

ILLINOIS POLLUTION CONTROL BOARD  
May 15, 1975

PROPOSED AMENDMENTS TO CHAPTER 2, )  
AIR POLLUTION REGULATIONS FOR ) R72-18  
GRAIN HANDLING AND GRAIN DRYING OPERATIONS )

INTERIM ORDER OF THE BOARD (by Dr. Odell)

On January 28, 1975, the Illinois Pollution Control Board (Board) published on pages 21 to 33 of Environmental Register No. 97 a proposal in the above matter for public comment. That proposal was based upon a previous draft proposal by Joint IEPA-Grain Industry Task Force and evidence submitted during hearings.

On the basis of comments concerning the proposal published in Environmental Register No. 97 and further study of the record, the Board hereby publishes for further public comment three proposed changes in language in this proposed Regulation.

Change 1. Add the Galesburg MPA because of large emissions from two grain handling operations and air quality considerations which are discussed below. Insert the following statement on page 23 of Environmental Register No. 97, under "Major Population Area", after the description of the "Rock Island, Moline area."

"The area within the municipalities of Galesburg and East Galesburg, plus a zone extending two miles beyond the boundaries of said municipalities".

Amendments to the original Task Force proposal were submitted by the Illinois Environmental Protection Agency (Agency) on July 9, 1974, during the hearing at Galesburg, Illinois. These Agency amendments included mandatory controls, irrespective of complaints, in major metropolitan areas (MMA's) as defined in the Illinois Air Pollution Regulations, Chapter 2. The intent was to minimize the air quality impact of grain handling emissions in areas where the quality of the air is of concern and where the population is most dense (R. 464-467). It was estimated that between 90 and 100 elevators would be subjected to the mandatory controls based on their size being greater than 2 million bushels yearly throughput and their location being within a MMA (R. 503).

During the next hearing on July 17, 1974, near LaSalle-Peru, Illinois, the Agency refined the MMA's to more concentrated major population areas (MPA's) with smaller geographic areas. The mandatory controls are imposed on elevators whose annual throughput is greater than 2 million bushels per year and which are located in major population areas (MPA's). The MPA's are defined in Rule 201 and are shown on Exhibits 27, 44, and 45. Their configurations are intended, according to the Agency, to "protect those areas containing major population centers of the state, and where we had

air quality problems or potential air quality problems" (R. 1044 - August 5, 1974). The refinement was intended to include the majority of the people within the MMA's without including rural areas where mandatory controls may not be necessary. In particular, the Agency cited situations of grain elevators located 30 miles away from cities that would be included in the MMA's, which are county-wide designations, but whose air pollution impact on the cities would not be a problem (R. 831). Therefore, the Agency devised the MPA's which, in most cases outside of Chicago and St. Louis Metro-east, were city limit plus one-mile buffer zone designations. The locations of the major grain elevators, those greater than 2 million bushels annual throughput, are shown on Exhibit 28 as green circles for locations outside city limits but within MMA's. There are 30 elevators indicated on Exhibit 28 which would not be subjected to mandatory controls using the MPA concept that would be using MMA's.

With the further refinement at the final hearing on August 5, 1974, in Chicago, the percentages of people within MMA's that include MPA's are as follows (R. 828-830, 1138-1139):

<u>Major Population Area (MPA)</u>	<u>Percentage of 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

The air quality concern within the MPA's is justified based on an examination of 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 air quality standard of  $75 \mu\text{g}/\text{m}^3$  was exceeded. Of these locations where the air quality violated the standard in 1973, only 4 are not within the designated MPA's. The four locations are Galena, Quincy (2 sites), and Metropolis. 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.

The reduction in geographic area from MMA's to MPA's reduces the number of elevators subjected to mandatory emission controls. Exhibit 53 includes the Task Force inventory of grain handling facilities larger than 2 million bushels annual throughput located in MPA's. According to this information there are 33 of these grain handling facilities, of which 16 will be required to install emission controls according to the Agency. The other 17 are considered by the Agency to already have adequate controls.

The major grain handling emitters of particulates should also be checked in relation to the MPA's. Exhibit 17 is the Agency emission inventory which is a state-wide ranking of emitters of pollutants. The Agency was asked to investigate whether the largest emissions of particulates from grain handling facilities would be subjected to mandatory controls. Their response is included in Exhibit 53, and it shows that only 21 of the 50 largest (>2 million bushels annual throughput) grain handling emitters are within MPA's as then defined. The other 29 large emitters, each with estimated emissions greater than 1,000 lbs/hr (Exhibit 17), would be controlled only if complaints occurred. In particular, the second and fourteenth largest emitters of particulates from grain are located in Galesburg and together emit an estimated 1,443 lbs/hr particulates. A citizen has objected to these particulate emissions for several years (R. 690-693). 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 in the state-wide ranking (outside of Cook County - Exhibit 50). This indicates that Galesburg should be included as an MPA for the purposes of this Regulation. Galesburg is larger (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). With our addition of Galesburg to the MPA's, we believe that proper protection of air quality in populated areas will be achieved.

Change 2. Change the zone of one mile to two miles beyond the municipalities included in the respective MPA's (as defined on pages 23 and 24 of Environmental Register No. 97) to increase the protection of residents within the densely populated municipalities so specified. Measured emissions from a large grain elevator and calculations from these data indicate that more than a one-mile buffer zone around municipalities in MPA's is needed to adequately protect residents of such areas from particulate emissions from large grain handling facilities around the perimeter of these municipalities.

Long-term emissions were measured for seven operations at a Kansas City terminal elevator using weekly totals over a 6-month period (Exhibit 43). The seven operations are: rail car unloading, truck unloading, rail car loading, cleaning, transferring (gallery belt), transferring (tunnel belt) and the headhouse. Short-term emissions were measured at the same elevator for individual operations of truck unloading, car unloading, and car loading. The emissions measured were those collected by the baghouse emission control systems and the results are conservative since not all emissions from the various operations were captured. The elevator handled various mixes of four grains (milo, wheat, corn, and soybeans) during the 6-month testing period, and while the long-term results did not show a dependence on type of grain handled, the short-term results did.

Emission factors (particulate emissions per weight of grain handled) were calculated using the throughput records kept by the elevator. The weekly results varied significantly from week to

week but it is felt that the long-term averages give a true indication of the emissions. The long-term average emission factors and their comparison with AP-42 "Compilation of Air Pollution Emission Factors" (Exhibit 24) are listed below:

	Emission factors (lbs/ton)	
	<u>Exhibit 43</u>	<u>AP-42</u>
Truck unloading	0.64	1
Car unloading	1.30	1
Car loading	0.27	1
Corn cleaner	5.78	5
Gallery belt	0.11	-
Tunnel belt	1.40	2*
Headhouse	1.49	-

\* Value is for transferring, conveying, etc.

In actual elevator operation several operations occur sequentially. For example, unloading a truck would be followed by elevation of the grain to the headhouse, and transfer onto the gallery for storage, so that the overall emission factor for this activity would be  $0.64 + 1.49 + 0.11 = 2.24$  lbs/ton.

Short term emission factors show a dependence on the type of grain and whether loading or unloading, as is shown below:

	<u>Truck unloading</u> (lbs/ton)	<u>Car unloading</u> (lbs/ton)	<u>Car loading</u> (lbs/ton)
Soybeans	1.63	1.51	0.44
Milo	0.95	1.08	0.29
Corn	0.47	0.62	0.28
Wheat	0.25	0.50	0.17

Evidence presented during the hearings indicated the impact on air quality, including adverse health effects (Exhibit 3), of particulate emissions from grain handling facilities. The Agency, in Exhibit 55, used dispersion modeling to estimate the contribution to the ambient particulate level from a typical grain elevator. The elevator was assumed to have an annual throughput of 2 million bushels, and particulate emissions (uncontrolled) based on the Kansas City study, Exhibit 43. Hourly and daily maximum ground level particulate concentrations were calculated for points at various distances from the elevator for various combinations of atmospheric stability and windspeed. The following table summarizes the results of the calculations:

<u>Distance from elevator</u> miles	<u>Maximum hourly concentration</u> $\mu\text{g}/\text{m}^3$	<u>Average 24-hour concentration</u> $\mu\text{g}/\text{m}^3$
0.50	2,547	425
0.75	2,061	290
1.00	1,621	208
1.25	1,327	150
1.50	1,125	117

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- Notes: 1. The 24-hour primary standard is  $260 \mu\text{g}/\text{m}^3$ .
2. The concentrations calculated are contributions from a single source and do not include background levels.

These results show that uncontrolled elevators may have a significant impact on air quality at distances greater than a mile, and thus we must question the use of a one-mile buffer zone in the designations of MPA's as proposed by the Agency. As pointed out in Exhibit 55, the ground level concentrations are directly proportional to the emissions, and via the emission factors to the size of the grain handling facility. For example, uncontrolled emissions from an elevator having an hourly rate of 20,000 bushels (roughly equivalent to an annual throughput of 4 million bushels) would result in a 24-hour ground level concentration of  $300 \mu\text{g}/\text{m}^3$  (which exceeds the primary standard) at 1.25 miles, and  $234 \mu\text{g}/\text{m}^3$  at 1.5 miles.

One way of analyzing the potential impact of elevators is to calculate the distances one would have to be located from elevators of certain sizes such that the 24-hour primary standard of  $260 \mu\text{g}/\text{m}^3$  was not violated. The following table uses the information and assumptions of Exhibit 55 to show the spatial impact of large elevators:

<u>Annual grain throughput of elevator</u> millions of bushels	<u>Distance to meet primary standards</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 the potential 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 one-mile buffer zone specified in the designations of MPA's by the Agency is not sufficiently large since it will only offer

protection to people from uncontrolled elevators not larger than 2.5 million bushels annual throughput.

In order to provide increased protection to citizens from large uncontrolled elevators, it is therefore necessary to increase the spatial coverage in defining MPA's beyond that proposed by the Agency. We do this by increasing the buffer zone around the municipalities included in the definition of MPA from one mile to two miles. This will then, according to the above table, protect people from the uncontrolled emissions from grain elevators of up to 9 million bushels annual throughput in size rather than 2.5 million bushels annual throughput.

Change 3. Rule 203(d)(9)(B)(iv)(c)(3) on page 28 of Environmental Register No. 97. In a letter received by the Board on February 25, 1975, from the Chicago Regional Port District it was indicated that the trimming machine portion of their two lessees' operations which convey grain to the corners of vessels could not comply with this Rule. Closure of the hatches of such vessels while filling them with trimming machines would create combustion hazards for men and property. Until technology is shown to be available to load such ships by improved methods, the removal efficiency requirement of particulates from trimming machines will be reduced below 98%. On the bottom of page 28, at the end of Rule 203(d)(9)(B)(iv)(c)(3), add after "atmosphere"; "except for the portion of grain loaded by trimming machines for which particulate matter emission reductions, at a minimum, shall equal the reduction achieved by compliance with subpart (iv)(c)(2) herein."

Public comment will be received until June 5, 1975, concerning the three changes proposed herein.

#### ORDER

The Illinois Pollution Control Board hereby proposes the following changes in R72-18, Proposed Amendments to Chapter 2, Air Pollution Regulations for Grain Handling and Grain Drying Operations:

1. On page 23 of Environmental Register No. 97, add the following "Major Population Area":

"The area within the municipalities of Galesburg and East Galesburg, plus a zone extending two miles beyond the boundaries of said municipalities."

2. On pages 23 and 24 of Environmental Register No. 97, in the definitions of each appropriate "Major Population Area", change "one mile beyond the boundaries of said municipalities" to "two miles beyond the boundaries of said municipalities."

3. On the bottom of page 28, at the end of Rule 203(d) (9) (B) (9v) (c) (3), add after "atmosphere"; "except for the portion of grain loaded by trimming machines for which particulate matter emissions, at a minimum, shall equal the reduction achieved by compliance with subpart (iv) (c) (2) herein."
4. Comments concerning these proposed changes will be received by the Board until June 5, 1975.

IT IS SO ORDERED.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion and Order was adopted on the 15<sup>th</sup> day of May, 1975, by a vote of 5-0

  
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Christan L. Moffett, Clerk  
Illinois Pollution Control Board

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