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REVISED

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Grain Dust Explosions Steady in 1995*

There were 14 grain dust explosions reported for the U.S. in 1995 according to Robert W. Schoeff, Professor Emeritus and Consultant, Kansas State University and Ralph Regan, Safety Director, USDA-FGIS. This compares to 15 in 1994 and a ten-year average of 14 explosions.

There was one fatality and 12 persons injured.

Four of the thirteen incidents occurred in feed mills, four in grain elevators, three in corn mills, two in rice mills, and one in an animal by-product plant.

The bucket elevator (leg) continues as the leading location for the primary explosion, 5 of 14, and 5 occurring in storage bins.

The **probable cause** of ignition was welding/cutting (4), fire (2), bearing failure, explosives, sparks from foreign material, and unknown (4).

Fuel sources were identified as rice (3), corn (3), corn starch (2), mixed feed (2), soybeans, wheat, distillers feed and meat and bone meal.

Most of the grain dust explosions occurred in the midwest with two in Iowa, three in Illinois, and one in Arkansas, Ohio, Mississippi, Nebraska, Maine, Washington, South Carolina, Oklahoma, and Texas. Dust explosions have occurred in 25 states during the past ten years with Iowa the leading state with 21 reported explosions.

Property damage was estimated to be \$6,775,000.00.

Appreciation is expressed to the many persons who provided the information that allowed us to compile data on grain dust explosions as a service to the grain storage and processing and allied industries, trade associations, and government agencies.

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

REPORTED GRAIN DUST EXPLOSIONS IN U.S. - 1995**

<u>NO.</u>	<u>DATE</u>	<u>COMPANY AND ADDRESS</u>	<u>FACILITY</u>	<u>DAMAGE*</u>	<u>KILLED</u>	<u>INJURED</u>
1	Feb. 23	Jupe Mills West, TX	Feed Mill	Minor	0	1
2	Mar. 24	Midwest Grain Pekin, IL	Wet Corn Milling	Moderate	0	4
3	May 5	ACCO Feed Oklahoma City, OK	Feed Mill	Minor	0	0
4	June 13	South Carolina Farm Bureau Marketing Assn. North Charleston, SC	Elevator	Minor	0	0
5	July 22	TEMCO Tacoma, WA	Port Elevator	Severe	0	0
6	Aug 9	DeCoster Egg Farms Leeds, ME	Feed Mill	Severe	1	0
7	Sept. 5	Foxley Grain Co. Grafton, NE	Grain Elevator	Moderate	0	0
8	Sept. 22	Lauhoff Grain Co. Danville, IL	Corn/Soybean Processing	Moderate	0	0
9	Sept. 26	National By-Products Cedar Rapids, IA	Animal By-Product Plant	Minor	0	0
10	Oct. 10	Cargill Rice Milling Greenville, MS	Rice Mill	Moderate	0	1
11	Oct. 26	Gerber & Sons, Inc. Baltic, OH	Feed Mill	Minor	0	1
12	Dec. 9	Riceland Foods Waldenburg, AR	Rice Mill	Minor	0	2
13	Dec. 11	Grain Processing Muscatine, IA	Wet Corn Milling	Moderate	0	0
14	Dec. 17	Fasco Feed Co. Mendota, IL	Grain Elevator	Moderate	0	3
				TOTALS	1	12

FLASH FIRE

July 30	A.E. Staley Co. Decatur, IL	Corn Refining	-----	1	0
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*Minor: Less than \$50,000; Moderate: \$50,000-\$500,000; Severe: Over \$500,000

¹Company will not cooperate in providing basic information.

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

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

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

	<u>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>TEN YEAR TOTAL</u>
Number	23	16	12	13	15	12	6	13	15	14	139
Dead	2	0	8	2	0	1	1	2	1	1	18
Injured	14	18	10	7	7	4	8	20	14	12	114
Est. Damage to Facility (\$ Mil.)	1.6	8.3	8.7	3.9	5.0	.3	.4	4.0	7.1	6.7	46.0
Type of Facility:											
Grain Elevator	13	11	7	7	8	4	5	9	7	4	75
Feed Mill	5	4	1	1	1	4	0	0	3	4	23
Flour Mill	1	0	0	0	2	1	0	1	2	0	7
Other:											
Corn Milling, Dry	0	0	2	1	1	0	0	0	0	1	5
Corn Milling, Wet	0	0	0	2	1	0	0	1	1	2	7
Soybean	0	0	0	0	0	0	0	0	0	0	0
Rice Mill	2	0	1	0	1	1	0	0	0	2	7
Oat Mill	0	0	1	0	0	0	0	0	0	0	1
Other	2	1	0	2	1	2	1	2	2	1	14

*Source: Robert W. Schoeff, Kansas State University, in cooperation with Ralph Regan, FGIS-USDA, January 22, 1996

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

<u>COMMODITY</u>	<u>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>TEN YEAR TOTAL</u>
Corn	6	13	7	4	2	5	4	9	8	3	61
Sorghum	6	0	0	2	1	0	0	0	1	0	10
Soybeans	1	1	1	1	1	0	0	1	0	1	7
Wheat	2	0	1	0	1	1	1	1	2	1	10
Barley	1	0	0	0	1	1	0	0	1	0	4
Oats	0	0	1	1	0	1	0	0	1	0	4
Beet Pulp	0	0	0	1	0	0	0	0	0	0	1
Corn Starch	0	0	0	1	0	0	1	2	0	2	6
Corn Gluten Meal	0	0	1	1	0	0	0	0	0	0	2
Distillers Feed	0	0	0	0	1	0	0	0	0	1	2
Feed By-Products	0	0	0	1	1	0	0	0	0	0	2
Grain Screenings	0	1	0	0	1	0	0	0	0	0	2
Mixed Feed	0	1	0	0	0	0	0	0	0	2	3
Rice (Bran)(Flour)(Hulls)	2	0	1	0	1	0	0	0	1	3	8
Wheat Flour	0	0	0	0	1	0	0	0	0	0	1
Wheat (Starch) (Gluten)	0	0	0	1	0	0	0	0	0	0	1
Other	5	0	0	0	4	4	0	0	1	1	15
TOTAL EXPLOSIONS	23	16	12	13	15	12	6	13	15	14	139

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, January 22, 1996

TABLE 3. U.S. GRAIN DUST EXPLOSIONS

LEADING STATES - 1958 to Date

<u>STATE</u>	<u>1958- 1985</u>	<u>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>10-YEAR TOTAL</u>
Iowa	43	2	2	1	3	0	4	2	1	4	2	21
Kansas	22	6	0	0	3	3	1	0	0	3	0	16
Illinois	45	1	2	1	2	2	0	1	0	1	3	13
Minnesota	31	1	1	3	1	2	0	0	1	1	0	10
Nebraska	56	2	0	0	1	0	1	0	3	1	1	9
Louisiana	8	2	0	1	2	2	0	0	2	0	0	9
Indiana	15	1	2	1	0	0	1	0	1	1	0	7
Ohio	19	0	2	0	0	1	1	0	2	0	1	7
Texas	35	2	1	1	0	1	0	1	0	0	1	7
Washington	2	1	0	0	1	1	1	0	0	0	1	5
Missouri	23	1	2	0	0	1	0	0	0	0	0	4
South Dakota	6	1	0	0	0	0	0	1	0	0	0	2

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, January 22, 1996