



FARM SAFETY

A Quarterly Newsletter

Fall 1997

GRAIN HANDLING SAFETY

California grows approximately 100,000 acres of wheat, rice, and barley for grain—not nearly the grain acreage of some Midwestern states, but certainly enough to kill if mishandled. A small grain bin holds enough grain to bury a person alive. Primarily, there are three different ways in which people become trapped in grain. All of them are associated with unloading.

Flowing Grain—Grain in a bin flows downward from the top center of the bin, creating a funnel effect that draws material and objects down to the conveyor. An unloading auger at the bottom of the bin transports the grain outside. It only takes two or three seconds to become helpless in



Photo by Jack Kelly Clark

flowing grain, which acts like quicksand and can pull a worker under and cause suffocation (Figure 1). This can also happen inside a gravity wagon.

may be able to get to the ladder and climb to safety. Without a ladder, a victim's only hope for survival may be to keep walking around the perimeter of the bin to avoid being drawn to the enter with the grain.

This Issue . . .

Grain Handling Safety

Note from the Director

Children, School, and Farm Fields

National Farm Safety & Health Week

Grain Entrapment Prevention

Zero Injuries: A Worthwhile Goal

Migrant Education Assistance

•••••

The Farm Safety Newsletter is designed and edited by Barbara Meihenny under the direction of William E. Steinke. Please direct any comments or inquiries to the Farm Safety Program, Department of Biological & Agricultural Engineering, 3022 Baines Hall, University of California, Davis, CA 95616; telephone (916) 752-0563; FAX (916) 752-2640.

◆ Never enter a silage- or grain-storage structure when it is being loaded or unloaded. The power to all conveying equipment, automatic and manual, should be shut off, locked, and tagged to prevent unexpected operation.

◆ Always use a safety harness, safety line, and at least two observers during bin entry.

◆ Install a permanent ladder on the inside of all grain bins. If workers absolutely must enter the bin, and unloading starts in spite of proper shut-off, lock-out precautions, they

◆ Secure grain storage areas to prevent unauthorized entry.

◆ Warn family, employees, and visitors of dangers of flowing grain.

◆ Place warning decals on all bin entrances and gravity wagons.

Collapse of Crusted Grain—Caked or frozen grain or silage is also a suffocation or crushing injury threat. If a bin has been partially emptied below a crust of grain, someone who steps on the crust while attempting to break it up can fall through →

and become buried (Figure 2). Workers should always assume all surfaces are bridged. Break up surface crusts from outside the bin with a wooden pole—not a metal one—or a weighted line thrown through the bin door. Metal poles, pipes, or lines are electrocution hazards, because they may contact overhead power lines near the grain bin.

- ◆ **From outside of the bin**, use a wooden pole or weighted line to break up surface crusts in the grain.

- ◆ Never walk onto a surface crust or enter a storage structure below material sticking to the walls.

- ◆ Carry a long pole when entering bins to probe grain for cavities and stabilize the worker in case of grain flow.

- ◆ Manage grain to avoid conditions that cause spoilage and bridging.

Avalanche of a Vertical Grain Wall—

Grain in bad condition can cake in large vertical columns against the bin wall. Workers may try to dislodge the grain by poking it with a stick or shovel. This can cause the grain wall to break free and result in an avalanche that can completely bury a worker inside the bin (Figure 3).

- ◆ Use a body harness and safety rope that is securely tied off.

- ◆ Work from top to bottom of a vertical grain wall, staying above the highest part of the wall.

- ◆ Be prepared for the entire grain wall to break free and fall at any time.

- ◆ Manage grain to avoid conditions that cause spoilage and formation of vertical grain walls.

Carbon Dioxide Poisoning—A suffocation hazard also exists from the gases given off from spoiling grain. For example, the carbon dioxide given off is heavier than air and will collect above the grain surface. You cannot

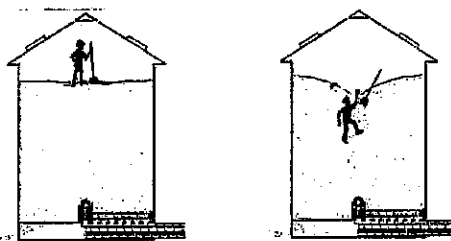


Figure 1 — Entrapment can occur quickly as an unloading auger draws grain from the top center, forming a surface cone as the bin is emptied.

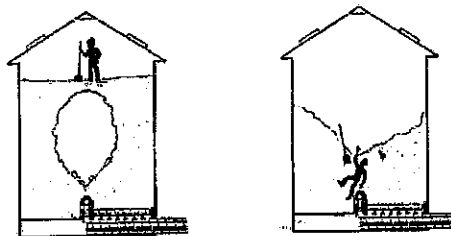


Figure 2 — Grain can form a hard crust that appears to be firm enough to walk on. However, the crust can break and instantly bury an individual in the hollow cavity that formed underneath the bridge.

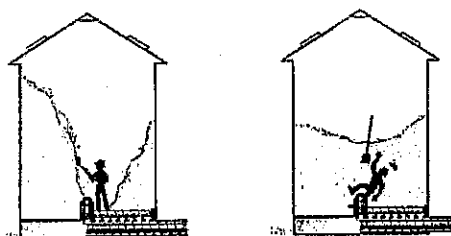


Figure 3 — If broken up from below, a steep wall of grain can break free and cause an avalanche that could bury a worker inside the bin.

smell, see, or taste carbon dioxide. If enough gas has collected to decrease the oxygen concentration from the normal 21% to less than 19.5%, you will think less clearly, become drowsy, lose consciousness, or even die. Workers who fall through crusted grain can be killed by carbon dioxide that has collected under the crust, even if they are not completely buried. If the bin has a ventilating fan, it should be turned on to thoroughly ventilate the bin before entry and should be left on as long as a person is in the bin.

General Safety Procedure—If a grain bin must be entered, three people should be used. The person entering the structure should wear a safety belt or harness attached to a lifeline. A second person should stay at the bin entrance to watch the person inside the bin and keep tension on the lifeline at all times to prevent the worker in the bin from slipping under the grain. The third person should stay on the ground to go for help or assist in freeing the person in the bin, if necessary. *

The Farm Safety Program exists to help promote safety and health in the workplace. Through this newsletter we hope to keep our audience aware of the many issues of occupational hazards in agriculture. The information given herein is supplied with the understanding that no discrimination is intended, and no endorsement by Cooperative Extension is implied.

William E. Steinke
 William E. Steinke, Ph.D., Director
 Farm Safety Program

James M. Meyers
 James M. Meyers, Ed.D., M.P.H.
 Extension Specialist