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Grain Dust Explosions Up In 1993*

Reversing a twelve year downward trend, there were 13 grain dust explosions reported for the U.S. in 1993 according to Robert W. Schoeff, Consultant and Professor Emeritus, Kansas State University and Ralph Regan, Safety Director, USDA-FGIS. This compares to a record low of 6 in 1992 and a ten-year average of 15 explosions.

There were two fatalities and 20 persons injured.

Nine of the thirteen incidents occurred in grain elevators; the others in a food plant, candy factory, flour mill, and wet corn plant.

The bucket elevator (leg) continues as the leading location for the primary explosion (6).

The probable cause of ignition for nine cases was bearing failure (3), head pulley out of alignment and rubbing against the metal housing (2), welding and cutting, fire from burning ingredients, electrical short, and sparks from foreign material.

Fuel sources were identified as corn (9), cornstarch (2), wheat, and soybeans.

Most of the grain dust explosions occurred in the midwest with three in Nebraska, two in Ohio, and one in Indiana, Iowa, Minnesota, and Wisconsin. There were two in Louisiana and one in Mississippi and New Jersey.

Property damage was estimated to be \$3,510,000.00.

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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January 20, 1994

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

REPORTED GRAIN DUST EXPLOSIONS IN U.S. - 1993**

<u>NO.</u>	<u>DATE</u>	<u>COMPANY AND ADDRESS</u>	<u>FACILITY</u>	<u>DAMAGE*</u>	<u>KILLED</u>	<u>INJURED</u>
1	March 21	ADM Cedar Rapids, IA	Wet Corn Mill	Minor	0	0
2	May 17	Zumbro/IBF Inc. ¹ Owatonna, MN	Food Plant	Severe	1	0
3	June 3	St. Charles Grain Elevator Destrehan, LA	Port Elevator	Minor	0	5
4	Aug. 3	Great Harvest Bread Whitefish, WI	Flour Mill	Moderate	0	0
5	Aug. 10	U.S. Commission Co. Upper Sandusky, OH	Grain Elevator	Minor	0	0
6	Sept. 1	Bunge, Inc. Vicksburg, MS	River Elevator	Minor	0	3
7	Sept. 23	Scribner Grain Scribner, NE	Grain Elevator	Minor	0	0
8	Oct. 13	Dorchester Farmers Co-op Dorchester, NE	Grain Elevator	Minor	0	0
9	Oct. 19	Central Soya Co. Bellvue, OH	Grain Elevator	Severe	0	0
10	Oct. 25	Paalaur Corp. ² Hamilton, NJ	Candy Manufacturer	Moderate	0	9
11	Nov. 17	Ag-One Co-op Millville, IN	Grain Elevator	Severe	0	1
12	Dec. 11	Farmers Co-op Grain & Supply Minden, NE	Grain Elevator	Severe	1	2
13	Dec. 14	Continental Grain Co. Westwego, LA	Port Elevator	Minor	0	0
TOTALS					2	20

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

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 January 20, 1994
 in cooperation with
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¹Food Plant
²Candy Manufacturer

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U.S. GRAIN DUST EXPLOSION STATISTICS*

	<u>1984</u>	<u>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>TEN YEAR TOTAL</u>
Number	21	23	23	16	12	13	15	12	6	13	154
Dead	9	4	2	0	8	2	0	1	1	2	29
Injured	30	20	14	18	10	7	7	4	8	20	138
Est. Damage to Facility (\$ Mil.)	19.9	65.0	1.6	8.3	8.7	3.9	5.0	.3	.4	4.0	117.1
Type of Facility:											
Grain Elevator	12	19	13	11	7	7	8	4	5	9	95
Feed Mill	5	1	5	4	1	1	1	4	0	0	22
Flour Mill	1	0	1	0	0	0	2	1	0	1	6
Other:											
Corn Milling, Dry	1	2	0	0	2	1	1	0	0	0	7
Corn Milling, Wet	0	0	0	0	0	2	1	0	0	1	4
Soybean	1	0	0	0	0	0	0	0	0	0	1
Rice Mill	0	1	2	0	1	0	1	1	0	0	6
Oat Mill	0	0	0	0	1	0	0	0	0	0	1
Other	1	0	4	1	0	2	1	2	1	2	12

*Source: Robert W. Schoeff, Kansas State University, in cooperation with Ralph Regan, FGIS-USDA, January 1994

U.S.

GRAIN DUST EXPLOSIONS

LEADING STATES - 1958 to Date

<u>STATE</u>	<u>1958-1983</u>	<u>1984</u>	<u>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>10-YEAR TOTAL</u>
Nebraska	46	6	4	2	0	0	1	0	1	0	3	17
Iowa	41	0	2	2	2	1	3	0	4	2	1	17
Illinois	39	2	4	1	2	1	2	2	0	1	0	17
Texas	33	1	1	2	1	1	0	1	0	1	0	11
Minnesota	28	1	2	1	1	3	1	2	0	0	1	12
Kansas	21	0	1	5	0	0	3	3	1	0	0	13
Missouri	23	0	0	1	2	0	0	1	0	0	0	4
Ohio	15	0	2	0	2	0	0	1	1	0	2	8
Oklahoma	15	0	0	0	0	1	0	0	0	0	0	1
New York	9	0	0	0	0	0	0	0	0	0	0	0
Wisconsin	9	0	0	0	0	0	0	0	0	0	1	1

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, January 1994

GRAIN DUST EXPLOSIONS
 BY COMMODITY HANDLED AT TIME OF EXPLOSION
 1984 to Date

<u>COMMODITY</u>	<u>1984</u>	<u>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>TEN YEAR TOTAL</u>
Corn	11	14	6	13	7	4	2	5	4	9	75
Sorghum	0	2	6	0	0	2	1	0	0	0	11
Soybeans	2	0	1	1	1	1	1	0	0	1	8
Wheat	5	0	2	0	1	0	1	1	1	1	12
Barley	0	1	1	0	0	0	1	1	0	0	4
Oats	1	0	0	0	1	1	0	1	0	0	4
Beet Pulp	0	0	0	0	0	1	0	0	0	0	1
Corn Starch	0	1	0	0	0	1	0	0	1	2	5
Corn Gluten Meal	1	2	0	0	1	1	0	0	0	0	5
Distillers Feed	0	0	0	0	0	0	1	0	0	0	1
Feed By-Products	0	0	0	0	0	1	1	0	0	0	2
Grain Screenings	0	0	0	1	0	0	1	0	0	0	2
Mixed Feed	0	0	0	1	0	0	0	0	0	0	1
Rice (Bran)(Flour)	0	1	2	0	1	0	1	0	0	0	5
Wheat Flour	0	0	0	0	0	0	1	0	0	0	1
Wheat (Starch) (Gluten)	0	0	0	0	0	1	0	0	0	0	1
Other	2	2	5	0	0	0	4	4	0	0	17
TOTAL EXPLOSIONS	21	23	23	16	12	13	15	12	6	13	154

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, January 1994