



Investigation Guideline

Product: Riding Mowers and Lawn and Garden Tractors

Appendix # : 12

Date amended: July 2004

I. Introduction

A. Background Information

Riding mowers and lawn garden tractors were associated with an estimated 20,900 emergency room treated injuries for each year from 1993 through 2002. The hospitalization rate was almost twice the average rate of 4 percent for all other products reported through NEISS. The estimated annual average of deaths upon arrival (DOA) was 88 per year during this 10-year period.

The major hazard patterns for riding mowers and lawn and garden tractors are loss of stability (tipping/rolling over), runovers/backover, blade contact, and incidents involving the controls (gear shift, clutch, brake, etc.). Other hazard patterns are entrapment in moving parts and objects that are thrown by the blade.

Based on the special study of riding mower and lawn and garden tractor related incidents between 1987 and 1990, the operators in the 5-14 and 65 and older age groups, operators with height 60 inches and less, and operators with weight less than 125 pounds or more than 200 pounds received injuries at a higher rate. Operators, eighty-five years old or older, who contributed about one-tenth of one-percent of mowing time in their households had the highest rate of injuries.

The objective of the investigations is to evaluate the effectiveness of the standard requirements ANSI B71.1 Comprehensive Mower Standard in order to reduce the hazards associated with the use of riding mowers and lawn and garden tractors and for the purpose of informing the public of hazards involving the use of these products in the presence of children (as passengers or bystanders)

B. Product Descriptions

Figure 1 and 2 respectively show a rear engine riding mower and front engine lawn and garden tractor. These two illustrations are typical of the vast majority of the products in U.S. market. A small portion of the mowers are "specialty mowers". These include lever-control mowers, articulated mowers (body of mower is hinged), mower with front-projecting mower decks, and other variations.

Figure 1
Riding Mower (Rear Engine Type)
(NEISS Code 1422)



Figure 2
Lawn and Garden Tractor (Front Engine Type)
(NEISS Code 1405)



C. Specific Items of Interest

Incidents involving tipping, sliding, rolling over, inability to stop, loss of control, and run over or back over incidents are of interest.

1. Tipping, Sliding, Inability to Stop, Loss of Control

- Obtain photographs of the terrain from several angles. **Mark key points** in the incident sequence, for example, where mower started to slide and where mower tipped over.
- List any **terrain features** that are in the immediate area where the tipping, sliding, etc. occurred (e.g. hole, ditch, bump, tree root). **Sketch and if possible, obtain photographs.**
- Diagram the **directions the mower** was pointing relative to the slope at key events in the sequence. Label the diagram.
- If tipping involved, report the **direction of tipping** (right, left, backwards).
- State **position of vehicle** after the incident (e.g. on side, upside down, tipped partially and returned to wheels)
- State the **position of victim before** the incident (e.g. leaning, moved in seat).
- State **position of victim after** the incident (e.g. under mower, to the right or to the left of the mower, etc.)
- Note any **turns made** just before tipping and the direction of the turn relative to the slope.
- Ask whether, and if so, when, the operator **applied either the brake, the clutch, or the combined brake/clutch** at any time during the sequence of events. If the brakes were applied and the mower did not stop, ask when was the last time the brakes were adjusted or replaced. **WITH OWNER'S PERMISSION, check the brakes by placing the mower on level ground (do not try this with mower on a slope, since a mower with poor brakes might roll away out of control), ENGINE OFF, brakes on, gear shifted in neutral. WHILE STANDING OFF THE MOWER, push the mower to see if it rolls or moves, or if the brakes hold the vehicle).**
- Ask whether the **mowing deck** was on the vehicle at the time of the incident.

- If the mower goes from a level or sloped area onto an embankment or more steeply slope area, ask if the embankment or steep slope is usually mowed. **Obtain photographs of the transition area.**

2.Runover/Backover

- Specify if the victim slipped or fell
- Describe the victim's/operator's activity at the time of the incident (riding or pushing the mower, getting on /off the mower, bystander, passenger, etc.).
- Specify if the victim/operator was working on an incline or in tall grass.
- If the incident occurred on a slope, determine slope of the ground.
- **Diagram the location** of the victim when last seen and at the moment of the incident including the **direction of mower travel**. Also **mark the point on the diagram** where the operator shifted into reverse. **Measure the distance** (in feet) between the shifting in reverse and the final location of the victim.
- Ask whether the operator observed the **location of the victim** prior to the incident, how long before the incident, and where.
- Direction the victim approached the mower – front, sides (left or right), or rear of the mower.
- Describe whether the victim slid feet first, head first, or hand first or how did the victim go under the mower?
- Describe the location where the victim contacted with the mower – under housing, through discharge chute, front wheels, or rear wheels.
- Describe whether the victim contacted with the blade. Explain the body parts that contacted with the blade.
- Describe the mark or damage to the machine from contact if any.
- Ask how fast was the mower moving?
- Ask if the operator **routinely mows** in reverse and why.
- **Photograph** the entire lawn mower. **Marking** the location of the gear shift control and accompany labeling noting the position of reverse gear.

If **BACK OVER**, determine:

- **Location of the engine** , in front of the steering control, behind or under the driver’s seat, or somewhere else.
- **Location of the cutting blades**, behind the rear wheel of the mower, under the mower between the front and rear wheels, on the side, in the deck that is in front of the mower, or some place else (specify).
- The **blade height setting** at the time of the incident.
- Whether the blade was engaged (the power to the blade was “on”) or disengaged (the power to the blade was “off”).
- Whether a grass catcher was attached to the mower at the time of the incident.
- Whether the vehicle equipped with a **safety control device** (a system to stop the blade rotation automatically when the vehicle operates in reverse).
- Whether the system is functioning. **IF THE OWNER WILL PERMIT**, perform the following:

Place the mower on level ground; set the parking brake. Place the gearshift in neutral. Start the engine. While sitting in the normal operating position, MAKE SURE THE AREA BEHIND THE MOWER IS CLEAR. Engage the blade. Disengage the clutch if required. Move gearshift lever into reverse. Note whether the engine stops. If the engine does not stop, listen to noise level and observe the airflow. Does it seem like the blades have stopped? DO NOT MAKE ANY OTHER ATTEMPT TO CHECK IF THE BLADE HAS STOPPED.

D. Headquarters Contacts

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II. Instructions for Collecting Specific Information

A. Synopsis

- It is important to describe clearly the **sequence of events**. Describe what happened immediately before, during, and after the incident. Include location of victim relative to the mower, and a **detailed description** of parts of the mower involved in the injury.
- If the vehicle was in motion at the time of the incident, **describe the terrain** (both general terrain and local terrain at the point of incident). **Describe and photograph** any factor concerning the terrain, the vehicle and the operator’s and/or victim’s activities which may have contributed to the incident.

B. Description of Incident Environment

- Outline the general conditions (e.g. sunny, cloudy).
- Height of grass being mowed.
- Condition of grass (wet, dry, tall, etc.).
- Description of surface if not grass (asphalt or concrete, gravel, dirt, wet, dry, muddy).
- Description of property and its use.
- If slopes involved, indicate **direction of the mower** “facing” – uphill, downhill, across the hill, diagonal down the hill, or diagonal up the hill.
- Indicate whether the mower **go over a slope, a hill, or a drop-off**.
- Was there a **grass catcher attached** to the mower and was it full, empty, or partly full, at the time of the incident?
- Was the mower equipped with any of **additional weights**? Specify types of the weights.
- Were there any **other attachments** such as a cart, a plow, a tiller, or something else on the mower, at the time of the incident?

C. Description of Interaction between Injured Person(s) and Product

- Specify victim’s/operator’s age, sex, height, weight, and describe any physical disabilities. Determine whether medication, drugs, or alcohol were taken prior to the accident.
- If victim was a mower operator, characterize: the victim’s knowledge of mower operating instructions, perception of hazard, familiarity with safe mowing operations, and length of experience with mower involved in the incident.
- The **level of supervision** when a child victim was mowing.
- **Victim’s location** relative to mower (e.g. sitting on mower, behind mower, getting on or off mower).
- If the victim is **not the mower operator**, characterize: operator’s awareness of the victim’s presence, victim’s awareness of the lawn mower’s presence, or victim’s location in relation to mowing operations.

- Indicate whether the operator **read the operator's manual**, and how recently prior to the incident.

D. Description of Product

- **Vehicle classification (provide front, rear, and side photograph)** – type (tractor style, rear engine rider, lever steer, other), manufacturer, model number, serial number or other id., engine/motor (gas, electric, diesel, front/rear engine, power rating, manufacturer), location of mower deck, and tire diameter.
- **Manner in which mower was acquired** (new, used, rented, or borrowed).
- **Age of mower** (if acquired used, state number of years owned and total age, if known).
- **Mechanical condition of mower** (condition, maintenance level, previous repairs or modifications) **Pay special attention to repair made shortly before the incident.**
- **Vehicle controls** (*steering type* – front or rear wheel; *shape of control* – wheel, handle bars, levers, or other; *gears* – location, configuration, number of forward gears, reverse gears, or hydrostatic; *brake/clutch* – two separate pedals, one combined pedal, reverse gear).
- **Starting procedures** (electric start, manual rope start, electric with manual back-up).
- **Dimensions** (*wheel base* - distance from front to rear wheels, center to center; *front track width* – distance between front wheels, outside to outside of tires; *rear track width* – distance between rear wheels, outside to outside of tires; *seat height* relative to ground).
- **Owner's manual.** If possible, obtain a copy of the owner's manual.
- **Certification to Product Safety Standards.** Look for a label that shows certification to the ANSI B71.1 standard. Note the year given on the label. The year is needed because there are different versions of the ANSI B71.1 standard depending on the year.

III. Photographs/ Diagrams of Incident Scene

- Take a series of good, clear photographs of the incident scene and the product, simulating the incident sequence.
- Photograph the vehicle (front, side, rear), the manufacturer's nameplate, OPEI certification, warning signs, safety features such as shielding or blade stop control, vehicle controls, any suspected modifications of the mower and the parts of the mower causing the injury or involved in the incident.
- A white rope or other white line or light colored marker laid across the grass may help in showing up slopes, surface irregularities, and victim/mower position in photographs.
- Mark and note where slope measurements were made.
- Draw sketches and stick diagrams to clearly show the scene, the victim and the mower location.
- Show mowing pattern, the position and direction of motion of the mower throughout the incident, the position of mower operator and the victim, if not the operator.
- Show the location of buildings, trees, ditches, and other obstacles.
- Note any surface irregularities near the point of the incident such as holes, ruts, sudden changes in slope

IV. Obtaining samples and documents related to the investigation

- Obtain any official records associated with the incident that may be available.

(Attached DATA RECORD SHEET)



DATA RECORD SHEET **Investigation Guideline**

PRODUCT: Riding Mowers and Lawn and Garden

Tractors _____

TASK NUMBER _____ INCIDENT DATE _____

1. Indicate who is the victim – operator, passenger, or bystander.

2. Type of mower – riding mower or lawn and garden tractor.

3. Brand name (manufacturer), model name/number, and horsepower of the mower.

4. How old is the mower?

5. Describe the type of steering control – steering wheel, bicycle-type handle bar, lever, or something else.

6. Location of engine – in front of steering control, behind or under the driver’s seat, or somewhere else.

7. Location of the cutting blades – behind the rear wheels of the mower, under the mower between the front and rear wheels, in a deck that is in front of the mower, or someplace else.

10. Describe whether the mower has an automatic blade or engine stop when the driver gets off the seat or lifts a foot off the pedal.

11. If this safety control is activated, do both the engine and blade stop or does just the blade stop?

12. Explain why the safety control is not working now. Has it been repaired since the incident?

13. Was it working at the time of the incident?

14. At the time of the incident, was the engine running or not running?

15. Was the blade engaged (“on” position) or disengaged (“off” position)?

16. Did the rotating blade contact the victim? Describe how did contact occur.

17. Describe whether the driver was sitting on the seat, leaning over though still on the seat, sliding off the seat, or the driver was completely thrown off the seat at the time of the incident.

18. Describe if the mower tilted, slid, or rolled over - was it backwards, sideways, or forwards?

19. Did the driver fall, jump, or was the driver thrown from the mower?

20. Describe whether there were any environmental conditions such as wet grass, uneven surfaces (holes, bumps, rocks, or obstacles), a steep embankment or anything else that may have contributed to the incident?

21. Did the incident happen while turning?

22. Was the mower on level ground or was it on a hill or slope just before the incident?

23. Just before the incident, in what direction was the mower facing –uphill, downhill, across the hill, diagonal down hill, or diagonal uphill?

24. Describe the pattern the slope was being mowed at the time of the incident.

25. Is this slope area usually mowed?

26. Was there a grass catcher attached to the mower at the time of the incident?

27. Was the mower equipped with any additional weights or ballast?

28. Was there any other attachment on the mower such as a cart, a plow, or a tiller?

29. When the incident happened, was the driver shifting gears, trying to brake, releasing the clutch (pedal), pushing the clutch (pedal)?

30. If the incident related to **run over/back over**, please describe the direction the victim approach the mower (such as front, left side, right side, or rear of the mower).

31. Did the victim slide into mower feet first, head first, or hand first? How did the victim contact or go under the mower?

32. Where exactly on the mower did the victim contact or go under?

33. Did the rotating blade contact the victim?

34. What was the blade height setting?

35. What body parts were contacted with the blade?

36. Did the machine and/or blade stop after the contact?

37. Was there a mark or damage to the machine from contact? Please explain.

38. On the mower, is there a triangular shield with the letters "OPEI" in the center and the year on the edge of the triangle?