

ILLINOIS POLLUTION CONTROL BOARD
November 29, 1988

IN THE MATTER OF:)
)
PETITION TO AMEND 35 ILL. ADM.) R87-18
CODE PART 216, CARBON MONOXIDE)
EMISSIONS (Midwest Grain Products)
of Illinois)

ADOPTED RULE FINAL ORDER

OPINION AND ORDER OF THE BOARD (by J.D. Dumelle):

This matter is before the Board upon a regulatory proposal filed by Midwest Grain Products of Illinois (Midwest) on June 12, 1987. Through its proposal, Midwest is seeking relief for its Pekin, Illinois (Tazewell County) Alcohol Production Facility from the requirements of 35 Ill. Adm. code 216.126, which sets emission limits on carbon monoxide (CO) at no greater than 200 ppm, corrected to 50 percent excess air. Midwest is proposing that it be exempted from that standard and instead be subject to an emission standard not to exceed 700 ppm, corrected to 50% excess air. The Illinois Environmental Protection Agency (Agency) took no position on the proposal, neither supporting or opposing Midwest's proposal.

A merit hearing on this proposal was held on November 23, 1987, at the Pekin City Hall, Pekin, Tazewell County, Illinois. On February 16, 1988, the Department of Energy and Natural Resources (DENR) filed a negative declaration, setting forth its determination that the preparation of a formal impact study was unnecessary. The negative declaration was based upon DENR's finding that the cost of making a formal study is economically unreasonable in relation to the value of the study to the Board in determining any adverse economic impact of the proposed regulation. On March 15, 1988, the Board received notification that the Economic and Technical Advisory Committee (ETAC) concurred in DENR's negative declaration.

BACKGROUND

At its Pekin Facility, Midwest operates its plant 24 hours/day, 7 days/week with 4 weeks/yr scheduled for regular maintenance. Pet. 5. The plant, which has been modernized by Midwest, has a present capacity of 50,000 gallons/day; and employs approximately 135 people. Pet. 1. The facility consists of a new 120,000 lb/hr bubbling-bed fluidized bed combustion (FBC) boiler and three natural gas fired boilers retained for emergency and standby services only. R. 33, Pet. 3. A high-

pressure topping-turbine generator was also installed, generating 3000 KW of electricity for Midwest's use. Midwest has provided the following data concerning its new boiler:

ENGINEERING DATA FOR FLUIDIZED
BED COMBUSTION BOILER

Manufacturer	Foster Wheeler
Type	Fluidized Bed
Steam Flow, pph	120,000
Steam Temperature, Degrees F	750
Steam Pressure, psig	685
Steam Enthalpy, Btu/lb	1377
Feedwater Temperature, Degrees F	228
Feedwater Enthalpy, Btu/lb	196
Boiler Efficiency, %	83.5
Heat Input, MMBtu/hr	170
Coal Feed Rate, lb/hr	16,100
Mass Flue Gas Flow Rate, lb/hr	215,000

The electricity generation is accomplished using high sulfur Illinois coal, available 40 miles from the plant site. Pet. 3. Midwest asserted that the use of locally available Illinois coal, transported from nearby mines, results in lower levels of air pollution. Pet. 3.

Midwest asserted that fluidized bed combustion technique is an efficient and environmentally safe method for utilizing high sulfur Illinois coal. Nonetheless, it is asserted, it is not technically possible to operate the Midwest's particular bubbling-bed boiler in an efficient manner, while simultaneously meeting the carbon monoxide limits set forth at 35 Ill. Adm Code 216.121. Midwest submitted data from a similar Foster Wheeler (FBC) Boiler currently operating at Georgetown University. Performance tests conducted indicate carbon monoxide emissions (adjusted to 50% excess air) were 630 ppm based upon wet flue gas. Likewise, at Great Lakes Naval Training Center, a fixed bed FBC boiler was operating with carbon monoxide emissions between 1000 and 2000 ppm.

In August of 1984, Midwest, using Clear Air Engineering, conducted emissions testing on the boiler at issue. The results showed average carbon monoxide emissions of 484 ppm, corrected to 50% excess air. Pet. 6. Notwithstanding, it is uncontested that modern fluid bed boilers are capable of meeting the 200 ppm limitation. However, these newer boilers are of a different design which results in the lower emissions. Pet. 8. Midwest's plant cannot avail itself of this design.

Although the petition referenced 484 ppm average emissions for August of 1984, testimony at hearing indicated that emissions have been lowered such that Midwest is in compliance with the 200

ppm limitation fully 88% of its operating time. Mr. Tony Petricola, plant manager and chemical engineer for Midwest, explained the inconsistency between the data as follows:

"Quite accidentally, it was discovered that a shift in coal mix from a 50/50 mixture of Coal A and Coal B to nearly 100% Coal A resulted in a possible decrease in carbon monoxide levels. This led us to suspect that coal fines may be a significant factor in influencing carbon monoxide levels for this type of boiler. An explanation is that coal fines are carried out of the combustion zone before they are completely burned. Incomplete combustion is known to produce carbon monoxide. Based upon this finding ... Midwest Grain Products now uses virtually 100 per cent Coal A, even though it is more expensive than Coal B." R. 21.

Thus, Midwest was able to reduce its emission significantly by altering the source of fuel used. Mr. Petricola further stated that carbon monoxide readings at the Midwest plant were not corrected for 50 percent excess air; this correction would lower carbon monoxide data by approximately 15 percent. R. 28. Also it was asserted that exceedances of the 200 ppm are expected mainly during load changes.

ENVIRONMENTAL IMPACT

Although the Illinois Environmental Protection Agency (Agency) took no official position on Midwest's proposal, at hearing, counsel for the Agency made the following statement:

"... But under these facts that have been presented by Midwest Grain, which are specific to Midwest Grain and to its particular FBC Boiler and their good current operating practices, and we have studies that show no harmful effect to the environment. The Agency is basically taking the position of no objection and no actual support ..."

R. 48.

It should be noted that the studies referred to were not made a part of this record, apparently because the Agency neither supported nor opposed the petition. Additionally, Mr. Petricola testified that the plant is environmentally safe and meets all requirements except those for carbon monoxide. R. 15, 27, 28, Pet. 5.

Midwest has sponsored a study of its carbon monoxide emissions from its FBC Boiler, utilizing the industrial source complex short term (ISCST) dispersion model. Pet. 8. The modeling was conducted using 1973 meteorological data and a carbon monoxide emission of 700 ppm. A summary of the results and the allowable air standards is set forth below:

<u>Averaging Period</u>	<u>Model Results</u>	<u>Significance Level</u>	<u>Percent of Significance Level</u>	<u>NAAQS</u>	<u>Percent of Limit</u>
1 HR	102.7ug/m3	2000ug/m3	5.1	40,000ug/m3	0.25
8 HR	49.7ug/m3	575ug/m3	8.6	10,000ug/m3	0.50

From the data submitted above, it is clear that establishment of the proposed site specific standard will not interfere with attainment and maintenance of National Ambient Air Quality Standards for carbon monoxide. Midwest's pro rata contribution to the significance level is de minimus. Additionally, it should be noted that Pekin, Tazewell County is an attainment area for carbon monoxide. Based upon the data submitted there will be no community health impact from the operation of Midwest's FBC Boiler.

TECHNICAL FEASIBILITY

Midwest submitted substantial evidence regarding the technical infeasibility of modifying its plant or boiler operations. Midwest undertook several studies to identify the causes of higher carbon monoxide levels and possible methods of reducing them. R. 19. In the first study, boiler load, limestone usage, bed temperature and excess oxygen were varied -- but no clear correlation was observable. In most cases, higher bed temperatures resulted in lower carbon monoxide levels -- but higher nitrogen oxide levels. In a second study performed by Midwest, it was concluded that attempts to lower carbon monoxide emissions by manipulating operating conditions were useless and invariably resulted in inefficiencies and increases in nitrogen oxide and sulfur dioxide. R. 21. (It was during this study that Midwest discovered that using coal from one of its suppliers substantially reduced emissions).

Midwest examined three means of reducing carbon monoxide: First, utilizing a larger freeboard area above the bed; second, increasing excess air; and third, using baffles in the combustion chamber. These have been rejected as inordinately expensive, incapable of significantly reducing carbon monoxide emissions or simply impractical and inapplicable to Midwest's facility. R. 22-25.

Although Midwest has examined the problem and studied many alternatives, the plant technology is such that it is not

possible to operate the Foster Wheeler Bubbling Bed Boiler and continuously meet the 200 ppm standard for carbon monoxide while simultaneously maintaining low sulfur dioxide and nitrogen oxide emissions. R. 27. Midwest's engineers stated they know of no available technology to reduce carbon monoxide without decreasing combustion efficiency and increasing nitrogen oxide emission.

ECONOMIC REASONABLENESS

Midwest introduced testimony that its facility is in compliance approximately 88% of the time. Additionally the current boiler was obtained at a cost of roughly 12.5 million dollars. R. 33. This does not include research costs paid to Bradley University. As noted above, there is, as yet, no known methodology or technology available that would prevent Midwest's facility from exceeding the 200 ppm limitation -- especially during load changes. For Midwest, this would mean two things: A loss of its \$12.5 million investment in the current boiler and additional costs of \$20 million to obtain a new, modern boiler. R. 32.

On May 19, 1988 the Board proposed for First Notice a rule which is substantially the same as that initially proposed. However, in noting several questions that remained outstanding, the Board's Opinion included suggested alternative language and requested comments by Midwest and IEPA.

Comments were submitted by both Midwest and the IEPA. Both contested the proposed alternative language -- but for different reasons.

In its First Notice Opinion and Order of May 19, 1988 the Board set forth the following as possible alternative language:

Section 216.122 Exception, Midwest Grain Products

- a) Emissions of carbon monoxide from the bubbling-bed fluidized bed combustion boiler of Midwest Grain Products of Illinois, located in Pekin, Illinois, shall not exceed 700 ppm corrected to 50% excess air during periods of load changes. No more than 12% of the operation hours during any continuous 30-day period shall exceed the 200 ppm of CO corrected to 50% excess air emission limitation of Section 216.121.

On June 2, 1988, Midwest filed its response to the Board's request for comment. Midwest stated that it would be impossible to guarantee compliance with the suggested alternative rule for two reasons. Initially, Midwest stated that much of its recent reduction of carbon monoxide is the result of using "one specific type of coal". Midwest further stated that there is no guarantee that this coal will always be available: "we must have an

alternate . . . supply if we are to continue operations . . . if it became necessary to use the alternate coal, it may be impossible to comply with the proposed alternate rule".

Secondarily, Midwest stated that it is impossible to maintain low CO levels during load swings; because CO levels can rise above 700 ppm for short periods of time. Midwest notes that load swings are mandated by several factors, including the following:

- (a) the process using the boiler's steam output
- (b) maintenance requirements
- (c) necessary shutdowns for cleaning
- (d) sales and production requirements

In summary Midwest reaffirmed its stated intention to "do everything possible to minimize CO levels" and reaffirmed confidence in its ability to comply with the rule as originally requested.

On August 8, 1988 the IEPA filed its response to the Board's May 19, 1988 Order. In responding to the suggested alternative language the IEPA stated as follows: "While the Agency is not opposed to the current wording . . . (it) suggests that a one-hour averaging time be applied to the 700 ppm CO limit so as to smooth out any short excesses over 700 ppm.

The Agency's comments noted some difficulty in determining what was or was not a "load change" as set forth in the suggested alternate rule. The comments stated that "even if the boiler were being held at a constant load, there would be some amount of fluctuation which would constitute a "load change". Determining compliance with such a rule would be extremely difficult, if not impossible."

In recognizing the Board's concerns regarding sporadic, temporary exceedances the Agency's comments noted that use of the one-hour averaging period would be consistent with the modeling demonstrations, which relied upon one-hour averages in demonstrating no significant impact upon ambient air quality.

Finally, the Agency's comments recommended the following language as an alternative to the Board's suggested alternative language:

The standard for carbon monoxide of Section 216.121 does not apply to emissions from the fluidized bed combustion boiler of Midwest Grain Products of Illinois, located in Pekin, Illinois, where the emission of carbon monoxide shall not exceed 700 parts per million, corrected to 50 percent excess air. Compliance shall be based upon a one-hour average.

The Agency's suggested language addressed both the Board's concerns about exceedances of the 700 ppm limitation and Midwest's concerns about temporary exceedances during load changes. Thus the language that "compliance shall be based upon an one-hour average" was added at Second Notice.

On August 18, 1988 the Board issued its Second Notice Opinion and Order. This Order addressed action which occurred subsequent to the First Notice Order and prior to August 18, 1988.

Subsequent to the Second Notice Opinion and Order this Board submitted its Second Notice package to the Joint Committee on Administrative rules. On November 18, 1988 the Joint Committee filed its Certificate Of No Objection To Proposed Rulemaking; thus there was no need to amend or modify language of the regulation. The text of the rule adopted today is identical to the language proposed at Second Notice on August 18, 1988.

ORDER

The Board hereby adopts, as final, the following amendments to be filed with the Secretary of State.

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE B: AIR POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD
SUBCHAPTER c: EMISSION STANDARDS AND LIMITATIONS
FOR STATIONARY SOURCES

PART 216
CARBON MONOXIDE EMISSIONS

SUBPART A: GENERAL PROVISIONS

Section	
216.100	Scope and Organization
216.101	Measurement Methods
216.102	Abbreviations and Conversion Factors
216.103	Definitions
216.104	Incorporations by Reference

SUBPART B: FUEL COMBUSTION EMISSION SOURCES

Section	
216.121	Fuel Combustion Emission Sources
<u>216.122</u>	<u>Exception, Midwest Grain Products</u>

SUBPART C: INCINERATORS

Section

216.141 Incinerators
216.142 Exceptions

SUBPART N: PETROLEUM REFINING AND
CHEMICAL MANUFACTURE

Section
216.361 Petroleum and Petrochemical Processes
216.362 Polybasic Organic Acid Partial Oxidation
Manufacturing
Processes

SUBPART O: PRIMARY AND FABRICATED METAL PRODUCTS

Section
216.381 Cupolas

Appendix A Rule into Section Table
Appendix B Section into Rule Table
Appendix C Compliance Dates

AUTHORITY: Implementing Section 10 and authorized by Section 27 of the Environmental Protection Act (Ill. Rev. Stat. 1981, ch. 111 1/2, pars. 1010 and 1027).

SOURCE: Adopted as Chapter 2: Air Pollution, Rule 206: Carbon Monoxide Emissions, R71-23, 4 PCB 191, April 13, 1972, filed and effective April 14, 1972; amended at 3 Ill. Reg. 47, p. 92, effective November 8, 1979; amended at 4 Ill. Reg. 24, p. 514, effective June 4, 1980; codified at 7 Ill. Reg. 13579; amended in R87-18 at ___ Ill. Reg. _____, effective _____.

SUBPART B: FUEL COMBUSTION EMISSION SOURCES

Section 216.122 Exception, Midwest Grain Products

The standard for carbon monoxide of Section 216.121 does not apply to emissions from the fluidized bed combustion boiler of Midwest Grain Products of Illinois, located in Pekin, Illinois, where the emission of carbon monoxide shall not exceed 700 parts per million, corrected to 50 percent excess air. Compliance shall be based upon a one-hour average.

(Source: Added at ___ Ill. Reg. _____,
effective _____)

IT IS SO ORDERED.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion and Order was adopted on the 29th day of November, 1988 by a vote of 7-0.

Dorothy M. Gunn
Dorothy M. Gunn, Clerk
Illinois Pollution Control Board