

ILLINOIS POLLUTION CONTROL BOARD

June 13, 1975

IN THE MATTER OF:)
AMENDMENTS TO CHAPTER 2, AIR POLLUTION REGULATIONS) R72-18
FOR GRAIN-HANDLING AND GRAIN-DRYING OPERATIONS)

OPINION OF THE BOARD (by Dr. Odell)

This Opinion supports the Amendments to Chapter 2, Air Pollution Regulations for Grain-Handling and Grain-Drying Operations, which were adopted by the Illinois Pollution Control Board (Board) on June 13, 1975.

INITIAL PROPOSAL

On November 6, 1972, the Illinois Environmental Protection Agency (Agency) proposed to the Board amendments to Chapter 2 for the purpose of altering particulate regulations and operating permit requirements for grain-handling and grain-drying operations. The proposed amendments were for parts of Rule 103 (Permits) and Rules 201 and 203 (Particulate Emission Standards and Limitations). The amendments proposed by the Agency were published December 1, 1972, in the Board Newsletter No. 57.

Three hearings were held on the Agency proposal on March 14 (Urbana), April 23 (Peoria), and May 16, 1973 (Galesburg). During these 1973 hearings, many issues were raised which clearly indicated additional work was necessary on the proposed amendments before they would be satisfactory. After the first hearing, the Director of the Agency notified this Board that "the Agency agreed to establish a Joint EPA-Industry Task Force to develop substantive regulations for the control of emissions from grain handling and conditioning operations." The Director requested that the Board amend the regulations to extend the date by which an operating permit is required for grain handling and conditioning operations to September 1, 1974. "The Agency believes that this extension is necessary in order to give the Joint EPA-Industry Task Force enough time to propose new regulations covering grain handling and conditioning operations" (letter of April 19, 1973). The Agency filed a formal request that its original proposal be withdrawn. Mr. R.J. Kissel, a representative of the Grain and Feed Association on the Task Force, recommended "that the compliance date for those operations (grain handling and conditioning) be extended to May 30, 1975, with an understanding that if the Task Force can come up with a sooner compliance date, that we will do so" (Galesburg R. 42).

In an Order of June 15, 1973 (8 PCB 307) the Board amended Chapter 2, Air Pollution Regulations, in Rule 103(b)(2)(A) by

establishing September 1, 1974, as the date by which an operating permit is required for grain handling and conditioning operations, in Rule 201 by defining "grain handling and conditioning operations", and in Rule 203(i) by establishing May 30, 1975, as the date by which grain handling and conditioning operations shall comply with the requirements of Rule 203. The Board's Interim Opinion of August 9, 1973 (9 PCB 47-49) explained the developments to that date and stated that "the action of the Board in this proceeding is intended to facilitate study by the Task Force and the development of a comprehensive program relating to grain handling."

DEVELOPMENT OF THIS REGULATION

On April 22, 1974, the Director of the Agency transmitted to the Board "Proposed Amendments To Chapter 2, Air Pollution Regulations For Grain-Handling And Grain-Drying Operations," which were prepared by the Joint EPA-Industry Task Force during the previous year. The Task Force comprised 14 members representing the Agency, Grain and Feed Association, grain elevators, farmers, and an equipment supplier. The Task Force proposal was published May 7, 1974, in the Board Newsletter No. 84.

Public hearings on these "Proposed Amendments To Chapter 2" were held on June 18 (Mt. Vernon), June 24 (Decatur), July 9 (Galesburg), July 17 (LaSalle-Peru), and August 5, 1974 (Chicago). Relevant testimony and documents submitted during the 1973 hearings for R72-18 are included as a part of the current proceeding (R. 12).

In an Order of August 8, 1974 (13 PCB 349), the Board again amended Chapter 2, Air Pollution Regulations, in Rule 103(b)(2)(A) by deleting September 1, 1974, as the date on which operating permits are required for grain-handling and grain-drying operations, and ruling that a later date would be established by subsequent Board action in the R72-18 proceeding. In the Board's Environmental Register No. 97 (January 28, 1975), September 1, 1975, was proposed as the date by which operating permits were required for grain-handling and grain-drying operations. However, December 31, 1975, is the date now established for operating permits in the accompanying Regulation.

These Amendments to Chapter 2 exempt grain-handling and grain-drying operations from Rules 203(a), 203(b), 203(c), and 203(f)(2), which include process weight standards and fugitive dust regulations, unless a facility complies with those Rules in accordance with provisions in Rule 203(d)(9)(K) herein. However, other regulations are adopted herein which are better adapted to most of the industry and maintain suitable air quality. The Amendments also establish a permit system under which existing grain-handling operations with an annual grain through-put of 300,000 bushels or more and existing grain-drying operations with a total grain-drying capacity in excess of 750 bushels per hour for 5% moisture extraction shall apply for an operating permit by

December 31, 1975. All grain-handling and grain-drying operations, regardless of size, must implement and use specified Housekeeping Practices. For grain-handling facilities having a grain through-put exceeding 2 million bushels per year and located within designated major population areas, air pollutants collected must be ducted through air pollution control equipment which has a removal efficiency of 98% by weight prior to release into the atmosphere. These mandatory controls on large facilities in major population areas (where the air quality is of special concern and where the population is most dense) are to minimize the air quality impact of grain-handling and grain-drying emissions.

Particulate emissions from feed grinding and processing operations have been and will continue to be governed by Rules 203(a), 203(b), 203(c), and 203(f), rather than Rule 203(d) (9) herein (R. 90-95).

NEED FOR POLLUTION ABATEMENT

The objectives of this Regulation are to maintain satisfactory air quality and eliminate nuisances (as determined by the Board) caused by particulate emissions from grain-handling and grain-drying operations. In Illinois, there are approximately 1,400 licensed grain dealers (including about 200 truckers and farmers) that handle large quantities of grain and therefore will be especially affected by this Regulation (R. 387). In addition, many farmers have private grain-handling and grain-drying facilities for crops produced on their farms.

Extraneous particulate matter, such as dust, "bees wings" (chaff from corn, R. 243), etc., associated with grain-handling and grain-drying operations can be a nuisance to people and property if it is not handled properly (R. 731, Exhibit 20, PCB 72-215 Environmental Protection Agency v. Weldon Farmers Grain Co-op 6 PCB 433, December 12, 1972). Uncontrolled emissions from such sources can irritate people who live or work nearby and can also settle on property in amounts which may be unsightly or damaging (R. 690-696). These effects are likely to be greatest from large, inadequately controlled sources in areas where many people live nearby.

Agency files indicate that from July 1, 1970, to June 1, 1973, there were approximately 100 (R. 475) to 150 (R. 323) elevators against which citizens had complained of excessive dust, chaff, etc. These citizen complaints were lodged almost exclusively against elevators having an annual grain through-put in excess of 300,000 bushels, as is indicated in the following table (R. 477):

| <u>Annual grain through-put bushels</u> | <u>Percent of elevators (Exhibit 7)</u> | <u>Percent of citizen complaints to Agency</u> |
|---|---|--|
| 0 - 299,999 | 23 | 4 |
| 300,000 - 999,999 | 35 | 11 |
| 1,000,000 - 1,999,999 | 27 | 39 |
| More than 2,000,000 | 14 | 45 |

On June 1, 1974, there were complaints in Agency files against 138 elevators (Ex. 40).

In addition to the "nuisance of fallout of material from grain handling on personal property, individuals may suffer allergenic reactions from respiration of emissions from grain handling operations" (R. 111). The "Health Effects of Particulate Matter Emitted by Grain Handling" were summarized by Mr. Gary Patzlaff of the Agency (R. 102-145). Although grain dust can cause health problems, it is not as harmful as many air pollutants, such as sulfur dioxide or hydrocarbons (R. 126). Particles larger than 10 microns are usually not inhaled, but very small particles less than 1 micron in size can travel into the innermost parts of the respiratory system (R. 123). There is no evidence that respiratory diseases such as tuberculosis or cancer can be attributed to grain dust (R. 142).

A study in New Orleans, Louisiana (Ex. 3), indicated that outbreaks of bronchial asthma, defined by sharp peaks above the average number of emergency room visits at Charity Hospital, occurred during late summer and fall. Twice as many asthma outbreak patients were found to be susceptible to grain dust as other individuals who had no previous history of allergenic reactions. Southwest winds were believed to blow emissions from a large grain elevator over the major patient population area and thus contribute to the attacks of bronchial asthma (R. 108).

A study on the University of Minnesota campus in Minneapolis, 1959-1968, "concluded that bronchial asthma attacks in grain-sensitive students was increased two-fold when atmospheric particulate concentrations, as reflected by the number of suspended particles, were high. Many of these particles could be identified as emanating from grain elevators and flour mills" located within a mile in all directions except southeast of the campus (R. 110).

CHARACTERISTICS OF GRAINS AND ASSOCIATED PARTICULATES

The approximate amounts of the major grains produced annually in Illinois are as follows (R. 50):

| | | |
|----------|---|----------------------|
| Corn | - | 1 billion bushels, |
| Soybeans | - | 280 million bushels, |
| Wheat | - | 50 million bushels. |

Other minor crops, such as oats, barley, rye, etc., total approximately 30 million bushels annually. Approximately 39 percent of the corn moves into market channels and the remainder is fed to livestock on farms (R. 52). Most of the soybeans and wheat move into market channels within a few months after they are harvested.

The objectionable particles associated with grain include chaff, which is usually greater than 300 microns in diameter, and extraneous dust, which is typically smaller than 300 microns in diameter. Dust particles <10 microns are not visible to the eye (Ex. 5, page 1) but they may have adverse health effects, as is indicated in the section on "Need For Pollution Abatement." Particles larger than 10 microns are visible and may be objectionable if they settle on people or property in excessive amounts. "Bees wings" are very light (1.061 pounds per cubic foot, R. 246) and therefore they may be blown considerable distances (they fall approximately 2 inches per 100 horizontal feet in a two-mile-an-hour wind, R. 278) before they settle on the soil or other objects. Characteristic properties of various sizes of particulate pollutants in grain are given below (Ex. 5, 6):

| <u>Size in microns</u> | <u>Properties of particles</u> |
|------------------------|---|
| < 10 | Invisible to eye; may influence health adversely. |
| 10 - 99 | Gray, extraneous dust. |
| 100 - 299 | Gray, extraneous dust. |
| 300 - 3,499 | Predominantly chaff from grain (R. 244). |
| 3,500 - 5,000 | Predominantly plant fragments. |

The percentages of various sizes of pollutants associated with two samples of corn are as follows (Ex. 5, page 3):

| <u>From rack-type dryer (Ex. 6)</u> | | <u>PCB 72-215 EPA v. Weldon</u> | |
|-------------------------------------|-------------|---------------------------------|-------------|
| Size in microns | % by weight | Size in microns | % by weight |
| <105 | 1.5 | <150 | 1.1 |
| 106 - 335 | 17.1 | 151 - 1,000 | 11.0 |
| 336 - 3,125 | 71.1 | 1,001 - 2,500 | 24.3 |
| 3,126 - 5,469 | 10.3 | 2,501 - 4,750 | 63.6 |
| Total | 100.0 | Total | 100.0 |

SOURCES OF AIR POLLUTION IN GRAIN-HANDLING
AND GRAIN-DRYING OPERATIONS

Grain-handling and grain-drying operations include unloading grain at dump pits, conveying and elevating, drying and other conditioning, storage, and load-out, which are illustrated in Exhibit 2 (R. 57-68).

Air pollutants associated with grain-handling operations come from several sources, mostly unconfined, which are listed below (Ex. 5, page 6; R. 247-249):

| <u>Percent of particulate emissions</u> | <u>Sources</u> |
|---|---|
| 6 - 10 | Unloading, above grate; |
| 25 | Unloading, within dump pit; |
| 12 - 15 | Conveyor at bottom of dump pit; |
| 5 - 10 | Conveyor to elevator leg; |
| 15 | Elevator top; |
| 15 | Distribution to bin or vehicle. |
| <u>78 - 90%</u> | <u>of particulates associated with grain.</u> |

Excess moisture is removed from grain primarily with column dryers and rack dryers (Ex. 2, pages 5-7), and to a lesser extent with bin dryers (R. 489). Because of differences in construction and operation, particulate emissions from column dryers are much less than from rack dryers (Ex. 8, 11) and, therefore, the use of column dryers is expanding (R. 65).

The three major sources of particulate emissions from grain-handling and grain-drying operations, listed in decreasing order of magnitude, are (a) uncontrolled rack dryers, (b) uncontrolled dump pits, and (c) uncontrolled load-out operations (Ex. 8, R. 251-262).

CONTROL OF PARTICULATES BY EMISSION STANDARDS VERSUS EQUIPMENT REQUIREMENTS

Most emission standards are established in quantitative terms, and operators are then free to comply by any methods that achieve the appropriate standard. Three different methods were considered in developing emission standards for grain-handling and grain-drying operations, but none of them is considered to be satisfactory for various reasons. These methods are (a) for a specific, confined source, such as a duct or chimney, (b) for unconfined, ambient atmosphere, and (c) the material balance method, which involves measuring the amount of material going into a process and measuring what comes out. Processed material which is unaccounted for is considered to be emitted into the atmosphere. Before valid emission standards can be developed, accurate data must be obtained concerning the nature of the pollutant being emitted to the atmosphere. This requires an accurate procedure for obtaining representative samples of the pollutant under specified conditions. Although established procedures are available for measuring air pollution from both confined sources and in the ambient atmosphere, emissions from grain-handling and grain-drying operations can neither be characterized as coming from confined sources nor as being part of the ambient air.

Special efforts were made to determine whether existing, confined source testing methods could provide a reliable basis for sampling particulate emissions from grain dryers (R. 203-208). Results of studies in Missouri (Ex. 12) and Illinois (Ex. 13) with confined source testing methods indicated that they do not give reliable and reproducible results for grain dryers because (a) isokinetic sampling conditions are not met, and (b) the gas flow velocity is too slow (<10 feet per second). On the basis of

current information, the Agency concluded that "there is no piece of equipment available for use in sampling the grain-drying industry that has demonstrated that reliable, repeatable results can be obtained" (R. 206).

Further difficulties were encountered in relating ambient air quality levels to emissions from grain-drying operations (R. 224-229). The instrumentation now in use is capable of measuring particles ranging in size from 1 to 100 microns, whereas particles emitted from grain-drying operations usually range in size from 150 to 2,500 microns. Therefore, instrumentation is currently not available to accurately measure the particles emitted from grain-drying operations (Ex. 21). Even if ambient air monitoring capability existed, other problems would persist, including the determination of contributions from other sources such as dump pits, load-out areas, and fugitive dust from roads or fields.

Mr. F.L. Smith believed that the problems encountered in measuring emissions from grain-drying operations and from grain-handling operations are similar, but specific data were not presented to support this statement (R. 209-211).

Since available techniques are not well suited to accurately measure particulate emissions from grain-handling and grain-drying operations, emphasis in this Regulation is placed upon the (a) use of good housekeeping practices and (b) installation and operation of emission control equipment where needed to eliminate nuisance conditions and maintain satisfactory air quality.

NEED FOR GREATER POLLUTION CONTROL IN MAJOR POPULATION AREAS

During the hearing in Galesburg on July 9, 1974, the Agency introduced "Amendments To Proposed Grain-Handling Regulations" (Ex. 18, R. 461-469). These Agency Amendments proposed nine major metropolitan areas (later changed, R. 818-844, to major population areas, Ex. 27, 44, 45) in which 99% particulate removal efficiency was specified for grain-handling facilities which have a grain through-put exceeding 2 million bushels per year. During the last two hearings, there was much discussion concerning these Agency Amendments [July 17 hearing R. 845-856, 863-889, 892-896, 911-914, 971-990, 1024-1036, 1046-1048, 1059-1085, and most of the August 5 hearing R. 1039 (sic) - 1207].

The Agency Amendments and refinements were made primarily to minimize the air quality impact of grain-handling emissions in areas where the quality of air is of concern and where the population is most dense (R. 464-467). The air quality concern within the major population areas (MPA's) is justified based on an examination of the 1973 air quality data. Exhibit 50 shows the 1973 annual average particulate levels for 136 locations within Illinois (58 within Cook County) as reported by the Agency. At 56 locations (30 within Cook County), the annual mean primary particulate standard of 75 micrograms per cubic meter was exceeded. Of these locations where the air quality violated the standard in 1973, only four (Galena, Metropolis, and 2 sites in Quincy) are not within designated MPA's. Based on current sampling locations, the MPA's do include areas where air quality is of concern and where emissions

from grain-handling facilities should be minimized. After thorough discussion "the industry members of the Task Force indicated acceptance of the basic concept of the MPA as being the recommendation of the Task Force within the geographical boundaries that have most recently been given to the Board" (R. 1204).

As a result of examining data in Exhibits 17, 50, and 53, the Board added Galesburg to the MPA's designated by the Agency. Based on the best available information, the second and fourteenth largest emitters of particulates from grain in Illinois are located in Galesburg and together emit an estimated 1,443 lbs/hr particulates (Ex. 53). A citizen has objected to these emissions for several years (R. 690-696). These emissions probably contributed significantly to the 1973 annual mean particulate level of $66 \mu\text{g}/\text{m}^3$ in Galesburg, which places it 36th among 78 air monitoring sites in the Illinois ranking outside of Cook County (Ex. 50). Galesburg has more population (approximately 36,000) than Kankakee (approximately 31,000) and its 1973 annual particulate level ($66 \mu\text{g}/\text{m}^3$) also exceeded that of Kankakee ($60 \mu\text{g}/\text{m}^3$ based on the Bradley reading).

The percentages of people within major metropolitan areas (MMA's) that are included in the much smaller MPA's, where protection from excessive particulates is most needed, are as follows (R. 828-830, 1138-1140):

| <u>Major population area (MPA)</u> | <u>Percentage of MMA population protected</u> |
|------------------------------------|---|
| Chicago | 98 |
| Rockford | 65 |
| Rock Island-Moline | 80 |
| Peoria | 73 |
| Pekin | 70 |
| Bloomington-Normal | 64 |
| Champaign-Urbana | 58 (Ex. 27) |
| Decatur | 75 |
| Springfield | 63 |
| St. Louis Metro-east | 88 |

Measured emissions from a large elevator in Kansas City (Ex. 43) and calculations from these data indicate that more than a one-mile buffer zone around municipalities in MPA's, as proposed by the Agency, is needed to adequately protect residents of such areas from particulate emissions from large grain-handling facilities around the perimeter of these municipalities. Particulate emission (uncontrolled) data from the Kansas City study (Ex. 43) and dispersion modeling were used by the Agency to estimate the contribution of emissions from a typical grain elevator to the ambient particulate levels (Ex. 55). Based upon calculations using the information and assumptions in Exhibit 55, the following table lists the distances one would have to be located from elevators of certain sizes so that the 24-hour primary particulate standard of $260 \mu\text{g}/\text{m}^3$ would not be violated:

| <u>Annual grain through-put of elevator</u> millions of bushels | <u>Distance to meet primary standard</u> miles |
|--|---|
| 2.0 | 0.83 |
| 2.5 | 1.0 |
| 4.4 | 1.5 |
| 9.0 | 2.0 |
| 15.0 | 2.9 |
| 20.0 | 3.5 |

Since the above calculations do not include background pollution levels, the distances should be considered minimums in terms of protecting people from potentially adverse health effects (at the 260 $\mu\text{g}/\text{m}^3$ 24-hour primary standard) of emissions from these large uncontrolled grain elevators. Based on the above analysis, the Board has increased the buffer zone around municipalities in MPA's from one mile to two miles. The protection of people from uncontrolled emissions from grain elevators will be correspondingly increased from facilities with an annual through-put of 2.5 million bushels up to 9.0 million bushels.

The control of emissions from grain-handling and grain-drying operations involves (a) the capture of particulates from various sources and (b) the removal of particulates in devices such as baghouses or cyclones before air is released to the atmosphere (R.770). During the last two hearings, there was vigorous debate concerning whether the removal efficiency of particulates collected should be 99%, as proposed by the Agency (Ex. 18), or 98%, as suggested by most industry representatives [July 17 hearing R. 916-941, 946-958, 1004-1022, 1024-1036 and August 5 hearing R. 1075 (sic) -1115]. Brief summaries of the relative merits of 99% versus 98% removal efficiency are given in Exhibits 58 (Haschemeyer), 60 (Detweiler), and 61 (Benedetto).

The two most common kinds of particulate removal devices are baghouses (fabric filters) and cyclones. In comparison with cyclones, baghouses have slightly higher efficiency, especially for small particles, but they cost more to install and operate, and are more difficult to consistently maintain at their rated efficiency. If 99% removal efficiency is required, control technology would be limited primarily to baghouses because some cyclones cannot guarantee this efficiency but can consistently achieve 98% efficiency. After thorough study of testimony and recurrent discussions of this problem both before and after this proposed Regulation was published for comment January 28, 1975, in our Environmental Register No. 97, the Board decided to require particulate removal efficiency of not less than 98% by weight for grain-handling facilities having a grain through-put exceeding 2 million bushels per year and located within a major population area.

ECONOMIC IMPLICATIONS OF THIS REGULATION

Professor L.F. Stice, University of Illinois College of Agriculture, characterized the grain-handling industry as a "highly competitive, low margin, high capital requirement industry with slow depreciation rates; an industry that often found themselves without adequate working capital or resources to modernize when fast changes came into being" (R. 635). In a study of 77 grain elevators in 1971, the average returns on capital investment were about 9% (R. 642). However, "only a third of these 77 firms probably had the financial strength or sufficient strength and working capital to expand and modernize" (R. 643).

Net profits for 1971 for 261 grain elevators in Illinois in relation to annual grain through-put are listed below (Ex. 7):

| Annual grain through-put bushels | Net profit (thousands of dollars) | | | | | |
|----------------------------------|-----------------------------------|------|-------|-------|--------|------|
| | Loss | 0-20 | 21-40 | 41-60 | 61-100 | >100 |
| 0 - 299,000 | 11 | 26 | 2 | 2 | 1 | |
| 300,000 - 999,000 | 18 | 64 | 27 | 2 | 3 | |
| 1,000,000 - 1,999,000 | 7 | 22 | 29 | 5 | 5 | |
| 2,000,000 - 2,999,000 | 2 | 2 | 16 | 3 | 2 | |
| >3,000,000 | | 1 | 2 | 1 | 5 | 3 |
| Total | 38 | 115 | 76 | 13 | 16 | 3 |

Large elevators, with an annual grain through-put exceeding 2 million bushels, are more profitable and can finance pollution control equipment more readily than smaller elevators.

This Regulation affects grain-handling operations having a grain through-put of more than 300,000 bushels per year and grain-drying operations with a total grain-drying capacity exceeding 750 bushels per hour for 5% moisture extraction. On grain-handling facilities having a grain through-put of more than 2 million bushels per year and located within a major population area, the use of air pollution control equipment is mandatory and the particulate removal efficiency must be at least 98% by weight. This group comprises approximately 50 large grain-handling facilities (R. 1147), of which less than one-half have adequate pollution control equipment (R. 1149). Other grain-handling and grain-drying operations, including those located outside a major population area, will be required to use air pollution control equipment in those cases where the results of a certified investigation by the Agency indicate that a particular grain-handling or grain-drying operation is causing or tending to cause air pollution. This group includes the 138 grain-handling facilities against which complaints have been filed with the Agency (Ex. 40), if the complaints are proven up by certified investigations. Therefore, there are approximately 175 to 200 grain-handling facilities in Illinois which will need to promptly install air pollution control equipment in order to comply with these Regulations (R. 1148).

Baghouses and cyclones are used to control particulate emissions from grain-handling operations. Costs per standard cubic foot of air per minute (scfm) are higher for small installations than for large installations.

Some representative costs for baghouses installed in different sizes of grain-handling operations are as follows:

| Cost | | Size of facility | | Source of information |
|---------|-----------|------------------|--------------------------|-----------------------|
| Total | Per scfm | Total scfm | Annual grain through-put | |
| \$ | \$ | thousands | millions of bu. | |
| 25,000 | 2.00 | 12-13 | | R.1077,1083 |
| | 3.00-5.00 | 12-16 | | R.294,917 |
| 18,000 | 0.62 | 29 | } 24 | R.1005,1006 |
| 90,500 | 2.05 | 44 | | |
| 40,000 | | | 10-20 | Ex. 8 |
| 90,000 | | | 80 | Ex. 8 |
| 865,000 | 1.73 | 500 | | R.1084 |

Representative costs of cyclones installed in different sizes of grain-handling operations are as follows:

| Cost | | Size of facility | | Source of information |
|---------|-----------|------------------|--------------------------|-----------------------|
| Total | Per scfm | Total scfm | Annual grain through-put | |
| \$ | \$ | thousands | millions of bu. | |
| | 1.75-3.00 | 12-16 | | R.294,917 |
| 20,000- | | | | |
| 35,000 | 1.25-2.19 | 16 | 5 | R.420,423 |

For similar sizes of facilities, the cost of installing and operating baghouses is usually higher than for cyclones (R. 294, Ex. 60). Cyclones are sometimes used as primary collectors with supplementary baghouses.

"Fifth-mesh control on rack dryers will cost about \$0.20-0.40 per scfm of exhaust air. . . . or about \$22,000 for a 2,000 bushels per hour dryer" (Ex. 8). At an elevator with an annual grain through-put of 4.8 million bushels, air pollution controls on a rack dryer cost nearly \$36,000 (R. 422). New column dryers will cost \$0.40-0.50 per scfm of exhaust air or about \$60,000 for a 2,000 bushels per hour dryer (Ex. 8).

EXPLANATION OF SPECIFIC RULES

The explanations given in the remainder of this Opinion are intended to provide background for the specific rules that were adopted June 13, 1975. Major attention is given to those rules which were debated most vigorously during the hearings, but little or no explanation is given for rules which are self-explanatory.

103 PERMITS

(b) (2) (A) Date Operating Permit Required

The third paragraph under "Initial Proposal" and the third paragraph under "Development Of This Regulation" explain the postponement of this date, first to September 1, 1974, and then to a later date to permit the completion of this R72-18 proceeding. After studying the testimony presented during the hearings, the Board proposed in our Environmental Register No. 97 (January 28, 1975) that September 1, 1975, be the date by which operating permits were required for grain-handling and grain-drying operations. However, because of delay in adopting this Regulation, December 31, 1975, is the date now established for operating permits in the accompanying Regulation. This will give ample time for applications for operating permits to be filed 90 days before the operating permit is required, as is specified in Rule 103(b) (2) (B) of Chapter 2.

(i) Exemptions

- (17) Twenty-three percent of the 1,400 elevators in Illinois have a grain through-put of less than 300,000 bushels per year (Ex. 7). These small grain elevators have generated only 4 percent of the air pollution complaints received by the Agency (R. 477) and earn very low economic returns (Ex. 7) so that their ability to finance pollution control equipment is quite limited. Approximately 100,000 farmers in Illinois (R. 384) have personal grain-handling facilities, but almost all of them have an annual grain through-put of much less than 300,000 bushels. Since these small grain-handling facilities usually do not create an air pollution problem if they are properly managed, and the administrative costs of issuing permits to them would greatly exceed the benefits gained, they are exempt from the operating permit requirements. However, all grain-handling and grain-drying facilities, regardless of size, are still subject to sanctions pursuant to a violation of Section 9(a) of the Environmental Protection Act.

- (18) The Joint EPA-Industry Task Force proposed a permit exemption for "grain-drying operations with a total aggregate grain-drying capacity not exceeding 550 bushels per hour at 5% moisture extraction at manufacturer's rated capacity." Mr. E.A. Campbell, an engineer with the Agency, explained (R. 494, 495) the basis for the 550 bushels and 5% moisture extraction (Ex. 7, graph DR4). Professor H.J. Hirning of the University of Illinois Agricultural Engineering Department stated that the 550 bushels drying capacity at 5% moisture extraction "is more stringent than I would personally like to see" (R. 718). In Exhibit 22 Professor Hirning explained that grain dryers on farms are increasing in size as farms become larger. To increase the drying capacity Rule 103(i)(18), he suggested 10% moisture extraction, as is indicated as one of the two alternatives in ASAE Standard 248.2, Section 9.1.1 (Ex. 22). Exhibit 7, graph DR4, indicates that a permit exemption for a total grain-drying capacity not exceeding 750 bushels per hour for 5% moisture extraction is more appropriate since it separates the smaller grain dryers used by farmers and small elevators from the large capacity dryers (>750 bushels) that are used in larger grain-handling facilities.
- (19) An operating permit is not required for portable grain-handling equipment and for one-turn storage space for grain.

201 DEFINITIONS

The following definitions are identical to definitions of the same terms which appear in the Illinois Environmental Protection Act, and the Pollution Control Board Regulations, Chapter 2, Air Pollution:

Act, Agency, Air Pollution, Board, and Person.

The other definitions are self explanatory except for the following ones in which the background and intent need to be given in more detail.

Certified Investigation: Certified investigations are made by the Agency to determine whether a grain-handling or grain-drying operation is causing or tending to cause air pollution. Such an investigation may be initiated as a result of citizen complaints or surveillance by the Agency.

Grain: This definition was added to characterize the unaltered grains (Ex. 60), to which this Regulation applies, and to distinguish them from processed feed, to which Rules 203(a), 203(b), 203(c), and 203(f) of Chapter 2 apply.

Major Population Area: These major population areas were defined during the last three hearings in this proceeding, as is explained in the section on "Need For Greater Pollution Control In Major Population Areas." These areas were given special attention to minimize the air quality impact of grain-handling emissions where the quality of air is of greatest concern and where the population is most dense.

203(d) (9) Grain-Handling and Grain Drying Operations

The process weight standards of Rules 203(a), 203(b), and 203(c) and the fugitive particulate matter Rule 203(f) (2) of Chapter 2 do not apply to grain-handling and grain-drying operations, unless they elect to comply with those Rules in accordance with the provisions in Rule 203(d) (9) (K) herein. Except for this choice, grain-handling and grain-drying operations must comply with the other provisions of Rules 203 (d) (9), 201, and 103 as adopted in this proceeding.

(A) Housekeeping Practices

When the "Proposed Amendments To Chapter 2" were submitted by the Joint EPA-Industry Task Force to the Board, "Minimum Recommendations For Housekeeping Practices" were included as an Appendix. These Housekeeping Practices were later [August 5 hearing R. 1061 (sic)] incorporated directly into these Amendments to Chapter 2 as Rule 203(d) (9) (A). The Housekeeping Practices must be followed by all grain-handling and grain-drying operations, regardless of size.

(B) Existing Grain-Handling Operations

All existing grain-handling operations with a total annual grain through-put of 300,000 bushels or more shall apply for an operating permit pursuant to Rule 103(b) (2) (A) herein and Rule 103 (b) (2) (B) of Chapter 2, unless they are allowed to use alternate control according to Rule 203(d) (9) (K) herein. However, existing grain-handling operations located outside major population areas and existing grain-handling operations having a grain through-put of not more than 2 million bushels per year and located inside a major population area shall receive such permit if they can meet the conditions specified in Rules 203(d) (9) (D), 203(d) (9) (E) or 203(d) (9) (B) herein. For "Cleaning and Separating Operations", "Major Dump-Pit Areas", "Internal Transferring Areas", and "Load-Out Areas", different particulate removal efficiencies are required for facilities with an annual grain through-put exceeding 2 million bushels and located within a major population area (98%) than for facilities having a grain through-put of not more than 2 million bushels per year or located outside a major population area (90%).

The control of particulate emissions involves first the capture of particulates and then their removal from the air before it is released to the atmosphere. For example, on dump pits a minimum face velocity of at least 200 fpm is required at the effective grate surface in order to satisfactorily capture particulates at this point. Also, particulates must be captured to the extent necessary to prevent persistent visible particulate matter emissions directly into the atmosphere (R. 762). The Board does not intend to classify small, infrequent wisps of dust as persistent emissions of visible particulate matter.

Watercraft loading has some unique features, such as draft changes with loading and the use of trimming machines to load certain kinds of ships. Special provision was made for trimming machines in Rule 203(d)(B)(iv)(c)(2). Distinct progress is being made in reducing particulate emissions from watercraft loading and the best technology needs to be utilized more fully [R. 591-612, R. 891 (Ex. 30), and R. 1121 (Ex. 38)].

(C) Existing Grain-Drying Operations

The basis for requiring existing facilities with a grain-drying capacity in excess of 750 bushels per hour for 5% moisture extraction to apply for operating permits pursuant to Rule 103(b)(2)(A) herein and Rule 103(b)(2)(B) of Chapter 2 is given in the discussion of Rule 103(i)(18). These dryers must be operated so as to preclude the emission of particulate matter with a mean diameter larger than 300 microns.

A distance of 300 microns is equivalent to the 50 mesh sieve opening required in rack dryers, but is only 1/8 of the size of the 0.094 inch transverse openings allowed in column dryers (Ex. 5, page 2). In comparison with rack dryers, particulate emissions are lower from column dryers because of three design features in the latter (Ex. 11). "First, the grain column apparently acts to a large extent as a filter and thereby retains potential particulate emissions. Secondly, a rack dryer allows essentially free fall of the grain down the height of the dryer, whereas virtually no free fall can occur in the vertically flooded grain column of a column dryer. Thirdly, the much lower air velocity through the grain column does not separate the lighter particles (i.e., bees wings) from the grain column itself" (R. 493).

For rack dryers having a total grain-drying capacity in excess of 750 bushels per hour for 5% moisture extraction, the exhaust gas shall be ducted through air pollution control equipment which has a particulate removal efficiency of 90% by weight prior to release into the atmosphere at grain-handling facilities having a grain through-put of not more than 2 million bushels per year or located outside a major population area. For similar rack dryers at grain-handling facilities having a grain through-put exceeding 2 million bushels per year and located within a major population area, the dryer exhaust gas shall be ducted through air pollution control equipment which has a particulate removal efficiency of 98% by weight prior to release into the atmosphere.

(D) Exemptions

This Rule is included to allow existing grain-handling and grain-drying operations located outside a major population area and any existing grain-handling operation having an annual grain through-put of less than 2 million bushels and located within a major population area to obtain an operating permit without installing air pollution control equipment, as specified in Rule 203(d)(9)(B) and 203(d)(9)(C), respectively, if they can meet the requirements of Rules 203(d)(9)(D)(i) and 203(d)(9)(D)(ii).

(E) Loss of Exemption

If the Agency determines after a certified investigation that any existing grain-handling or grain-drying facility located outside a major metropolitan area or any grain-handling facility having an annual grain through-put of less than 2 million bushels and located within a major population area is operated so as to cause or tend to cause air pollution, the Agency is authorized by this Rule to notify the operator of the subject facility that he is required to apply for a new operating and/or construction permit pursuant to Rule 103 herein within 60 days after receipt of such written notice from the Agency.

(F) New and Modified Grain-Handling Operations

New and modified grain-handling operations having an annual grain through-put greater than 300,000 bushels shall file applications for construction and operating permits pursuant to Rule 103 herein, and shall comply with the control equipment requirements of Rule 203(d)(9)(B).

(G) New and Modified Grain-Drying Operations

New and modified grain-drying operations with a total grain-drying capacity exceeding 750 bushels per hour for 5% moisture extraction shall file applications for construction and operating permits pursuant to Rule 103 herein, and shall comply with the control equipment requirements of Rule 203(d) (9) (C).

(H) Circumvention

Circumvention results from proof that a pattern of ownership or facility development was established with the intent to avoid the requirements of this Regulation. The fact that some legitimate business purpose is served by the pattern of ownership or facility development shall not be a defense if the predominant purpose of the pattern of ownership or facility development was to circumvent the requirements of this Regulation.

(I) Standard on Appeal to Board

This Rule states that the burden of proof in permit appeal cases is on the applicant. This is consistent with Section 40 of the Act. The last three lines of Rule (I) herein indicate that the applicant must prove that his operation is not causing air pollution as defined in Section 3(b) of the Act.

(J) Compliance Dates

Existing grain-handling and grain-drying operations subject to Rules 203(d) (9) (B), 203(d) (9) (C), and 203(d) (9) (D) shall achieve compliance by April 30, 1977. This is 16 months after the date that operating permits are required and, according to detailed testimony in the record of this proceeding, should give ample time for the installation of necessary pollution control equipment.

Reasonable dates for compliance depend on the degree of air pollution, the number of facilities which will need control equipment promptly, lead times needed to install control equipment, and the number of firms available to install needed equipment. As is explained in the sections concerning "Need For Pollution Abatement" and "Economic Implications Of This Regulation," there are approximately 175 to 200 grain-handling facilities in Illinois which will need to promptly install air pollution control equipment in order to comply with these Regulations (R. 1148). There are approximately one dozen firms available to install

the needed control equipment (R. 564, 925, 931). Estimates of lead time necessary to install different kinds of control equipment varied considerably, as is indicated below:

Aspiration and cyclone for dump pit = 8-12 months
(R. 292, 302, 917)
Aspiration and baghouse unit for dump pit = 12-18
months (R. 918, 941)
Control on cleaner = 9-10 months (R. 555)
Installation of equipment in stock = 2-4 months
(R. 555)
Delivery of components from other companies =
2-18 months (R. 556)
Time necessary to deliver 100 baghouse units =
12 months (R. 564)
Time required for installation of a large bag-
house unit after order is placed = 18 months
(R. 944)
Suggested overall time needed for compliance =
36 months (R. 918).

All grain-handling and grain-drying operations must comply with the Housekeeping Practices specified in Rule 203(d)(9)(A) beginning on the date that Rule 203(d)(9) is adopted by the Board.

New grain-handling and grain-drying operations shall comply with the provisions of Rule 203(d)(9) beginning on the date that this Rule is adopted by the Board.

(K) Alternate Control of Particulate Emissions

This Rule states that as long as the applicable provisions of Rule 203 are complied with, the emission limitations in this Regulation do not apply. For purposes of clarity Rules 203(a) and 203(b) are set out in separate paragraphs. This Rule also states that regardless of compliance with Rule 203(a) or 203(b) the Housekeeping Practices specified in Rule 203(d)(9)(A) must be complied with. The last paragraph states the kinds of proof that will satisfy the requirements of this Rule.

(L) Severability

This is a standard severability clause which specifies that a determination invalidating one provision in these Regulations does not affect the validity of other provisions of the Regula-

tions. It is consistent with parallel provisions in other chapters of the Board's regulations.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion and Order was adopted on the 13th day of June, 1975, by a vote of 50.



Christan L. Moffett, Clerk
Illinois Pollution Control Board