

April 6, 1999

Agricultural Dust Explosions in 1998*

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

There were 18 dust explosions reported in the U.S. in 1998 according to Robert W. Schoeff, Professor Emeritus, Kansas State University, and Ralph Regan, Safety Director, USDA-FGIS. This compares to 16 in 1997 and a ten-year average of 13.5 explosions.

There were 7 fatalities and 24 injured with one tragic incident at Haysville, KS, accounting for all those killed and 10 of the injured.

Eleven of the eighteen incidents occurred in grain elevators, three in feed mills, and one each in a wet corn mill, frozen dough factory, sugar plant, and aircraft factory.

The **primary explosion** occurred in bucket elevators in 11 cases; one each in a pellet dryer, storage bin, warehouse basement, polishing room, with 3 unknown.

The **probable ignition source** was bearing failure (3), hot metal (3), electrical (2), fire, welding, truck backfire (1 each) and unknown (7).

Fuel sources were identified as corn (9), wheat (2), mixture of grain (2), and soybeans, corn starch, wheat flour, wheat starch polymer, and sugar (1 each).

Dust explosions occurred in 13 different states: Kansas (6); Illinois, Indiana, Iowa, Minnesota, Mississippi, Missouri, Nebraska, Ohio, Oregon, South Dakota, Tennessee, and Texas (1 each).

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.

Special recognition and appreciation is extended to Ralph Regan for his leadership and assistance in obtaining and reporting these data over many years. Ralph recently retired as safety director of FGIS.

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. - 1998**

<u>NO</u>	<u>DATE</u>	<u>COMPANY</u>	<u>ADDRESS</u>	<u>FACILITY</u>	<u>DAMAGE*</u>	<u>KILLED</u>	<u>INJURED</u>
1	Jan 10	ADM	Decatur, IL	Wet Corn Mill	NA	0	5
2	Feb 26	United Coop	Harris, KS	Elevator	Minor	0	0
3	Apr 9	Gearly Grain Co.	Junction City, KS	Elevator	Severe	0	0
4	Apr 21	Pendleton Grain Growers	Island City, OR	Elevator	Moderate	0	0
5	May 17	Rich's	Murfreesboro, TN	Frozen Dough	Minor	0	2
6	June 4	Eastern Farmers Coop	Hartford, SD	Elevator	Minor	0	0
7	June 8	DeBruce Grain Co.	Haysville, KS	Elevator	Severe	7	10
8	July 2	Consolidated Grain & Barge	Cincinnati, OH	Elevator	Moderate	0	0
9	July 7	Cessna Aircraft	Wichita, KS	Aircraft Plant	Minor	0	1
10	July 10	Farmers Grain Terminal	Greenville, MS	Elevator	Severe	0	0
11	July 16	Terre Haute Grain	Terre Haute, IN	Elevator	Minor	0	0
12	Aug 20	Farmers Elevator Co.	Buffalo Lake, MN	Feed Mill	Moderate	0	2
13	Aug 28	Imperial Holly Sugar	Sugarland, TX	Sugar Plant	NA	0	1
14	Sept 29	Bunker Hill Cattle Co.	St. Paul, NE	Feed Mill	Minor	0	1
15	Oct 23	Barlett Coop Assn.	Edna, KS	Feed Mill	Moderate	0	0
16	Nov 2	Frontier Equity Exchange	Bird City, KS	Elevator	Severe	0	0
17	Nov 18	Bunge Corp.	LaGrange, MO	Elevator	Minor	0	0
18	Nov 23	Control Country Coop	Reinbeck, IA	Elevator	Moderate	0	2

Robert W. Schoeff
 Kansas State University
 Manhattan, KS 66506-2201
 April 6, 1999

NA - Not available

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

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

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

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

	<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>1998</u>	<u>TEN YEAR TOTAL</u>
Number	13	15	12	6	13	15	14	13	16	18	135
Dead	2	0	1	1	2	1	1	1	1	7	17
Injured	7	7	4	8	20	14	12	19	14	24	129
Est. Damage to Facility (\$ Mil.)	3.9	5.0	.3	.4	4.0	7.1	6.7	29.6	11.4	29.8	98.2
Type of Facility:											
Grain Elevator	7	8	4	5	9	7	4	4	9	11	68
Feed Mill	1	1	4	0	0	3	4	4	2	3	22
Flour Mill	0	2	1	0	1	2	0	1	1	0	8
Other:											
Corn Milling, Dry	1	1	0	0	0	0	1	1	0	0	4
Corn Milling, Wet	2	1	0	0	1	1	2	0	0	1	8
Rice Mill	0	1	1	0	0	0	2	1	0	0	5
Oat Mill	0	0	0	0	0	0	0	0	0	0	0
Other	2	1	2	1	2	2	1	2	4	3	20

*Source: Robert W. Schoeff, Kansas State University, in cooperation with Ralph Regan, FGIS-USDA, April 6, 1999

TABLE 2. GRAIN DUST EXPLOSIONS
BY COMMODITY HANDLED AT TIME OF EXPLOSION
1989-1998

<u>COMMODITY</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>1998</u>	<u>TEN YEAR TOTAL</u>
Corn	4	4	5	4	9	8	3	5	8	9	59
Sorghum	2	1	0	0	0	1	0	0	0	0	4
Soybeans	1	1	0	0	1	0	1	2	2	1	9
Wheat	0	1	1	1	1	2	1	0	3	2	12
Barley (malted)	0	1	1	0	0	1	0	1	0	0	4
Oats	1	0	1	0	0	1	0	0	0	0	3
Beet Pulp	1	0	0	0	0	0	0	1	0	0	2
Corn Starch	1	0	0	1	2	0	2	0	0	1	7
Corn Gluten Meal	1	0	0	0	0	0	0	0	0	0	1
Distillers Feed	0	1	0	0	0	0	1	0	0	0	2
Feed By-Products	1	1	0	0	0	0	0	0	0	0	2
Grain Screenings	0	1	0	0	0	0	0	0	0	0	1
Mixed Feed	0	0	0	0	0	0	2	1	0	0	3
Rice (Bran)(Flour)(Hulls)	0	1	0	0	0	1	3	1	0	0	6
Wheat Flour	0	1	0	0	0	0	0	1	1	1	4
Wheat (Starch) (Gluten)	1	0	0	0	0	0	0	0	0	1	2
Other	0	3	4	0	0	1	2	1	2	3	16
TOTAL EXPLOSIONS	13	15	12	6	13	15	14	13	16	18	135

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, April 6, 1999

TABLE 3. U.S. GRAIN DUST EXPLOSIONS

LEADING STATES - 1958 to Date

<u>STATE</u>	<u>1958-1988</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>1998</u>	<u>10-YEAR TOTAL</u>
Iowa	48	3	0	4	2	1	4	2	3	3	1	23
Kansas	28	3	3	1	0	0	3	0	0	0	6	16
Nebraska	58	1	0	1	0	3	1	1	1	5	1	14
Illinois	49	2	2	0	1	0	1	3	1	1	1	12
Minnesota	36	1	2	0	0	1	1	0	2	1	1	9
Ohio	21	0	1	1	0	2	0	1	0	1	1	7
Louisiana	11	2	2	0	0	2	0	0	0	0	0	6
Indiana	19	0	0	1	0	1	1	0	0	0	1	4
Texas	39	0	1	0	1	0	0	1	0	0	1	4
Washington	3	1	1	1	0	0	0	1	0	0	0	4
South Dakota	7	0	0	0	1	0	0	0	1	1	1	4
Missouri	26	0	1	0	0	0	0	0	0	0	1	2

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, April 6, 1999