**Standards Operating Procedure**

**Tractor Operations**

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**I. PURPOSE**

To reduce the risk of physical injury or property damage in areas where tractors are in operation.

**II. SCOPE**

This procedure covers tractor and agriculture implement operations that KSU College of Agriculture can control and over which it can be expected to have an influence. Tractors are engineered vehicles specifically designed to deliver at a high tractive effort (torgue) at slow speeds, for the purposes of hauling a (trailer) or machinery use in agriculture or construction. Agricultural implements may be towed behind or mounted on the tractor, and the tractor may also provide a source of power if the implement is mechanized. These activities include, but are not limited to training, inspections, and the safe operation of the equipment.

**III. CONSEQUENCES OF DEVIATION**

This procedure serves as an essential element in identifying and managing risk to staff associated with operating tractors. Ignoring this procedure could result in serious injuries, fatalities, or property damage.

**IV.** **RESPONSIBILITIES**

The Supervisor is responsible to initiate all aspects of the Tractor Standard Operating Procedure Employees are required to be trained and implement all safe work practices associated with the Tractor Operation Standard of Practice to include immediate notification of the supervisor if a hazard is encountered that cannot be controlled. If there is an issue or question regarding this written Tractor Operations program, the employee must bring these questions or concerns to the attention of their supervisor or COA EH&S Director for proper review.

**V. TRAINING**

Every employee who operates a tractor shall be trained by their supervisor or designated trainer specifically in the operation of the tractor to be used.

* Training shall include a complete review of the equipment operations manual.
* Training shall emphasize safe operating practices to avoid roll-over and the importance of maintaining the use and function of PTO and other guards.
* All specified training in **(Appendix A)** must be completed and documented in accordance to the Safety Orientation Checklist for tractor implement safety. In addition, complete the Tractor Safety quiz (from MF2708) in Qualtrics. (Employee ID and password required) at <https://kstate.qualtrics.com/jfe/form/SV_8wgT5y5fXWWdodn> and complete the Rollover Protection which must be conducted initially and annually at <https://www.ksre.k-state.edu/agsafe/training/specialized/rollover/story.html> (To access this course you will need to contact your EHS Coordinator for the secured username and password.)

**VI. GENERAL SAFE WORK PRACTICES**

* Restrict operation to adults. Prior to operation, read the owner’s manual.
* Operators should receive instruction and demonstrate competency to their supervisor or designated experienced individual.
* Do not allow riders, unless specifically designed for such.
* Keep loads even, low, and within the manufacturer’s specified limits.
* Avoid potentially dangerous terrain, such as deep mud or snow and steep hills and slopes. Be familiar with the terrain and potentially hidden hazards (e.g., gulches, ditches, sinks, etc.).
* Be aware of other traffic and persons near the area of operation. Maintain a safe distance. Be aware of blind spots.
* Obey all speed limits and other traffic regulations. If possible, avoid operating at night and during inclement weather.
* Be aware of and avoid operating near overhead power lines.
* Shut-off the tractor before dismounting. Keep steps and platforms clean and in good condition. Use handholds when mounting and dismounting.
* Avoid operating on public thoroughfares; but, if necessary, use flashers and ensure that the tractor is equipped with a Slow Moving Vehicle emblem, and operate in accordance with traffic laws.
* Avoid the risk of crushing/trapping – when backing up to attachments or structures, never allow an assistant to position themselves between the tractor and the attachment or structure.
* Always inspect the condition of the tractor before and after daily use and adhere to recommended preventative maintenance schedules.
* Keep a fire extinguisher on the tractor. Ensure that it is properly charged and inspected.
* Know what to do in the case of an emergency. Maintain a method of communication and keep a first aid kit in the tractor.
* Do not ride on motorized vehicles or equipment unless a proper seat is provided for each rider. This includes but is not limited to prohibiting the riding on attachments such as dump box, forks, bucket, or shovel of any equipment.
* Never mount or dismount vehicles or equipment while they are still in motion. Do not dismount any vehicle without first shutting down the engine, setting the parking brake, and securing the load.
* Hand signals used must be agreed upon among involved parties when hitching equipment, during plot operations, or when spotting.
* All power transmission components and moving parts must be guarded.
* The manufacturer’s instruction manual, if published by the manufacturer and currently available, must be the source of information for the safe operation and maintenance of field equipment.

## **Power Take-Offs and Drivelines**

Power Take-Offs (PTOs) are fast-revolving shafts used to power ancillary equipment on tractors and like equipment. PTOs present an entanglement hazard. The hazard can be controlled with a properly installed shield or guard, which provides a barrier between the revolving shaft and the operator.

* Always disengage the PTO, turn off the tractor, and remove the keys before leaving the tractor seat and approaching the driveline to perform maintenance or adjustments.
* Do not perform maintenance or adjustments until the driveline and attached machinery have stopped moving completely.
* Never step over or reach under a moving power take off shaft or drive line, even one that is guarded. Wait until the shaft has stopped rotating.
* Make sure PTOs are shielded with an enclosing type guard. Some older equipment may have a U-shaped tunnel type guard. This type of guard is ineffective and therefore dangerous. U-shaped guards should be replaced with upgraded guards, as recommended by the manufacturer. Guards should also conform to the following:
	+ Guards must be situated so as to prevent the intentional or accidental exposure of body parts to the point of operation by reaching through, over, under, or around the guard.
	+ Guards must not create additional hazards (for example, with sharp edges or protruding parts).
	+ Guards must not create a pinch point between the guard and moving machine parts.
	+ The possibility of bypassing a guard can be minimized by using guards that are difficult to remove or that are interlocked.
	+ Maintain guards in accordance with the manufacturer’s recommendations.
	+ The master shield must have sufficient strength to prevent permanent deformation of the shield when a 250 pound operator mounts or dismounts the tractor using the shield as a step.
	+ Signs must be placed at prominent locations on PTO driven equipment specifying that power drive system safety shields must be kept in place.
* Do not wear loose-fitting clothing or dangling jewelry when working with PTOs. Confine long hair to prevent entanglement and scalping. Shirts should be tucked in, jackets zipped, and sleeves buttoned.
* Make sure the hitching position of equipment to the PTO is at the proper height, as described in the operator’s manual.
* Do not attach equipment to the PTO unless it is rated for the RPM of the PTO.
* Power takeoff driven equipment is guarded to prevent employee contact with rotating members of the power drive system. When the tractor master shield must be removed to use specific power takeoff driven equipment, the equipment must provide protection from the part of the tractor power takeoff shaft that protrudes from the tractor.
* Signs are placed at prominent locations on the tractor and on power takeoff driven equipment requiring that safety shields are kept in place.

##  **Roll-Over Protection Structures (ROPs)**

ROPS are designed to protect the operator in the event of a tractor rollover. These structures, which include roll-bar, frame, and roll protective cab designs are important for preventing rollover injuries/fatalities. Strong consideration should be given to retrofitting older tractors, when retrofit kits are available from the manufacturer. Review and follow the recommendations in the owner's operational manual, as well as those listed below.

* ROPs design must meet the applicable American Society of Agricultural Engineers (ASAE) Standards and Society of Automotive Engineers (SAE) Standards as listed in OSHA 1928.51(b)(1).
* Tractors should be provided with a seat belt to sufficiently confine the tractor operator to the area protected by the ROPS.

##  **Tips for Reducing the Risk of a Side Rollover:**

* Set wheels as far apart as possible.
* Lock the brake pedals together before high-speed road travel.
* Match speed to operating conditions and loads. Do not let the front wheels bounce.
* Slow down before turning.
* Use engine braking when going downhill.
* Avoid crossing steep slopes. Watch for depressions on the downhill side and bumps on the uphill side. Turn downhill, not uphill, if stability becomes a problem.
* Stay at least as far from ditches and rivers as banks are deep.
* Keep front-end loader buckets as low as possible when moving.
* If right front tire goes off the road into the ditch – turn downward rather than attempting to turn back onto the roadway.

##  **Tips for Reducing the Risk for Rear Overturn:**

* Always hitch loads at the drawbar.
* Use front weights to increase tractor stability.
* Start forward motion slowly and change speed gradually.
* If possible, avoid backing downhill.
* Drive around ditches.
* Back out or be towed out of ditches or mud.

**VII. INSPECTION AND MAINTENANCE**

* A pre-use inspection of the tractor must be completed prior to equipment use. Check the tires for proper inflation and defects, windows for visibility, seat position, seat belts, brakes for adjustment, steering response, rear view mirrors, slow-moving vehicle emblem and reflectors (if applicable), all fluid levels, fire extinguisher is available, all equipment required guarding is in place, check for loose parts, and running lights for day or night time operation. **Use (Appendix C or Manufacturer provided inspection form), keep all documentation of file.**
* All motor vehicles and their parts must be maintained in good repair and safe condition. **Use (Appendix B or Manufacturer provided inspection form), keep all documentation on file.**
* Operators must not use tires that are worn beyond the point of safety.
* Operators must report to their supervisor any motor vehicle or other farm equipment that is in unsafe operating condition. Operators must ensure that the vehicle or equipment is removed from service and repaired before use.
* Before an employee performs service or repair work under hydraulic or mechanical raised dump truck beds, blades, discs, or other equipment, the raised portion of the equipment must be manually pinned or blocked to prevent falling.
* Operators must exercise care when there is a hydraulic oil leak. High pressure oil can penetrate skin and cause major health issues.

**VIII. RELATED DOCUMENTS & TOOLS**

* OSHA Agricultural Safety Fact Sheet: <https://www.osha.gov/Publications/OSHA3835.pdf>
* OSHA Agricultural Operations: <https://www.osha.gov/dsg/topics/agriculturaloperations/vehiclehazards.html>
* OSHA Publications: <https://www.osha.gov/pls/publications/publication.athruz?pType=Industry&pID=81>
* UW Center of Agricultural Safety & Health: <https://fyi.uwex.edu/agsafety/2013/04/08/tractor-operator-training-to-cultivate-safety-in-2013/>
* University of Nebraska Lincoln, Tractor Safety SOP: <https://ehs.unl.edu/sop/s-tractor.pdf>.

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**Controlled documents are maintained electronically.
Printed documents are UNCONTROLLED.
Prior to relying on a printed document, verify that it is current.**

**(APPENDIX A)**

**TRACTOR SAFETY TRAINING**

Employee Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Employee Signature:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Trainer Signature:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Before you use the tractor you must:**

\_\_\_Review the tractor operations manual.

\_\_\_Review the “Tractor Safety Elements”: Video Link: <https://www.youtube.com/watch?v=hZWmgC8t6Zc>.

\_\_\_Complete the Tractor Safety quiz (from MF2708) in Qualtrics. (Employee ID and password required). <https://kstate.qualtrics.com/jfe/form/SV_8wgT5y5fXWWdodn>

\_\_\_Complete the Rollover Protection which must be conducted initially and annually at <https://www.ksre.k-state.edu/agsafe/training/specialized/rollover/story.html> (To access this course you will need to contact your EHS Coordinator for the secured username and password.)

\_\_\_Read KSRE Tractor Safety Booklet and Complete the “Quiz Yourself sections:

<https://www.bookstore.ksre.ksu.edu/pubs/MF2708.pdf>.

\_\_\_Complete the Tractor Operator Performance Evaluation with Trainer. **(Appendix D)**

\_\_\_Check shields and guards are in place.

\_\_\_PTO master shield is in place.

\_\_\_Adjust the seat so you can easily reach the controls.

\_\_\_Use handrails when getting on and off the tractor.

**You must observe the following safety rules each time you use a tractor:**

\_\_\_Security fasten seat belt if the tractor has ROPS.

\_\_\_If possible, avoid operating the tractor near ditches, embankments and holes.

\_\_\_Reduce speed when turning, crossing slopes and maneuvering through rough, slick, or muddy surfaces. Stay off slopes too steep for safe operation.

\_\_\_Watch where you are going, especially at row ends, on the roads and around trees.

\_\_\_Stay off slopes too steep for safe operation.

\_\_\_Do not permit others to ride.

\_\_\_Operate the tractor smoothly, no jerky turns, starts or stops.

\_\_\_Hitch only to the drawbar and hitch points recommended by the tractor manufacturers.

\_\_\_When tractor is stopped, set brakes securely and use park lock.

\_\_\_Shut off motor during refueling.

\_\_\_When using public roads, make sure the tractors have lamps, reflectors and a SLOW MOVING VEHICLE emblem, where applicable.

\_\_\_If operating the tractor on public roads one-half hour after sunset to one half-our before sunrise, the tractor must have the necessary lights and reflectors required by state laws.

\_\_\_These tractor operation points are good safe work procedures to practice. Workers must inform supervisor of needed safety corrections.

**Tractor Maintenance Record (Appendix B)**

OSHA requires owners and operators to perform routine maintenance of their tractors. This Tractor Maintenance Record is provided to help you meet this requirement. If you have any questions about the maintenance record, please contact your supervisor.

|  |  |
| --- | --- |
| Department |  |
| Manufacturer |  |
| Model # |  |
| Serial # |  |
| Tractor ID |  |
| Tractor Location |  |

**Repair and Maintenance Record**

|  |  |  |
| --- | --- | --- |
| **Date** | **Description of Work** | **Maintenance Performed By** |
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**Pre-Use Inspection Checklist for Tractors (Appendix C)**

**Instructions:** The operator shall inspect tractors prior to placing the machine in service at the beginning of each work shift. Deficiencies noted on the inspection form shall be corrected prior to operation. If the deficiencies cannot be corrected, the tractor shall not be used and lock-out/tag-out procedures initiated according to the Tractor Operation Standard of Practice.

Tractor Make: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Model: \_\_\_\_\_\_\_\_\_\_\_\_\_S/N: \_\_\_\_\_\_\_\_\_\_\_\_\_ Date Completed: \_\_\_\_\_\_\_\_\_\_\_\_\_ Inspected By: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| --- | --- | --- | --- |
| **Inspection Item** | **OK** | **Repair** | **Comments** |
| Copy of “Operating Manual” must be available |[ ] [ ]   |
| Operating and safety decals are present and legible |[ ] [ ]   |
| Battery terminals are in good condition |[ ] [ ]   |
| Fluid levels checked (hydraulic oil, engine oil, coolant etc.) |[ ] [ ]   |
| Structural and other critical components present and all associated fasteners and pins are in place |[ ] [ ]   |
| Check hydraulic hoses, fittings for leaks and sharp bends |[ ] [ ]   |
| Carefully check for frayed or worn cables |[ ] [ ]   |
| Operating and emergency controls |[ ] [ ]   |
| Safety devices |[ ] [ ]   |
| Inspect required personal protective devices  |[ ] [ ]   |
| Check hydraulic hoses, fittings, and cylinders. |[ ] [ ]   |
| Check electrical components and cables |[ ] [ ]   |
| Check for loose or missing parts |[ ] [ ]   |
| Check tires and wheels |[ ] [ ]   |
| Check ROPS |[ ] [ ]   |
| Inspect PTO system |[ ] [ ]   |
| Check for cracks in welds or structural components |[ ] [ ]   |
| Check other damage to machine impacting operation |[ ] [ ]   |
| Other items specified by manufacturer |[ ] [ ]   |

**PERFORMANCE EVALUATION FOR TRACTOR OPERATORS**

**(Appendix D)**

Please print clearly and fill out the form completely. Mark each task as a pass or fail. If the item does not apply, mark the item as N/A. Once completed, submit this form to the supervisor to be kept on file.

Employee Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Employee Signature:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Trainer Signature:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Level 1

|  |  |  |
| --- | --- | --- |
| Task  | Pass  | Fail  |
| Performed inspection of tractor prior to operating  |   |   |
| Wear seatbelt if available  |   |   |
| Properly started and stopped engine  |   |   |
| Properly used brakes while operating tractor  |   |   |
| Properly set the parking brake  |   |   |
| Demonstrated proper use of clutch and shifting  |   |   |
| Demonstrated safe driving on level ground or slight grade  |   |   |
| Properly attached/detached 3 point on tractor  |   |   |
| Properly hitched implement to tractor  |   |   |
| Demonstrated safe procedures for lowering or blocking out implements  |   |   |

# Level 2

|  |  |  |
| --- | --- | --- |
| Task  | Pass  | Fail  |
| Demonstrated knowledge of appropriate fuel type for the tractor and the location of the fuel tank.  |   |   |
| Properly attached/detached hydraulic lines on implement  |   |   |
| Properly operated and shut down power take off (PTO)  |   |   |
| Properly operated front end loader  |   |   |
| Properly operated backhoe  |   |   |

**Overall Performance (circle one) Pass Fail**

*Tractors approved to operate.(mark box to left of appropriate tractor/s with approval date):*

# Level 1 Level 2

|  |  |  |  |
| --- | --- | --- | --- |
|   |   |   |  |
|   |  |   |   |
|   |  |   |   |
|   |   |   |   |

The following information has been reviewed with the trainee:

#  \_\_No extra rider(s) \_\_Hearing protection availability & location

#  \_\_Potential known locations for tractor overturns \_\_Fueling procedures

#  \_\_PTO Safety \_\_Driving on roadways

 Performance Audit Reference: MSU