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February 3, 1997

Agricultural Dust Explosions in 1996*

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

There were 13 dust explosions reported in the U.S. in 1996 according to Robert W. Schoeff, Professor Emeritus, Kansas State University and Ralph Regan, Safety Director, USDA-FGIS. This compares to 14 in 1995 and a ten-year average of 13 explosions.

There was one fatality and 19 injured.

Four of the thirteen incidents occurred in grain elevators, four in feed mills, and one each in a rice mill, brewery, flour mill, corn mill, and sugar plant.

The **primary explosion** occurred in storage bins in 5 cases, 4 in bucket elevators, two were unknown, and one each in the headhouse and tunnel.

The **probable ignition source** was hot metal (3), bearing failure (2), fire, sparks, lightning, static electricity (1 each), and unknown (4).

Fuel sources were identified as corn (5), soybean meal (2), beet pulp pellets, malted barley, mixed feed, rice, sugar, and wheat flour (1 each).

Dust explosions occurred in 8 different states: Iowa (3); Minnesota (2); North Carolina (2); Pennsylvania (2); Arkansas, Illinois, Nebraska, and South Dakota (1 each).

Property damage was estimated to be \$29.6 million, with the most severe being at a sugar plant in Nebraska. 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.**

Readers are reminded that two highly acclaimed video tapes, "**Deadly Dust II**" and "**Deadly Dust III**" are available for training of employees, contractors, and fire department personnel from Kansas State University. Write for brochure or call Steve Ballou, Dept. of Communications, Dole Hall-KSU, Manhattan, KS 66506-6903. For more details about this report, call Robert W. Schoeff, 913-539-8891, Manhattan, KS.

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.

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

REPORTED GRAIN DUST EXPLOSIONS IN U.S. - 1996**

<u>NO.</u>	<u>DATE</u>	<u>COMPANY AND ADDRESS</u>	<u>FACILITY</u>	<u>DAMAGE*</u>	<u>KILLED</u>	<u>INJURED</u>
1	Jan. 29	Riceland Foods Jonesboro, AR	Rice Mill	Moderate	0	0
2	Jan. 31	Fasco Mills Seward, IL	Grain Elevator	Moderate	0	0
3	Feb. 8	Carroll's Foods Warsaw, NC	Feed Mill	Severe	0	4
4	May 6	National Food Corp. Plankinton, SD	Feed Mill	Minor	0	0
5	May 19	Grainland Coop Frost, MN	Grain Elevator	Severe	0	0
6	July 10	Latrobe Brewing Co. Latrobe, PA	Brewery	Minor	0	0
7	July 12	ConAgra Martin's Creek, PA	Flour Mill	Moderate	0	0
8	July 17	Swaledale Elevator Co. Swaledale, IA	Grain Elevator	Minor	0	0
9	July 20	Western Sugar Co. Scottsbluff, NE	Sugar Plant	Severe	1	15
10	Sept. 8	Quaker Oats Co. Cedar Rapids, IA	Corn Mill	Minor	0	0
11	Oct. 1	Farmers Coop Craig, IA	Grain Elevator	Moderate	0	0
12	Oct. 15	Carroll's Foods Warsaw, NC	Feed Mill	Minor	0	0
13	Nov. 12	Angus Coop Elevator Angus, MN	Feed Mill	Minor	0	0

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

Robert W. Schoeff
Kansas State University

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

Manhattan, KS 66506-2201

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

February 3, 1997

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

	<u>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>TEN YEAR TOTAL</u>
Number	16	12	13	15	12	6	13	15	14	13	129
Dead	0	8	2	0	1	1	2	1	1	1	17
Injured	18	10	7	7	4	8	20	14	12	19	119
Est. Damage to Facility (\$ Mil.)	8.3	8.7	3.9	5.0	.3	.4	4.0	7.1	6.7	29.6	74.0
Type of Facility:											
Grain Elevator	11	7	7	8	4	5	9	7	4	4	66
Feed Mill	4	1	1	1	4	0	0	3	4	4	22
Flour Mill	0	0	0	2	1	0	1	2	0	1	7
Other:											
Corn Milling, Dry	0	2	1	1	0	0	0	0	1	1	6
Corn Milling, Wet	0	0	2	1	0	0	1	1	2	0	7
Rice Mill	0	1	0	1	1	0	0	0	2	1	6
Oat Mill	0	1	0	0	0	0	0	0	0	0	1
Other	1	0	2	1	2	1	2	2	1	2	14

*Source: Robert W. Schoeff, Kansas State University, in cooperation with Ralph Regan, FGIS-USDA, February 3, 1997

TABLE 2. GRAIN DUST EXPLOSIONS
BY COMMODITY HANDLED AT TIME OF EXPLOSION
1987-1996

<u>COMMODITY</u>	<u>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>TEN YEAR TOTAL</u>
Corn	13	7	4	2	5	4	9	8	3	5	60
Sorghum	0	0	2	1	0	0	0	1	0	0	4
Soybeans	1	1	1	1	0	0	1	0	1	2	8
Wheat	0	1	0	1	1	1	1	2	1	0	8
Barley (malted)	0	0	0	1	1	0	0	1	0	1	4
Oats	0	1	1	0	1	0	0	1	0	0	4
Beet Pulp	0	0	1	0	0	0	0	0	0	1	2
Corn Starch	0	0	1	0	0	1	2	0	2	0	6
Corn Gluten Meal	0	1	1	0	0	0	0	0	0	0	2
Distillers Feed	0	0	0	1	0	0	0	0	1	0	2
Feed By-Products	0	0	1	1	0	0	0	0	0	0	2
Grain Screenings	1	0	0	1	0	0	0	0	0	0	2
Mixed Feed	1	0	0	0	0	0	0	0	2	1	4
Rice (Bran)(Flour)(Hulls)	0	1	0	1	0	0	0	1	3	1	7
Wheat Flour	0	0	0	1	0	0	0	0	0	1	2
Wheat (Starch) (Gluten)	0	0	1	0	0	0	0	0	0	0	1
Other	0	0	0	4	4	0	0	1	2	1	11
TOTAL EXPLOSIONS	16	12	13	15	12	6	13	15	14	13	129

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, February 3, 1997

TABLE 3. U.S. GRAIN DUST EXPLOSIONS

LEADING STATES - 1958 to Date

<u>STATE</u>	<u>1958- 1986</u>	<u>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>10-YEAR TOTAL</u>
Iowa	45	2	1	3	0	4	2	1	4	2	3	22
Illinois	46	2	1	2	2	0	1	0	1	3	1	13
Minnesota	32	1	3	1	2	0	0	1	1	0	2	11
Kansas	28	0	0	3	3	1	0	0	3	0	0	10
Nebraska	58	0	0	1	0	1	0	3	1	1	1	8
Louisiana	10	0	1	2	2	0	0	2	0	0	0	7
Indiana	16	2	1	0	0	1	0	1	1	0	0	6
Ohio	19	2	0	0	1	1	0	2	0	1	0	7
Texas	37	1	1	0	1	0	1	0	0	1	0	5
Washington	3	0	0	1	1	1	0	0	0	1	0	4
Missouri	24	2	0	0	1	0	0	0	0	0	0	3
South Dakota	7	0	0	0	0	0	1	0	0	0	1	2

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, February 3, 1997