ILLINOIS POLLUTION CONTROL BOARD
January 10, 1980

IN THE MATTER OF:	)	
	)	R78-10
PARTICULATE EMISSIONS FROM STEEL MILLS (Revisions to Rule 203(d) of Chapter 2)	)	

OPINION OF THE BOARD (by Mr. Goodman):

The Clean Air Act Amendments of 1977, Public Law No. 95-95, amending the Federal Clean Air Act, 42 U.S.C. §7401 et seq., imposed certain new requirements on the State of Illinois. Section 172 of the Clean Air Act requires that Illinois provide for the attainment of the National Ambient Air Quality Standard (NAAQS) for total suspended particulate (TSP) by December 31, 1982. The provisions for attainment are to be included in the State Implementation Plan (SIP), which must "contain emission limitations, schedules of compliance, and other such measures as may be necessary...." Clean Air Act, §172(b)(8). Such SIP limitations, schedules and measures will be contained primarily in the Board's Air Pollution Control Regulations. The regulatory amendments made in this proceeding will aid in fulfilling the mandates of §172.

Pursuant to the 1977 Clean Air Act Amendments, the Illinois Environmental Protection Agency (Agency) reevaluated the SIP to determine which portions should be amended in order to attain and maintain NAAQS for all pollutants. After identifying geographical areas which are nonattainment for TSP levels, the Agency determined which sources were contributing to high TSP levels. The Agency found that the highest monitored TSP levels were generally located in the vicinity of steel mills (R.6). Hence, the Agency proposed amendments to the Board's regulations covering particulate emissions from steel manufacturing processes.

On September 5, 1978, the Agency filed a proposal to amend Rule 203(d) of the Air Pollution Control Regulations (Chapter 2 of the Board's Rules and Regulations). The Board docketed the proposal as R78-10 and ordered hearings set. Agency revisions to its proposal were published in the Board's

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The Board acknowledges the assistance of Carolyn S. Hesse, Technical Assistant, and Ken F. Kirkpatrick, Administrative Assistant, in the drafting of this Opinion, and the assistance of Roberta Levinson in serving as Hearing Officer.

Environmental Register Numbers 183 and 191. Public hearings were held in the following locations:

October 31, 1978	Edwardsville
November 8, 1978	Chicago
December 11, 1978	Chicago
December 12, 1978	Chicago
February 14, 1979	Chicago
March 6, 1979	Chicago
March 13, 1979	Chicago

Pursuant to Public Act No. 80-1218, Ill.Rev.Stat., ch. 96 1/2, §7401 et seq., the Illinois Institute of Natural Resources on March 28, 1979, filed IINR Doc. No. 79/06, The Economic Impact of Proposed Regulations to Reduce Particulate Emissions from Steel Mills and Industrial Fugitive Sources. Hearings on the economic impact of the proposed regulations were held in the following locations:

May 3, 1979	Oglesby
May 4, 1979	Chicago
May 16, 1979	Belleville
May 17, 1979	Springfield

On March 29, 1979, the Board proposed an Interim Order to meet the federal deadline for submittal of SIP revisions pursuant to the Clean Air Act. On June 22, 1979, the Board proposed a Final Draft Order and published it in the Illinois Register on July 20, 1979, pursuant to the Illinois Administrative Procedures Act, Ill.Rev.Stat., ch. 127, §1001 et seq. The public comment period ended on September 4, 1979. On September 6, 1979, the Board adopted a Final Order in this proceeding. This Opinion supports that Order.

EXISTING AIR QUALITY

The Agency submitted information on total suspended particulate (TSP) monitoring and modeling studies which showed that high ambient levels of TSP are associated with steel mills. The highest measured TSP levels in the state occur near steel mills when there are light winds from the direction of the mills. Chemical analyses of the monitoring samples indicate the presence of high levels of iron (R.21*). The samples also show TSP concentrations more than twice the National

* Citations to page numbers in transcripts from the substantive hearings are designated with the letter "R". After this proceeding and R78-11 and R79-3 were consolidated, the transcript pagination started again with the number 1. Citations to transcripts from the last four hearings are designated with the letter "S".
When R78-10, R78-11, and R79-3 were consolidated, the

Ambient Air Quality Standard (Ex.1/2). Consequently, the Board agrees with the Agency's conclusion that particulate emissions from steel mills must be reduced from their current levels.

RULE BY RULE DESCRIPTION

The Board's Final Order in this matter is very similar to the March 8, 1979 regulatory proposal (Ex.1/53) developed by the cooperative efforts of the Agency and representatives of the steel industry. The order reflects a middle ground between the original proposals submitted by them. The proposal presented at the first hearing by the Agency is Exhibit 1/1. A revised proposal was offered by the Agency on November 8, 1978 (Ex.1/7). Interlake, Inc., with the support of the steel industry, presented its proposal on December 11, 1978 (Ex.1/15).

The rules were renumbered in the Order for the sake of clarity. Some of the rules are self-explanatory and need no additional comments. The following is a rule by rule description of the Final Order.

203(d)(5)(A) Beehive Coke Ovens

This rule is the same as the previous rule and constitutes a general prohibition against the use of beehive coke ovens.

203(d)(5)(B) By-Product Coke Plants

(i) Exemption

This rule exempts by-product coke plants from the visible emission standards and limitations set forth in Rule 202.

(ii) Charging

Visible particulate emissions during coke oven charging are limited to 170 seconds totaled over five consecutive oven charges. An exception is allowed for existing five-meter coke batteries having three charging ports; emissions from them shall not exceed 200 seconds totaled over five consecutive charges.

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records of these three proceedings were marked as group Exhibits 1, 2 and 3 in the consolidated record, respectively. The following notation is used to refer to specific exhibits: Ex. (group exhibit number)/(exhibit number as identified before consolidation of records). For example, "Ex.1/2" refers to the document that was admitted as Exhibit 2 in the R78-10 record before consolidation. "Ex.5" refers to Exhibit 5 of the consolidated record and is part of the record in all three proceedings.

Coke oven charging was described in detail by several witnesses (R.162-177, 340-387, 694-716, 730-732, 751-755). During hearing, there was much testimony on the achievability of various time limits on the duration of visible emissions. The Agency originally proposed that visible emissions be limited to 125 seconds per five consecutive oven charges and presented data derived from several exemplary coke ovens to support their proposal. Mr. Hopkins of the U. S. EPA believed that stage charging and good work practices can achieve a 125 second emission limitation (R.246). The City of Chicago presented data on the coke ovens in Chicago which showed that the ovens could meet the 125-second limit. The City urged that a more stringent limitation be adopted.

Industry, on the other hand, testified that it would be impossible to meet the 125-second limitation on a day-in, day-out basis (R.631). Although they could meet the 125-second limitation part of the time, they advocated adoption of a longer limitation to allow a cushion in the event of malfunction or operator problems (R.755). The exemplary coke ovens described first by the U.S. EPA witnesses have variations in their charging times caused by malfunctions which increase the charging time, such as misalignment of the larry car and charging hold, a closed damper between the off-take pipe and collector main, improper seating or nonuse of the jumper pipe, and abnormal operations resulting from extremely cold weather (R.627).

Consequently, industry proposed that visible emissions from coke oven charging be limited to 2 seconds per ton of coal charged. Since most of the four meter coke batteries in Illinois charge approximately 17 tons of coal per charge, this calculates to 170 seconds totaled over five consecutive oven charges. The coke oven battery at Wisconsin Steel is a five-meter-high battery and takes a charge of approximately 28 tons of coal (R.697). Industry's original proposal would have allowed Wisconsin Steel's coke oven charging limitation to be 280 seconds totaled over five consecutive oven charges (R.714). However, information in the record suggests that Wisconsin Steel can meet a 200 second limitation without having to take extraordinary measures (R.1169).

The Board has determined that a limitation of 170 seconds of visible emissions during five consecutive oven charges (with an exception of 200 seconds for existing five meter batteries with three charging ports) is a reasonable limitation. The control technology required to meet these limitations is essentially the same as that required to meet the Occupational Safety and Health Administration's coke oven standard (R.162, 230). By using this technology and proper work practices, steel mills will be able to comply with this limitation. In determining compliance with the coke oven charging limitation, the Board does not intend that mere wisps of smoke be included; rather, only sustained smoke evolution is to be counted.

(iii) Pushing

For the most part, this Rule is self-explanatory. Mobile and stationary hoods are to be used to control coke pushing emissions. Sources are allowed the option of using either stationary or closely hooded mobile particulate collection systems. The coke side sheds at Wisconsin's and Republic's facilities are examples of stationary systems (R.888). Granite City Steel has two closely hooded mobile systems which were described at hearing (R.886-888). Particulate control equipment in the latter type of system is allowed to emit a higher concentration of particulate matter (0.06 gr/dscf) than the former (0.03 gr/dscf), since this system exposes less ambient air to the emissions and, consequently, a smaller total volume of air needs to be collected. This volume of air contains a higher concentration of particulate matter than the volume of air collected by a stationary system. Hence, the two systems are essentially equivalent (R.893-894).

The phrase "shall be designed to capture" is used instead of the phrase "shall capture" because of difficulties in quantifying actual capture efficiencies (R.399). It is easier to design a piece of equipment to this standard of performance than to determine if it achieves this standard.

(iii) Coke Oven Doors

Coke oven doors leak when the door is not sealed against the jamb. Leaks can be minimized by maintenance procedures such as properly cleaning the doors and jambs, maintaining the knife-edge sealing surface on the door, adjusting the springs to increase or decrease the pressure applied to the knife-edge, inspecting the knife-edge to insure that it is not damaged and inspecting the jambs to insure that the seating surface is adequate and that the jambs are not warped (R.866).

The Board's Final Order allows no more than 10% of the coke oven doors on a given battery to leak at a given time. Two witnesses, one from the U.S. EPA and the other from the City of Chicago, testified that a standard of 10% door leakage is attainable through good operating and maintenance practices (R.166). At least one steel mill in Illinois has been meeting that standard (R.571). The Final Order also requires either that a door repair facility exists nearby or that spare doors are on the premises so that defective doors can be repaired and replaced promptly.

(v) Coke Oven Lids

This Rule limits visible emissions from coke oven charging lids; no more than 5% of the lids can emit visible emissions at a given time. Both industry and Agency representatives

stated that they thought this was a reasonable standard (R.637) and was achievable through good work practices (R.168). All proposals (Ex. 1/1, 1/7, 1/15, 1/53) submitted to the Board contained the same limitation as that contained in the Final Order.

(vi) Coke Oven Offtake Piping

All of the proposals (Ex. 1/1, 1/7, 1/15, 1/53) contained the same wording as found in this Rule. Visible emissions from coke oven offtake piping shall not emerge from more than 10% of such piping at any given time. This standard is achievable through proper work practices (R.168). Since most of these emissions are wispy, any adverse environmental impact from these is expected to be minimal (R.638).

(vii) Coke Oven Combustion Stacks

Particulate emissions from coke oven combustion stacks are not to exceed 0.05 gr/dscf (0.11 g/m^3 at dry standard conditions). This limit is achievable by the use of electrostatic precipitators or baghouses (R.208). The proposals included provisions which required that an opacity limit be met unless a stack test showed that particulate emissions do not exceed 0.05 gr/dscf. Since the Board feels that determining compliance with the grain-loading limitation is more accurate than determing compliance with the opacity limitation, the Board has omitted the opacity requirement.

(viii) Quenching

This Rule requires that coke oven quench towers be equipped with grit arresters or equipment of comparable effectiveness in reducing emissions of particulate matter which may be entrained in the steam plume. Such control technology represents the state of the art for controlling particulate matter from coke quench towers (R.641). Because there is a correlation between quench water quality and particulate emissions (R.195), the total dissolved solids concentration of the quench make-up water is to be limited to 1500 mg/l. The quench water quality itself is not limited to this number because doing so would require either once-through quenching or an expensive water treatment system (R.161). The TDS limit will allow the steel industry to reduce water pollution by recycling water in the quench towers.

Sources which use an equivalent method to control coke quenching emissions do not need to meet the TDS limit in the make-up water (S.476-478). The Board agrees that if another method of coke quenching is developed which is as effective in reducing particulate emissions, then its use should be allowed.

(ix) Work Rules

This Rule is essentially the same as the old rule, and no proposals suggested changing it.

203(d)(5)(C) Sinter Processes

Emission limitations from sinter plants are set out in four separate Rules:

(i) Breaker Box

Allowable particulate emissions from breaker boxes are determined on a process weight rate basis and are not to exceed the allowable emission rates specified by Rule 203(a). This limitation is achievable by enclosing the breaker box area and exhausting the emissions to a baghouse or venturi scrubber (R.131-133). The wording contained in the final Rule is the same wording as contained in the various proposals.

(ii) Main Windbox

The record indicates that it is possible to meet the specified emission limitation for existing main windboxes. However, Industry pointed out that this Rule would be overly restrictive for new, large sinter plants since it might require emission levels to be less than the level which has been determined to be the Lowest Achievable Emission Rate (LAER) (R.725). The industry proposal contained a provision to limit new sinter plant sources to 0.03 gr/dscf. The Board, however, finds that a determination of LAER should not be done in this proceeding. If and when a steel mill wants to build a new sinter plant, that facility will have to meet whatever LAER is at that time. If Rule 203(d)(5)(C)(ii) would be more restrictive then than LAER, this rule could be modified at that time to conform with LAER for that source.

(iii) Balling Mill Drum, Mixing Drum, Pug Mill and Cooler

The 30% opacity limitation contained in the Rule is the same as the one included in the Agency and industry proposals. The ability of sources to meet this limitation was not disputed at hearing.

(iv) Hot and Cold Screens

This Rule requires that pollution control equipment be used to achieve a limitation of 0.03 gr/dscf (0.07 g/m^3 at dry standard conditions) unless the source can meet the appropriate process weight rate limitation in Rule 203(a) or Rule 203(b).

203(d)(5)(D) Blast Furnace Cast Houses

The Rule governing blast furnace cast house emissions is the same as the rule found in the March 8, 1979 proposal (Ex. 1/53). Paragraph (i) requires that sources meet the process weight rate in Rule 203(a). The original Agency proposal required equipment which would capture all particulate emissions. Industry, on the other hand, disagreed with this approach and suggested that sources meet the process weight rate rule, Rule 203(a), if it is felt that a new rule for controlling cast house emissions is necessary (R.653). The Board finds that it is necessary to control blast furnace cast house emissions because they are a substantial source of TSP and a large proportion of these emissions is in the respirable size range (R.1001).

The measurement method which is to be used in determining compliance with paragraph (i) is described in the Rule to avoid any future ambiguities that may arise regarding which test should be used. The record is clear that determination of compliance may depend on the test method used.

Paragraph (ii) provides sources with an alternative for complying with the emission limitation in paragraph (i) by operating and maintaining collection equipment designed to capture 50% of certain emissions from the blast furnace cast house and by ducting them to particulate collection equipment.

203(d)(5)(E) Basic Oxygen Furnaces

This Rule limits particulate emissions from operations associated with basic oxygen furnaces (BOF's). Since hot metal transfers to mixers and ladles are major sources of particulate emissions (S.343), it is important to control these operations. During the time of hearing, one source was in the process of installing a canopy hood system which would comply with this rule (R.938). The Board finds that this rule is achievable.

Rule 203(d)(5)(F) Hot Metal Desulfurization Not Located in the BOF

This Rule is self-explanatory. It is the same as the industry-proposed rule and is similar to the original Agency-proposed rule.

Rule 203(d)(5)(G) Electric Arc Furnaces

The Board's final rule limiting particulate emissions from electric arc furnaces is the same as the rule contained

in the March 8, 1979 proposal (Ex. 1/53). The rule is also very similar to the rules contained in the Agency's (Ex. 1/1, 1/7) and industry's (Ex. 1/15) original proposals. From the limited testimony on this topic, it appears to the Board that this standard is an attainable one (R.759).

203(d)(5)(H) Argon-Oxygen Decarburization Vessels

This Rule requires that particulate emissions from argon-oxygen decarburization vessels be limited to the allowable emission rate specified in Rule 203(a), for new sources, or Rule 203(b), for existing sources, whichever is applicable. One industry witness testified that these limitations represent Reasonably Available Control Technology (R.416).

203(d)(5)(I) Liquid Steel Charging

All of the proposed rules limiting particulate emissions from liquid steel charging were exactly the same. The Board finds that this rule can be met.

203(d)(5)(J) Hot Scarfing Machines

All of the proposed rules were exactly the same. At least one source was in compliance with this rule at the time of hearing (R.755). Based on evidence in the record, the Board finds that this Rule can be met.

203(d)(5)(K) Measurement Methods

This Rule specifies the measurement methods to be used to determine compliance with Rule 203(d)(5). The measurement methods are the same methods that were used to obtain the data upon which these regulations were first developed (R.647).

Compliance Date and Severability

Rule 203(d)(5)(L) sets forth compliance dates for emissions sources governed by Rule 203(d)(5). Any source the construction or modification of which begins after September 6, 1979 must comply immediately. Sources constructed or modified on or prior to this date must fully comply by no later than December 31, 1982 and, in addition, must satisfy certain incremental emission reduction requirements.

Part D of the Clean Air Act mandates that SIP provisions relating to nonattainment areas "require, in the interim, reasonable further progress (as defined in Section 171(1))

including such reduction in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology" Section 172(b)(3). "Reasonable further progress" is defined as "annual incremental reductions in emissions of the applicable air pollutant (including substantial reductions in the early years following approval or promulgation of plan provisions under this part [D] and section 110(a)(2)(I) and regular reductions thereafter) which are sufficient in the judgment of the Administrator, to provide for attainment of the applicable national ambient air quality standard by [December 31, 1982]." Section 171(1).

This definition has been incorporated into Rule 203(d)(5)(L). Specifically, the Rule provides that compliance with an approved Compliance Program and Project Completion Schedule pursuant to Rule 104 constitutes compliance with the particulate emission standards and limitations of Part II of Chapter 2: Air Pollution Control Regulations, provided that the Compliance Program and Project Completion Schedule meet certain requirements. One requirement is that the Compliance Program and Project Completion Schedule provide for compliance "as expeditiously as practicable considering what is economically reasonable and technically feasible." Rule 203(d)(5)(L)(iii)(aa). In no case may final compliance be projected to a date later than December 31, 1982. Another requirement is that incremental emission reductions must be achieved by December 31, 1980 and by December 31, 1981, unless the Board allows an alternate timetable not to extend beyond December 31, 1982. This requirement ensures that sources will show "reasonable further progress."

Rule 203(d)(5)(L)(iv) specifies that prior emission limitations and standards shall be enforceable in the event that these regulations are rendered unenforceable due to judicial action. This will ensure that emissions are continuously limited by some enforceable regulation.

Rule 203(d)(5)(M) states that the provisions of Rule 203(d)(5)(L) are not severable. If any part of 203(d)(5)(L) is invalidated or disapproved by the U. S. EPA or by any court of law, then the entire Rule 203(d)(5)(L) must fall. This reflects the Board's view of the interrelated nature of these provisions. Should the entire Rule 203(d)(5)(L) become void, then the limitations stated in prior Rules shall be given effect. These provisions reflect the Board's determination that changes to the limitations governing by-product coke plants are warranted independently of the requirements of Part D of the Clean Air Act.

Total Plant Compliance, Limited Life Facilities and Replacement in Kind

The industry proposal contained three provisions which were not adopted by the Board. The first one, "Total Plant Compliance"

was not adopted because it was an oversimplification of U.S. EPA's "bubble" policy and did not adequately address issues inherent in the application of the principle of total plant compliance (R.953). For example, it did not consider that TSP emissions vary in particle size distribution and/or chemical composition; both parameters have varying effects on health and ambient air quality (R.812, 839). Additionally, it did not contemplate a demonstration of attainment of NAAQS (R.838-842) or a requirement of compliance with the existing SIP (R.841). Because of these facts, the Board does not find industry's total plant compliance proposal to be appropriate.

Industry's second provision which the Board did not adopt concerned "Limited Life Facilities". This provision would have allowed compliance plans regarding certain operations to consist of terminating operations by certain dates (Ex. 1/15). This provision is unnecessary because existing variance procedures can be used to achieve the same result (R.1086).

The third provision concerned "Replacement in Kind". It was not adopted because of potential conflicts with the 1977 Clean Air Act Amendments (R.814).

ECONOMIC IMPACT

The Illinois Institute of Natural Resources submitted a document to the Board entitled The Economic Impact of Proposed Regulations to Reduce Particulate Emissions from Steel Mills and Industrial Fugitive Sources, IINR Doc. No. 79/06 (hereafter "Study") (Ex.6). Control costs for the steel industry set forth in the Study were provided by certain steel companies to the Illinois State Chamber of Commerce (S.457). Benefits were monetized based on modeling data provided by the Agency (Ex.6, p.3; S.299). Order-of-magnitude accuracy was claimed (Ex.6, p.4; S.8).

The Study does not provide a precise presentation of the control costs attributable to R78-10. First, the Study's best estimate of direct costs (Ex.15) includes certain costs for controls which would be necessary under the previous rules (S.67-69). That is, the Study does not present an incremental analysis of cost differences between the prior regulations and R78-10. Secondly, the Study presents costs which were not measured by the authors; further the authors were unable to specify what type of equipment might be installed as a result of this proposed rulemaking (S.457). Such constraints limit the usefulness of the Study's cost estimates. For example, the Study authors' best estimate of annual direct costs to the steel industry is $38 million (Ex.15). However, this estimate includes $21 million for reverse osmosis water treatment systems which are not required by the Rule as adopted. The remaining $17 million includes some coke oven controls which

would have been necessary under the previous rules (S.286; S.458).

Somewhat more useful is Exhibit 14, which provides estimates of costs of specific control equipment. These estimates, provided by the Illinois State Chamber of Commerce, were in part supported by an independent literature review (S.288-293). Again, the two caveats mentioned above apply. In addition, Exhibit 14 pertains to the Board's Interim Order of March 29, 1979, not its Final Order; this means that certain items included in Ex.14, e.g., a water treatment plant for coke quench water, may not be installed.

The Study also estimated benefits due to decreased ambient concentrations of particulate matter. The estimate was based on Agency modeling results, population estimates, and damage coefficients. The damage coefficients translate ambient concentrations of particulate matter into monetary estimations of morbidity, mortality, and materials damage attributable to the particulates. These monetary estimates are very rough approximations of benefits. However, the discussion of the development of the damage coefficients was useful in pointing out the relative impact among morbidity, mortality and materials damage. Damages due to soiling are a significant part of the damage coefficients (Ex.6, p.21; Ex.6, App.B, App.C).

Some of the testimony offered by specific steel companies must be viewed in light of its context. Much of the testimony related to early proposals or preexisting rules rather than to the Final Order. Examples include cost estimates for total blast furnace cast house evacuation systems (R.579), once-through quenching (S.161; S.500), and modifications to meet a 125 seconds/five consecutive charges rule (R.495).

The overall control strategy mandated by R78-10 will redirect control expenditures. This control strategy represents an economically reasonable approach to obtaining emission reductions necessary to meet the NAAQS for TSP in the nonattainment areas of the State.

IMPACT ON HEALTH

In an attempt to assess the improvements in health which would occur as a result of compliance with Rule 203(d)(5), the Study authors made estimates using Agency data on predicted improvements in air quality (S.87). Since very little information exists in the literature which quantifies a relationship between exposure to particulate matter and the incidence of disease, any estimates on improvement in health are rough estimates. Part of the problem of estimating health effects is due to the fact that different sizes and different chemical

compositions of particulate matter have different impacts. For example, small particulates in the size range of 0.5 to 2.0 micrometers are more dangerous to human health than larger particulates (S.10). Many of the sources of particulates covered by this Regulation emit respirable-size particulate matter (R.78-83, 123-125, 837) and will impact on health. It has also been found that exposure to coke oven emissions is associated with increased rates of cancer (R.908, S.319, Ex.7(a) and (b)). Consequently, the Board agrees with the Study authors' conclusions that, although it is not possible to reliably quantify improvements in human health, "controlling air pollution will decrease disease and its concomitant financial burden" (Ex.6, p.11).

CONCLUSION

The Clean Air Act Amendments of 1977 specified strict requirements for the contents of state SIP's. Failure to comply with those requirements could drastically disrupt the economy of the State of Illinois. This rulemaking will help prevent any such disruption, while improving the health and well being of the people of the State of Illinois, by facilitating the attainment of the NAAQS for TSP.

This Opinion supports the Order of September 6, 1979.

Mr. Werner dissents.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify the above Opinion was adopted on the 10th day of January, 1979 by a vote of 3-1.

Christan L. Moffett, Clerk
Illinois Pollution Control Board