Understand agrosecurity precautions
- Permissions/protocols of the farm
- Farm hazards

13.11 Identify potential threats posed by wildlife/pests
- Bats
- Snakes
- Raccoons
- Rats
- Pigeons
- Mice
- Opossums
- Wild turkeys
- Feral pigs/cats/dogs
- Predators – coyotes/foxes
14.1 List and explain the following situations that should be considered an emergency requiring an immediate request for assistance from fire/rescue emergency medical services or law enforcement:

- Personal injury causing excessive blood loss, loss of consciousness, or difficulty breathing
- Person trapped under equipment or other heavy object
- Exposure to a chemical labeled with Danger, Danger/Poison, or skull and cross bones
- An out-of-control fire or explosion
- Hazardous chemical spill or spill of manure or other material that would threaten others or the environment
- Down electrical wires
- Entrapment in a confined space or free flowing material such as grain
- Entanglement in machinery
- Extremely hostile person
- Animal attack
- Drug overdose

14.2 Describe at least three of the following emergency or first-response measures that should be in place in agricultural worksites:

- Strategic placement of telephones, radios, and other communication aids
- Posting of emergency numbers by all phones
- Address and directions for finding the farm or worksite
- Have in place an emergency action plan
- Access to first-aid kit
- Strategic placements of fire extinguishers
- Labeled circuit breaker box and utilities
- Training of staff in appropriate first-response procedures
- Access to specialized emergency response protective equipment
- Central meeting location

14.3 List the first-response steps that should be taken in the event of an emergency.

- If it can be done safely, turn off all operating equipment and flowing material
- Call 911
- Move victim only when he or she is in immediate danger
- If trained in first aid/CPR, provide assistance to the victim
- Await the arrival of help

14.4 List the following types of information that the emergency dispatcher needs when reporting an emergency.

- Name and phone number
- Address and emergency road number, if known
- Exact nature of the emergency

14.5 Explain the importance of knowing how to control bleeding while waiting for medical assistance.

14.6 List the steps that should be followed while waiting for help to arrive.

- Stay calm
- Stay on the line
- Do not re-enter the scene
- Do not put yourself at risk
- Shut off operating equipment
- Do not move an unconscious or seriously injured victim unless there is immediate danger
- Secure the scene
- Assign some to go the nearest roadway to meet and direct the responding emergency personnel
14.7 List the steps that should be taken in the event of an agricultural fire or explosion.

14.8 Explain the three classes of fires that could occur on a farm, ranch or self-propelled equipment.
- Class A
- Class B
- Class C

14.9 Demonstrate the correct steps for discharging an ABC-type fire extinguisher using the P.A.S.S. method.

14.10 Identify the label as the best source of information on first-aid for pesticide poisoning.

14.11 Know that immediate use of water is the best first-aid for exposure to anhydrous ammonia.

14.12 Describe the following symptoms of heat stress.
- Heat cramps
- Heat exhaustion

14.13 Describe the following symptoms of heat stroke.
- Red, hot, dry skin
- Altered consciousness
- Rapid, weak pulse
- Rapid, shallow breathing
- Elevated body temperature

14.14 Identify the first-aid steps for heat stress.
- Remove the victim from heat and exposure to sun
- Cool victim as rapidly as possible
- If victim is conscious, provide cool fluids to drink
- Care for heat cramps is rest and fluids

14.15 Describe the following symptoms of frostbite and hypothermia:
- Pale/white skin
- Loss of feeling
- Uncontrolled shivering
- Slurred speech
- Lack of coordination

14.16 Identify the following first-aid steps for frostbite and hypothermia.
- Seek immediate shelter out of the wind and preferably a heated place
- Begin rewarming affected areas
- Seek medical attention immediately to avoid loss of extremities due to frostbite or death caused by low body temperature

14.17 Explain the steps that should be taken in the event of entrapment in grain.

14.18 Explain the steps that should be taken in the event of a confined space incident.

14.19 Explain the steps that should be taken in the event of an electrical contact.
- Do not make contact with down power liens
- Stay in machine
- Call 911 immediately
- Notify supervisor

14.20 Explain why an up-to-date tetanus vaccination is an important preventative measure for agricultural workers.
15.1 Identify the following general farm tasks that have been identified by the Hazardous Occupation Order in Agriculture (HOOA) to be too hazardous for youth under 16 years of age.

- Operating a tractor with a PTO hp of over 20
- Working with breeding livestock (bull, boar, stud horse, sow, cow with newborn calf)
- Working in woodlots (timber with butt diameter over 6 inches)
- Working on ladders or scaffolds at heights over 20 feet
- Operating a vehicle to transport passengers
- Riding on a tractor as passenger or helper
- Working inside a structure with a toxic environment (silos, manure pits, fruit storage, grain bin)
- Handling or applying agricultural chemicals
- Handling or using a blasting agent
- Transporting, transferring, or applying anhydrous ammonia
- Operating or assisting to operate specialized machinery

15.2 Describe at least five of the following hazards related to working with or around livestock.

- Biting
- Kicking
- Goring
- Trampling
- Crushing
- Zoonotic diseases
- Respiratory hazards

15.3 Identify the following restrictions on youth under 16 years of age while working in a woodlot with timber over 6 inches in diameter:

- Operating a chainsaw
- Felling
- Bucking
- Skidding
- Loading
- Unloading

15.4 Identify the types of personal protective equipment and clothing used or worn when operating a chain saw or working with timber.

15.5 Explain at least three of the following characteristics that cause slips and falls to be the leading cause of non-fatal injury in agricultural workplaces.

- Tall structures
- Tall equipment
- Ladders
- Bunk silos
- Hay mows and hay holes

15.6 List the restrictions included in the Fair Labor Standards Act for youth operating motor vehicles.

15.7 Identify and describe each of the following confined spaces or structures with potentially toxic environments that may be present on a farm or ranch operation that youth under the age of 16 are prohibited from entering.

- Environmentally controlled fruit storage
- Silos
- Manure pits
- Bunk/horizontal silo
- Bulk storage tanks
15.8 Explain the reason why youth under age 16 are not permitted to handle, mix, or apply agricultural pesticides.

15.9 Identify at least five of the following types of chemicals that may be present on a typical farm or ranch operation.

- Fertilizers
- Pesticides
- Cleaners
- Sanitizers
- Solvents, oils, and lubricants
- Paints
- Pharmaceutical drugs (veterinary medicines)
- Fuels

15.10 Identify and interpret the following key signal words used on agricultural chemical containers to warn of toxicity level.

- Caution
- Warning
- Danger
- Danger-Poison

15.11 Explain the reason why youth under age 16 are not permitted to handle blasting agents.

15.12 Identify each of the following hazards when using agricultural chemicals, including anhydrous ammonia.

- Eye injury
- Freeze burns
- Respiratory damage
- Asphyxiartion
- Death

15.13 Identify specific or geographic hazards that might be associated with farms or ranches, including:

- Overhead and buried utilities
- Poisonous insects
- Poisonous snakes
- Wild animals
- Drainage and irrigation canals, ditches, and streams
- Farm ponds/lagoons
- Frequent lightning
- Hills and holes
- Rough terrain
- Weather and temperature extremes
- Boulders

15.14 Identify the following types of powered tools used to maintain farms and ranches and explain their potential hazards.

- Lawn mowers
- Post-hole diggers
- High-pressure washers
- Chain saws
- Generators
- Log splitters
- Hedge trimmers
16.1 Demonstrate completion of a pre-operational visual inspection of a typical agricultural tractor including identification of the following conditions that need correction prior to operation:

- No ROPS
- Fluid leaks (fuel, hydraulics, coolant)
- Broken, damaged, or missing components
- Accumulation of trash, dirt, or flammable material
- Missing or damaged lights, reflectors, or SMV emblem
- Missing or discharged fire extinguisher
- Loose bolts on wheels
- Under inflated or damaged tires
- Missing or damaged shields and guards

16.2 Demonstrate safe and correct completion of the following pre-operation maintenance tasks.

- Check crankcase oil level and add as needed
- Check coolant level and add as needed
- Check fuel level and add as needed
- Check fire inflation pressure and adjust as needed
- Check air-cleaner obstruction indicator
- Clean windows, lights, reflectors, and SMV emblem
- Replace wiper blades as needed
- Lubricate grease zerks as needed
- Remove and replace PTO master shield

16.3 Demonstrate correct mounting and dismounting procedures, including:

- Place gearshift lever in neutral or park prior to dismounting
- Set parking brake
- Face the ladder or steps during mounting and dismounting
- Step down rather than jump

16.4 Demonstrate the following safe starting procedures for an agricultural tractor.

- Adjusting seat properly to reach controls
- Adjusting and fastening seat belt
- Checking neutral position on gear-shift control
- Disengaging clutch when starting the engine
- Checking PTO control for disengagement
- Checking for obstacles or hazards around tractor prior to moving

16.5 Demonstrate the ability to start and stop the engine as outlined in the operators manual.

16.6 Demonstrate the ability to fully depress the clutch pedal, select the appropriate transmission setting or position, and smoothly release the clutch pedal.

16.7 Demonstrate the ability to engage and disengage the PTO.

16.8 Demonstrate the ability to raise and lower the three-point hitch assembly.

16.9 Demonstrate the safe use of an implement jack stand to allow hitching to the drawbar.
16.10 Identify and correctly use a safety hitch pin.

16.11 Demonstrate the steps to follow for safely hitching a three-point type implement to a typical farm tractor.

16.12 Demonstrate the correct procedures for safe attachment and removal of a PTO-driveline to the stub-shaft of a typical agricultural tractor.

16.13 Demonstrate the correct way to connect and disconnect hydraulic connections to the tractor.

16.14 Locate and demonstrate the correct use of a header or platform safety stop on a typical self-propelled machine.

16.15 Demonstrate the steps for putting typical agricultural equipment into the transport position.

16.16 Demonstrate the correct procedures for lifting a 40-pound weight from the ground to the bed of a pick-up truck.

16.17 Demonstrate the correct method for discharging an ABC-type fire extinguisher.

16.18 Demonstrate the ability to call for emergency assistance.

16.19 Demonstrate the ability to safely operate the tractor and two-wheel trailer/implement through a standard obstacle course.