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Agricultural Dust Explosions in 1997*

The title of this report has been changed to more accurately describe the data collected each year.

There were 16 dust explosions reported in the U.S. in 1997 according to Robert W. Schoeff, Professor Emeritus, Kansas State University, and Ralph Regan, Safety Director, USDA-FGIS. This compares to 13 in 1996 and a ten-year average of 13 explosions.

There was one fatality and 14 injured.

Nine of the sixteen incidents occurred in grain elevators, two in feed mills, and one each in a bakery, cereal plant, flour mill, soybean processing, and walnut shelling plant.

The **primary explosion** occurred in bucket elevators in 8 cases; 2 in hammermills; 2 inside wood elevators and 1 in a wood feed mill that were on fire; and one each in dust collector, distributor, and storage silo.

The **probable ignition source** was fire (5), welding/cutting (2), bearing failure, metal sparks, and electrical failure (1 each), and unknown (6).

Fuel sources were identified as corn (8), wheat (3), soybeans (2), and wheat bran, wheat flour, and walnut shells (1 each).

Dust explosions occurred in 10 different states: Nebraska (5); Iowa (3); North Carolina, Oklahoma, California, Ohio, Illinois, South Dakota, Pennsylvania, and Minnesota (1 each). **Property damage** was estimated to be \$11.4 million. No dollar estimate can be placed on **the pain and suffering of the injured or the loss to the family of the fatally injured employee.**

Internationally- A major dust explosion(s) occurred August 20, 1997 at a port elevator in Blaye, France, killing 11 and injuring one or more persons and causing very heavy property damage. Two dust explosions were reported from the Rio Grande do Sul state of Brazil on March 13 and July 18, injuring 13 persons.

This report is based on a variety of news sources and voluntary cooperation of management as we seek to identify that dust explosions have occurred and what the cause might have been. The data is compiled as a service to the grain storage and processing and allied industries, trade associations, insurance companies, and government agencies.

Please give credit when using these statistics in your publications or electronic media.

*This report subject to revision as additional information is received.

REPORTED DUST EXPLOSIONS IN U.S. - 1997**

<u>NO</u>	<u>DATE</u>	<u>COMPANY AND ADDRESS</u>	<u>FACILITY</u>	<u>DAMAGE*</u>	<u>KILLED</u>	<u>INJURED</u>
1.	Apr. 7	Carroll's Foods Laurinburg, NC	Feed Mill	Minor	0	0
2.	May 16	Heintz Bakery Vinita, OK	Bakery	Minor	0	1
3.	May 18	Crain Walnut Shelling Richfield, CA	Walnut Shelling	Severe	0	6
4.	May 21	Stanton Feed & Grain Stanton, NE	Grain Elevator	Minor	0	0
5.	May 21	Foxley Grain Grainton, NE	Grain Elevator	Minor	0	2
6.	May 31	Frontier Co-op Meade, NE	Grain Elevator	Severe	0	0
7.	June 17	General Mills Toledo, OH	Cereal Plant	Minor	0	0
8.	July 7	Spangler's Flour Mills Mt. Joy, PA	Flour Mill	Minor	0	0
9.	July 12	Lakeland FS Inc. Shelbyville, IL	Grain Elevator	Moderate	0	0
10.	July 19	AgServe Co. Ogden, IA	Grain Elevator	Minor	0	0
11.	July 23	South Dakota Wheat Growers Huron, SD	Grain Elevator	Moderate	0	0
12.	Aug. 12	Gateway Co-op Conroy, IA	Feed Mill	Severe	0	3
13.	Aug. 22	Agri Co-op Elm Creek, NE	Grain Elevator	Severe	1	2
14.	Oct. 10	Honeymead Mankato, MN	Soybean Processor	Moderate	0	0
15.	Dec. 5	Sutton Co-op Sutton, NE	Grain Elevator	Moderate	0	0
16.	Dec. 29	Farmers Co-op Readlyn, IA	Grain Elevator	Severe	0	0

Robert W. Schoeff
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*Minor: Less than \$50,000; Moderate: \$50,000-\$500,000; Severe: over \$500,000.

**Report is subject to revision as new information is recieved.

In cooperation with Ralph Regan, FGIS, USDA, Washington, DC.

TABLE 1. U.S. GRAIN DUST EXPLOSION STATISTICS*

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>TEN YEAR TOTAL</u>
Number	12	13	15	12	6	13	15	14	13	16	129
Dead	8	2	0	1	1	2	1	1	1	1	18
Injured	10	7	7	4	8	20	14	12	19	14	115
Est. Damage to Facility (\$ Mil.)	8.7	3.9	5.0	.3	.4	4.0	7.1	6.7	29.6	11.4	77.1
Type of Facility:											
Grain Elevator	7	7	8	4	5	9	7	4	4	9	64
Feed Mill	1	1	1	4	0	0	3	4	4	2	20
Flour Mill	0	0	2	1	0	1	2	0	1	1	8
Other:											
Corn Milling, Dry	2	1	1	0	0	0	0	1	1	0	6
Corn Milling, Wet	0	2	1	0	0	1	1	2	0	0	7
Rice Mill	1	0	1	1	0	0	0	2	1	0	6
Oat Mill	1	0	0	0	0	0	0	0	0	0	1
Other	0	2	1	2	1	2	2	1	2	4	17

*Source: Robert W. Schoeff, Kansas State University, in cooperation with Ralph Regan, FGIS-USDA, February 27, 1998

TABLE 2. GRAIN DUST EXPLOSIONS
 BY COMMODITY HANDLED AT TIME OF EXPLOSION
 1988-1997

<u>COMMODITY</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>TEN YEAR TOTAL</u>
Corn	7	4	2	5	4	9	8	3	5	8	55
Sorghum	0	2	1	0	0	0	1	0	0	0	4
Soybeans	1	1	1	0	0	1	0	1	2	2	10
Wheat	1	0	1	1	1	1	2	1	0	3	11
Barley (malted)	0	0	1	1	0	0	1	0	1	0	4
Oats	1	1	0	1	0	0	1	0	0	0	4
Beet Pulp	0	1	0	0	0	0	0	0	1	0	2
Corn Starch	0	1	0	0	1	2	0	2	0	0	6
Corn Gluten Meal	1	1	0	0	0	0	0	0	0	0	2
Distillers Feed	0	0	1	0	0	0	0	1	0	0	2
Feed By-Products	0	1	1	0	0	0	0	0	0	0	2
Grain Screenings	0	0	1	0	0	0	0	0	0	0	1
Mixed Feed	0	0	0	0	0	0	0	2	1	0	3
Rice (Bran)(Flour)(Hulls)	1	0	1	0	0	0	1	3	1	0	7
Wheat Flour	0	0	1	0	0	0	0	0	1	1	3
Wheat (Starch) (Gluten)	0	1	0	0	0	0	0	0	0	0	1
Other	0	0	4	4	0	0	1	1	1	2	13
TOTAL EXPLOSIONS	12	13	15	12	6	13	15	14	13	16	130

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, February 27, 1998

TABLE 3. U.S. GRAIN DUST EXPLOSIONS

LEADING STATES - 1958 to Date

<u>STATE</u>	<u>1958-1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>10-YEAR TOTAL</u>
Iowa	47	1	3	0	4	2	1	4	2	3	3	23
Nebraska	58	0	1	0	1	0	3	1	1	1	5	13
Illinois	48	1	2	2	0	1	0	1	3	1	1	12
Minnesota	33	3	1	2	0	0	1	1	0	2	1	11
Kansas	28	0	3	3	1	0	0	3	0	0	0	10
Louisiana	10	1	2	2	0	0	2	0	0	0	0	7
Ohio	21	0	0	1	1	0	2	0	1	0	1	6
Indiana	18	1	0	0	1	0	1	1	0	0	0	4
Texas	38	1	0	1	0	1	0	0	1	0	0	4
Washington	3	0	1	1	1	0	0	0	1	0	0	4
South Dakota	7	0	0	0	0	1	0	0	0	1	1	3
Missouri	26	0	0	1	0	0	0	0	0	0	0	1

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, February 27, 1998