

Summary and Conclusions 1

Chronology of the Use of Water on Grain 5

Justification for Allowing Application of Water and Oilfor Dust Suppression10Air Pollution Regulations10OSHA Regulations11Insurance Rates12Grain Quality13Congressional Actions13

Frequency and Causes of Grain Dust Explosions 14

Improved Air Quality 20

Grain Quality Considerations 22

Cost and Effectiveness of Alternative Technologies 25 Pneumatic Systems 25 Housekeeping Practices 27 Use of Liquid Additives 27 Effectiveness of Oil as a Dust Suppressant **27** Effectiveness of Water as a Dust Suppressant **28** Cost Comparisons. 32 Economic Impacts 35 Results of the Survey **36** Dust Control Techniques 36 Motivation for Implementing Dust Control Strategies 37 Base Moisture Levels Used in Buying Grain 37 Regulation of Alternative Technologies **39**

Monitoring the Use of Water on Grain 42

Practices in Other Countries 51

A Market Directed Solution 53

References 56

TABLES

- Table 1.Opacity Limits by Type of Facility12
- Table 2.Five-year Average Grain Elevator Explosions and U.S. Grain Export
Volumes, 1960-199418
- Table 3.
 Comparison between Grain Elevator Dust Explosions and Grain Export Volume
 18
- Table 4.Equilibrium Moisture Contents at 25C of Common Grains, Seeds, and Feed Ingredients at
Relative Humidities of 65-90%, and Fungi Likely to be Encountered23
- Table 5. Financial Impact of Water and Oil Dust Suppressants on Soybeans 34
- Table 6.Number of Responses by Type of Firm, 199436
- Table 7.Method of Dust Control by Type of Firm, 199437
- Table 8.Primary Motive for Using Dust Control Practices38
- Table 9. Base Moisture Content Used in Purchasing Grain 39
- Table 10.Weight or Price Adjustments for Grain Below Base Moisture Content55

FIGURES

- Figure 1. Annual Number of Dust Explosions 17
- Figure 2. Grain Elevator Explosions Versus Grain Export Volume 19