

ILLINOIS POLLUTION CONTROL BOARD
June 8, 1978

IN THE MATTER OF:)
)
MOTOR RACING NOISE) R75-11
REGULATIONS)

OPINION OF THE BOARD (by Mr. Goodman):

This matter comes before the Board upon a proposal submitted by the Environmental Protection Agency (Agency) seeking to amend the Noise Regulations (Chapter 8 of the Board's Rules and Regulations) as they pertain to noise from motor racing facilities. The proposal was docketed R75-11.

The Board adopted the Noise Regulations on July 26, 1973. In Rule 201(c), the Board defined motor racing facilities as a Class "C" land use and allowed such facilities until August 10, 1975 to comply with the numerical limits of Rules 202 through 207. The Association for Motor Sports of Illinois (AMS) appealed the Board's adoption of Chapter 8 to the Illinois Appellate Court. In a recent decision, the Appellate Court affirmed the Board's Order adopting Chapter 8. Association for Motor Sports v. Pollution Control Board, 49 Ill.App.3d 954, 364 N.E.2d 631 (1977).

On September 25, 1974, the Environmental Protection Agency (Agency) submitted R74-14, a proposal seeking to exempt motor racing from the specific numerical limits of Part II, Chapter 8, between the hours of 7:00 a.m. and 10:30 p.m. Subsequent to holding the requisite hearings, the Board, on August 28, 1975, dismissed that proposal for several reasons: weak technical data on noise abatement techniques; insufficient economic data; insufficient information on conditions in the motor racing industry; strong citizen objections to the proposal; and insufficient factual data to allow the Board to establish standards to replace those of Part II, Chapter 8.

On August 11, 1975, the Agency filed the R75-11 Motor Racing Noise Proposal before the Board. On August 28, 1975 the Board

The Board expresses its appreciation for the excellent work done in this matter by Ms. Roberta Levinson, Administrative Assistant to the Board and Hearing Officer herein.

authorized hearings on the proposal, consolidated it with the R74-14 proposal and incorporated the R74-14 record into the R75-11 proceedings. On June 9, 1976, the Agency submitted revisions to its original R75-11 proposal. The Board published the revised proposal in Environmental Register #140. On January 6, 1977, the Board itself proposed a three-year delay of the muffler requirements and dB reduction schedule outlined in the proposal.

Public hearings were held in the following locations:

| | |
|-------------------|-------------|
| November 18, 1975 | Springfield |
| December 2, 1975 | Chicago |
| December 19, 1975 | Chicago |
| August 8, 1976 | Chicago |
| March 21, 1977 | Springfield |

In accordance with Section 6 of the Environmental Protection Act (Act), the Illinois Institute for Environmental Quality (IIEQ) on February 25, 1977, filed the final version of IIEQ Document No. 76/24, the Economic Impact Study of the Motor Racing Noise Proposal. The Study, entitled Economic Analysis of Environmental Regulation in the Racing Industry, was prepared for the IIEQ by Economic Evaluation Associates (EEA).

Economic impact hearings were conducted in the following locations:

| | |
|----------------|-------------|
| March 21, 1977 | Springfield |
| March 22, 1977 | Chicago |
| April 12, 1977 | Chicago |

The record was kept open in this matter for 45 days after the final hearing to allow for submittal of any public comments or legal briefs.

On November 23, 1977, the Board proposed a Final Draft Order, which incorporated the Agency's proposal with certain modifications, and set a 45-day public comment period. Subsequent to publication of the Board's proposed final draft, the Illinois Administrative Procedure Act became effective. That Act requires state agencies to publish for 45 days in the Illinois Register

all regulations they propose to adopt. The Board's proposed final draft was published in the Illinois Register on January 13, 1978, and subsequently, due to technical problems with the form of the notice, was republished on February 24, 1978. The public comment period in this proceeding thus extended through April 10, 1978.

The Board notes that the Association for Motor Sports filed a Motion seeking to strike the Agency's public comment dated April 10, 1978, as having been filed too late. The Motion is denied. The comment was filed within the public comment period based upon publication in the Illinois Register.

The Agency's R75-11 proposal divides motor racing facilities into four categories: drag racing, oval racing, sports car racing, and motorcycle racing. For each type of facility the proposal incorporates a muffler requirement, and for certain drag racing and oval racing facilities the proposal incorporates a gradual decibel reduction requirement. The numerical property line noise limitations of the Noise Regulations would, in the original proposal, apply to any races conducted after 10:30 p.m., and the proposal would prohibit after 10:30 p.m. the use of any motor racing vehicle which is not required to have a muffler. In addition, the Proposal requires the operators of motor racing facilities to employ noise abatement methods for reducing noise emissions from the public address system. Finally, the proposal incorporates exceptions for special motor racing events, racing events held during county or state fairs, facilities for which there are no residential dwelling units within two miles, facilities whose sound emissions do not exceed the background sound level by more than 7 dB(A) at any residential dwelling unit, and facilities whose sound emissions comply with the octave band sound pressure levels specified in Part II of Chapter 8.

The record in this matter consists of 1,062 pages of testimony, as well as 73 Exhibits. Testimony was received from the Agency, members of the public, trade associations, acoustical engineers, track owners, and industry representatives. The Board has carefully reviewed the testimony, exhibits and public comments submitted in response to the proposal. Based on consideration of the entire record and pursuant to Section 27 of the Act, the Board hereby adopts, with certain modifications, the Motor Racing Noise Regulations.

As a starting point, the Board notes that the data presented during this proceeding was expressed in terms of a single A-weighted sound level in decibels (dB(A)) rather than the octave band type of measurement incorporated in Rules 202 through 207. In the Motor

Vehicle Noise Regulation, R74-10, recently adopted by the Board, we found that dB(A), a unit that is weighted to compensate for the sensitivity of the human ear to sounds of different frequencies, was the proper descriptor for the noise emitted from motor vehicles. In this proceeding, the Agency similarly testified that the noise spectrum of practically all motor vehicles is distinct and very similar (R.11,60). Additionally, the Agency, as well as engineers testifying both on behalf of residents and on behalf of track owners, testified that the dB(A) is a universally accepted standard for measuring all motor vehicle noise, is relatively easily understood, and can be incorporated into an inexpensive sound level meter (R.12, 131). Octave band analysis, on the other hand, requires more technical skill, a better understanding of acoustics, more expensive sound level meters and the use of high quality tape recorders, since the noise from a race track fluctuates due to the movement of the vehicles on the track. The recorded sounds must then be laboratory analyzed to determine the precise level measured in each octave band. The Board agrees with the Agency's determination that dB(A) is the proper descriptor for noise emitted from motor racing vehicles. The following Table summarizes the numerical regulations of Chapter 8, Rules 202 through 205, in terms of dB(A) equivalents [In the Matter of Noise Pollution Control Regulations, R72-9, 8 PCB 703, 29 (July 31, 1973)]:

| | | <u>dB(A) for specified emitting land uses</u> | | |
|--------------------|-----------|---|----------|----------|
| | | <u>C</u> | <u>B</u> | <u>A</u> |
| | C | 70 | 62 | 62 |
| Receiving land use | B | 66 | 62 | 55 |
| | A (day) | 61 | 55 | 55 |
| | A (night) | 51 | 45 | 45 |

NEED FOR THE REGULATIONS

The motor racing noise issue is one which has aroused a great deal of public attention. There are approximately 100-125 motor racing facilities in Illinois (R.22). On the one hand, residents living near motor racing noise facilities are subjected to noise levels often greatly exceeding the daytime and evening noise limitations of Rules 202 through 207. The Agency during the R74-14 proceedings submitted a summary of twenty-six complaints received from residents living near various Illinois race tracks (R74-14,

Ex. 11, 14). During the R75-11 proceedings, a group of home owners residing near the Santa Fe race track opposed adoption of the Proposal. Citizen witnesses testified during both the R74-14 and R75-11 proceedings as to the interruption to their lives caused by motor racing noise. Citizens complained that the noise disrupted both outdoor and indoor activities, disrupted sleep and quiet conversation, caused them to leave home during the evenings when races were conducted, and caused slower appreciation of property in the area (R74-14, R.160-185, 335-350, 721-777, 810-835; R75-11, R.311-317, 333). On the other hand, many ardent racing fans and race track operators participated in these proceedings. These witnesses testified that a significant part of the attraction of the sport was the noise and that drivers are resistant to using mufflers (R.274, 287). Also, the warden of a correctional center for juvenile offenders and a priest who is assistant principal of a Catholic high school testified about successful programs they have been administering involving motor racing activities as an outlet for youths. They testified that a muffler requirement would severely hamper these programs (R.216, 223).

The primary sources of noise from motor racing facilities are the vehicles themselves, and the predominant source of noise from the vehicle is the exhaust system. Secondary noise sources at the race track include the public address system, crowd cheering noises and equipment used for maintaining the track and parking areas. The level of noise emitted from motor racing facilities is evidenced in both the R74-14 and R75-11 records. Exhibit 13 of the R74-14 record (R75-11, Ex. 2) contains the following noise readings on complaining homeowners property each near different race tracks in Illinois:

| <u>Complaint No.</u> | <u>Motorized vehicles</u> | <u>dB(A) reading</u> | <u>Ambient noise level</u> | <u>Distance from track</u> |
|----------------------|---------------------------|----------------------|----------------------------|----------------------------|
| 72-22-1 | Cars | 75-84 | 53 | - |
| 73-6 | Cars | 78-80 | - | 1/4 mile |
| 71-37 | Cars | 80-84 | 47-50 | - |
| 71-53 | Motorcycle | 84 | - | - |
| 72-24 | Dragsters | 78 | 54 | - |
| 72-15-1 | Single cars | 68-75 | - | 500 yards |

Exhibit 21 of R74-14 also contains sound level measurements revealing high dB(A) readings at residential property near motor racing facilities during racing events.

Additionally, tests conducted during May, 1975 at Rockford and Jacksonville speedways revealed levels above the compliance limits (R74-14, R.507). At Jacksonville, late model cars (20 vehicles), required to have mufflers, were measured at 93-113 dB(A) at 62-1/2 feet (R74-14, R.504). Not all cars were muffled, and the Agency believed that total muffling could reduce dB(A's) by 5-8. At 600 feet (the nearest resident) noise levels exceeded 80 dB(A). Similar but lower readings were recorded at Rockford speedway. A witness testifying on behalf of the Association for Motor Sports indicated that the noise level for late model stock cars at the Santa Fe race-track was approximately 107 dB(A) at 50 feet (R.183). Data from Oregon indicate that unmuffled drag race cars can emit sounds as high as 122 dB(A) when measured 50 feet from the vehicle path, and data from Colorado indicates that unmuffled racing cars may emit A-weighted sound levels as high as 110 dB(A) measured 100 feet from the racing vehicle (R74-14, Ex. 6, Attachment 1 and 2). It should be noted that noise attenuates 6 dB per doubling of distance.

In the original Opinion adopting the Noise Regulations, R72-2, we determined that various noise abatement techniques, including walls, barriers, domes, modification of engines, use of mufflers, and land acquisition were available and could bring about compliance with the numerical limits of Rules 202 through 207 within the allotted two year time period. However, having considered the new evidence presented since the original noise hearings, we find that these techniques are not currently technically feasible or economically reasonable methods of bringing motor racing facilities statewide into compliance with the decibel limits of Rules 202 through 207. The Agency testified that doming a quarter mile track would, in 1973, have cost \$1,210,000 (R.11). The problem with barriers is twofold: the cost of barriers, between \$12 and \$150 per linear foot, is excessive (R74-14, Ex. 6, Attachment 4 and 5), and barriers are not particularly effective in the motor racing noise situation because they are not always close to the noise source itself, the racing vehicle, particularly at oval tracks. As to land acquisition, testimony was presented during the hearing that the acquisition of 460 acres of land would be required in order to meet a 92 decibel level at 50 feet. We find that the acquisition of such a vast amount of land is not feasible around most existing tracks and would be an economically unreasonable method of control. As to the feasibility of obtaining compliance with the Noise Regulations through mufflers, although we find that muffling racing vehicles is

technically feasible, it alone cannot bring about compliance with the numerical limits of Rules 202 through 207. As will be discussed, mufflers can bring about a 16 dB reduction in oval racing vehicle noise and up to a 14 dB reduction in drag racing vehicle noise. However, considering the levels of noise previously discussed as being emitted from motor racing vehicles, even muffling to the greatest degree achievable will not result in compliance with the property line noise limitations. Additionally, a property line noise limitation, although uniform in terms of protection, results in a lack of uniformity as applied to the individual racing vehicles. The noise emitted from any particular vehicle may vary from track to track based upon such factors as bleacher arrangements, nearby reflective surfaces, and ground cover.

Based upon the unavailability of sufficiently effective traditional noise abatement techniques as applied to the motor racing situation statewide and the desire to adopt a Regulation which will allow uniform requirements to be applied to individual motor racing vehicles, we have determined that the property line noise limitation promulgated by us in 1973 is not, under our current knowledge, a technically feasible or economically reasonable means of control. Imposition of such a standard could indeed at the current time threaten the existence of the sport of motor racing in the State of Illinois. However, we recognize that homeowners will be subjected to noise levels which may well interfere with the peaceful enjoyment of their homes. We have, therefore, imposed a muffler requirement for individual racing vehicles which provides for the quieting of motor racing vehicles to the greatest extent technically feasible. Thus, the need for these regulations arises from the Board's duty to protect the citizens of Illinois from excessive noise and the Board's desire to prevent a shut down of the motor racing sport in Illinois.

An issue which arose during the proceedings was the availability of Rule 102, the general prohibition against noise pollution, to residents severely affected by noise emissions from motor racing facilities. The Board recognizes that, although we are abandoning the property line noise limitation concept for the motor racing noise situation as applied statewide, certain individual race tracks, even with the application of mufflers on racing vehicles, may indeed still cause noise pollution under the Rule 101(j) definition. In such situations, Rule 102 would prohibit the emission of noise which as received by nearby residential property is excessive. In other words, although we find that a statewide property line noise limitation is not technically feasible or economically reasonable, in an individual situation the injury to the health and welfare of the public may outweigh the difficulties of achieving a certain noise reduction at the property line. In reaching our decision we have essentially reached a compromise position between the citizen interests involved in the motor racing noise issue. We have

determined that motor racing facilities shall be exempted from the numerical limits of Rules 202 through 207, that individual racing vehicles shall be quieted to the greatest extent technically feasible, and that in individual situations in which the injury to the public may outweigh the technical and economic difficulties of complying with the numerical limits, Rule 102 shall prohibit noise which unreasonably interferes with the enjoyment of life.

TECHNICAL FEASIBILITY

The technical feasibility of muffling the various types of racing vehicles was one of the central issues addressed during the R75-11 and R74-14 proceedings. In discussing technical feasibility, we must examine the four categories of vehicles outlined in the Proposal - motorcycles, sports car vehicles, oval racing vehicles, and drag racing vehicles - as well as the sub-categories outlined therein. The record contains a significant amount of information on muffling effectiveness. Based on that information, we have determined that muffling to the degree and over the time period detailed in our Order is technically feasible.

Muffling of motorcycles is the least controversial aspect of the muffling issue. The original R75-11 Proposal required that any motorcycle competing in either an oval racing or motorcycle racing facility have a muffler which complies with the American Motorcycle Association (AMA) sound level requirement of 92 dB(A) or less when measured at 50 feet under a stationary test. The Agency's most recent Proposal and the version we have adopted changes the sound level requirement to 115 dB(A) at one-half meter from the exhaust system, in accordance with a change in the AMA's measurement procedure. The Economic Impact Study (Ex. 17) indicates that the AMA sanctions 85% of the motorcycle racing events in Illinois. Therefore, the Regulation we are hereby adopting is already being complied with or in effect in most motorcycle racing facilities. An official for the AMA and the Director of the Illinois Motorcycle Dealers Association (IMDA) both testified during the proceedings. They both endorsed the Proposal on behalf of their organizations and indicated that motorcycle racers could comply with the standard without any damage to their vehicles or degradation of performance (R.84, 96, Ex. 12).

The standard applied to sports car racing facilities parallels that applied at the Waterford Hills Sports car racing facility in Michigan. There is currently only one sports car racing facility in Illinois, Blackhawk Farms in South Beloit. No question has been presented as to technical feasibility of requiring non-supercharged sports car racing vehicles to comply with a 105 dB(A) limit measured at 50 feet from the center of the lane of travel, the requirement

incorporated in the R75-11 Proposal. The only issue with regard to these facilities is the economic impact of such a requirement, which will be addressed during the economic impact portion of our discussion. However, as to the supercharged vehicles, testimony indicated that application of a muffler to a supercharged vehicle would increase the back pressure and significantly degrade the performance and quality of the engine (R.41). Therefore, the proposal exempts such vehicles from the muffler requirement.

The record contains much information on the technical feasibility of muffling oval racing vehicles. Exhibit 14 contains a study done by W.H. Close of the U.S. Department of Transportation at an oval racing track in Beltsville, Maryland. Application of mufflers to three regular Late Model Sportsmen competitors at Beltsville resulted in a 15.8 and 13.9 dB(A) noise reduction measured at 50 feet during high speed operation of the vehicles. Application of a muffler on another large displacement Late Model Sportsmen auto resulted in a dB(A) noise reduction of greater than 20. Additionally, a new track record was set by a muffled vehicle. Exhibit 6, Attachment 1, in the R74-14 record indicates the results of tests performed on late model race cars required to be equipped with mufflers at the Cayuga International Speedway in Canada. Sound level measurements indicated that muffled late model race cars met 82 dB(A) at the property line of the race track 600 feet away from the racing path. Other sound level data indicated that at sites three quarters of a mile away from the track, muffled late model race cars produce sound levels of 68 dB(A). Also in Attachment 1 of Exhibit 6, R74-14, was data from Gidon Industries indicating that application of seven different mufflers to one vehicle, each during full throttle acceleration at the track, resulted in noise reduction of from 4-20 dB(A) with no detrimental effect on performance. The actual noise reductions in dB(A) of total vehicle noise at 50 feet obtained for the seven different mufflers were: 4, 16-1/2, 18, 18-1/2, 18-1/2, 19 and 20 dB(A). The mean noise reduction was 18 dB(A). With the application of mufflers at Raceway Park in Indianapolis, Indiana, one racer set a new racing record (R74-14, Ex. 6, Attachment 1, "Sometimes Silence is Very Golden"). We conclude that the muffling of oval racing vehicles to the extent required in our Order is technically feasible without fundamentally changing the cars or the sport. The Agency's proposal requires a muffler by March 15, 1977, a 10 dB reduction by March 15, 1978, and a 16 dB reduction by March 15, 1980. Because the March 15, 1977 and March 15, 1978 dates have already passed, we will extend the initial date until March 15, 1979. We also conclude that, although muffling to the degree of 10 and 16 dB reduction has been demonstrated, we have no indication that such mufflers are currently widely available. We will, therefore, extend the dates for requiring a 10 and 16 dB reduction by two years.

As to drag racing vehicles, the Agency's proposal divides such vehicles into three categories, based upon ease of muffling. Group A includes vehicles for which mufflers are easily installed; group B includes vehicles for which mufflers also may easily be installed, but some modification to the vehicle is necessary; and group C includes vehicles for which further modification is necessary. The Agency based its muffling requirement for drag racing vehicles on tests performed on oval racing vehicles and on tests conducted by the National Hot Rod Association (NHRA) during which members of the Agency were present. The NHRA tests conducted at the Los Angeles County Fair Grounds in Pomona, California (Ex. 15), revealed dB(A) reductions at 50 feet ranging from 4-13.5 during acceleration runs. The Agency's proposal requires a maximum dB reduction of 14 to be achieved by 1981 for all classes of vehicles. During the R75-11 hearings, the Agency agreed that no mufflers are currently on the market which can achieve a 14 dB reduction but, based upon the 16 dB reduction available for oval racing vehicles through muffling, a 14 dB reduction for drag racing vehicles appears achievable within the next few years. We are extending the compliance dates for drag racing vehicles in the following manner: Group A vehicles shall be required to have a muffler by March 15, 1979, and to achieve a 10 dB reduction by March 15, 1980 and a 14 dB reduction by March 15, 1982; Group B vehicles shall be required to have a muffler by March 15, 1980, to achieve a 10 dB reduction by March 15, 1981 and a 14 dB reduction by March 15, 1983; and Group C vehicles shall be required to have a muffler by March 15, 1981, to achieve a 10 dB reduction by March 15, 1982 and a 14 dB reduction by March 15, 1983. We conclude that the muffling of drag racing vehicles to the extent required by our Order is technically feasible within the allotted time.

DISCUSSION OF THE MOTOR RACING NOISE REGULATIONS

The following is a rule by rule discussion of the regulations adopted by the Board.

Rule 103: Measurement Procedures

This existing Rule is amended to specify under paragraph (d) the procedures applicable to the measurement of noise from motor racing vehicles. The procedures are consistent with those published by established standards organizations. It should be noted that the Board's November 23 draft Order contained a typographical error. Rule 103(d)(2) referred to Rule 414 but should have referred to Rule 411. The error has been corrected.

Rule 201: Classification of Land According to Use, and
Rule 208: Exceptions

Until adoption of this regulation, fair ground activities other than motor sports were a classified land use under Rule 201(b) but were exempted by Rule 208(a) from the numerical limits of Rules 202 through 207. Our amendment of Rule 201(b) simplifies the regulations by exempting fair grounds without racing activity from the numerical limits by declassifying such land use.

Rule 208(g) has been amended to exempt motor racing facilities from the numerical limits of Rules 202 through 207 for motor racing activities started between the hours of 7:00 a.m. and 10:30 p.m. on weekdays and 7:00 a.m. and 11:00 p.m. on weekend days. Definitions of weekdays and weekend days have been added to Rule 101. Application of Rules 202 through 207 after 10:30 p.m. or 11:00 p.m. generally requires the cessation of motor racing activities at that time. An issue raised at the hearings was why the 10:30 p.m. time limit should apply to motor racing when the stricter evening noise limitations in Rules 202 through 207 apply to other industries as of 10:00 p.m. Testimony at the hearings and written public comments indicated that scheduled racing events for any particular evening are subject to unpredictable delays because of both weather conditions and accidents and that some race tracks grade and clean their track surface after the last racing event, which in itself can cause noise emissions exceeding the Chapter 8 decibel limits. Therefore, additional time is necessary in order to allow motor racing facilities to complete their evening activities. Often, the highlighted race is the last one, and a 10:00 p.m. cut-off time would frequently preclude the running of this event. The 11:00 p.m. cut-off time on Friday and Saturday nights was suggested in public comment (P.C. #17) and is intended to give race tracks some leeway based on the assumption that people go to sleep later on weekends.

The Rule as drafted in the Board's November 23, 1977, proposed Order would have applied to motor racing activities conducted after the 10:30 p.m. cut-off time. Several public comments received by the Board expressed concern that such a Rule could force a track owner to stop an individual event before its completion. We have, therefore, changed Rule 208 such that the cut-off time applies to events started rather than conducted after 10:30 or 11:00 p.m. The intent of this rule is that individual races, not entire evening's events, started before the cut-off time may be completed.

Rule 101: Definitions

These definitions are largely self-explanatory. Although the Agency's proposal suggested that the definitions be included in

Rule 401, we have incorporated these definitions into those contained in our existing Rule 101 of Chapter 8. They are added to correspond to terms and terminology contained in the motor racing noise regulations. Several of these new definitions require further discussion and/or interpretation:

Background sound level is derived from a document by the International Standards Organization, document No. 1996. It is defined as the A-weighted sound level which is exceeded 90% of the time and is applicable only to the motor racing situation.

The Agency proposed in a public comment dated April 10, 1978, that this definition be broadened to apply to measuring the ambient sound level for any Part of the Noise Regulations, not just Part IV. The Board finds, however, that such a change at the last minute, without any public hearings or notice, would be inappropriate. We suggest that, should the Agency still wish to change the definition, it propose such a change in another proceeding.

Special-motor-racing-event has been revised to specify that only a motor racing event which is held on two consecutive days or less may be considered a special motor racing event. Special motor racing events are designated as such by the owner or operator of the facility and are included under the Rule 415 exceptions.

Weekday and Weekend day have been added after the public comment period and are relevant to Rules 208(g) and 402.

Well-maintained muffler is defined as a muffler which is free from defects which affect sound reduction. The Agency testified that an increase of 4 decibels or more over the vehicle's original sound emission level with mufflers applied would indicate that the mufflers were no longer well-maintained.

Rule 401: Motor Racing Facilities: Operational Procedures

This Rule is intended to require the owners or operators of motor racing facilities to use practical noise abatement methods to reduce noise emissions from the public address system. These methods should be readily available at most tracks.

Rule 402: Motor Racing Facilities: Racing Vehicles Without Mufflers

Rules 403, 406 and 409 exempt certain motor racing vehicles from the muffler requirements. The purpose of this Rule 402 is to preclude any vehicle which is not required to be equipped with a muffler from racing in any event which begins after 10:30 p.m. local time weekdays or after 11:00 p.m. weekend days. Therefore, after 10:30 or 11:00 p.m., the property line noise limitations of Rules 202 through 207 are effective and no unmuffled vehicles may participate in any racing event. The cut-off time is intended to take effect on the effective date of the regulations even though the muffler requirements are not triggered until 1979.

Rule 403: Drag Racing Facilities - Muffler Requirements

The muffler requirements of Rule 403 apply to drag racing vehicles which are equipped with normally aspirated gasoline burning engines. Such vehicles are basically those which are not supercharged. The decibel reduction requirements are reductions in total vehicle noise, not just insertion noise or reduction in exhaust noise, during operation in a manner which simulates wide-open throttle competition. As mentioned previously, we have allowed a two-year delay in the muffler and specific decibel reduction requirements over those dates incorporated in the Agency's proposal. The intent of the Rule is to require the drag racing vehicles listed under Table 1 to comply with the schedule in Table 1 and to require that any motorcycle being used as a drag racing vehicle at a drag racing facility comply by March 15, 1979 with the muffling requirement. As stated previously, the categories of vehicles are determined on the basis of ease of muffling and necessity of modification of the vehicles in order to muffle. The classes of vehicles are those determined by the national and international functioning bodies, the NHRA, the IHRA, and the AHRA.

Rule 404: Drag Racing Facilities - Sound Level Measurement Requirements

The original Agency proposal required sound level measurements to be taken during qualification runs under wide-open throttle conditions. However, the revisions which the Agency submitted in June and the version which we adopt today requires sound level measurements to be made under static conditions. This change, which was suggested by the NHRA, is to allow the vehicle sound level test to be incorporated into the technical inspection which is performed before each racing event. Measurements under such conditions are simpler than during qualification runs and, according to the Agency, are preferred by the racing industry (R.493). The Agency indicated that it would make forms available upon which

the operators of racing facilities would record the measurements taken (R.53).

An issue arose at the hearings as to whether there was any correlation between sound levels occurring during static and wide-open throttle conditions. Although the measurements are to be made under static test conditions, the purpose is to determine compliance with the decibel reduction requirements to be achieved according to Rule 403 under wide-open throttle conditions. Tests taken by the NHRA at which the Agency was present revealed that for vehicles equipped with certain types of mufflers such correlation does exist (Ex. 15, R.491-3). During the period of time between the requirement of muffling and the specific dB reduction requirement, the Agency intends to study the static sound level measurements to be taken by race track operators and wide-open throttle measurements to determine correlation for purposes of inspection and enforcement of the regulations (R.494). We have incorporated a requirement in Rule 404(b) that the Agency develop procedures for determining compliance with Rule 403 by means of a static test.

Rule 404: Drag Racing Facilities - Emission Limits

The 115 dB(A) limit for motorcycles competing at drag racing facilities incorporated in this Rule is in accordance with the requirement currently being imposed by the AMA.

Rule 406: Oval Racing Facility - Muffler Requirements

The muffler requirements for oval racing facilities apply to oval racing vehicles other than sprint racing vehicles, midget racing vehicles, and supercharged oval racing vehicles, all of which are defined in Rule 101. As noted previously, the excepted vehicles are those which cannot be muffled without degradation of performance and deterioration of the engine itself. As is the case with drag racing vehicles, the muffler requirement and dB reduction requirement imposed upon oval racing vehicles are intended to require a reduction in total vehicle noise, rather than exhaust noise, when such vehicles are operated in a manner simulating wide-open throttle competition. Also as noted previously, we have allowed an extra two years for the specific dB reduction requirements. As in the case of drag racing vehicles, any motorcycle used as an oval racing vehicle is required to be equipped by March 15, 1979 with a muffler.

Rule 407: Oval Racing Facilities - Sound Level Measurement Requirements

This Rule parallels the sound level measurement requirement

for drag racing facilities. All the requirements of Rule 404, including the measurement and record-keeping requirements applied to drag racing vehicles and motorcycles racing at drag racing facilities, shall apply to oval racing vehicles and motorcycles racing at oval racing facilities.

Rule 408: Oval Racing Facilities - Sound Emission Limit

The sound emission limit for motorcycles competing at oval racing facilities parallels the requirement of 115 dB(A) for motorcycles competing at drag and at motorcycle racing facilities.

Rule 409: Sports Car Racing Facilities - Muffler Requirements

The intent of this Rule is to require that all sports car racing vehicles which are not supercharged be equipped with a muffler which brings the vehicle into compliance with the sound emission limit incorporated in Rule 411. This Rule parallels that now enforced at a race track in Michigan.

Rule 410: Sports Car Racing Facilities - Sound Level Measurement Requirements

Unlike the Rules applied to the other categories of motor racing facilities, this Rule requires that noise emissions from sports car racing vehicles be measured during qualifying runs.

Rule 411: Sports Car Racing Facilities - Sound Emission Limits

Sports car racing vehicles are required to meet a 105 dB(A) limit measured 50 feet from the center lane of travel of the vehicle while accelerating on the track. The Board notes that Rule 103(d) allows the Agency to provide for measuring emissions at distances other than 50 feet, provided appropriate correction factors are applied.

Rule 412: Motorcycle Racing Facilities - Muffler Requirements

This Rule parallels the requirement currently imposed by the American Motorcycle Association, the sanctioning body for motorcycle racing. The Rule is intended to require mufflers on all motorcycle racing vehicles which are not supercharged.

Rule 413: Motorcycle Racing Facilities - Sound Level Measurement Requirements

The measurement requirements for motorcycle racing vehicles competing at motorcycle racing facilities are the same as those

required for measuring noise from motorcycle racing vehicles competing at drag and oval racing facilities. Again these measurement requirements are those now imposed by the AMA.

Rule 414: Motorcycle Racing Facility - Sound Emission Limits

The sound emission limit for motorcycles racing at motorcycle racing facilities, 115 dB(A) at one-half meter from the rear exhaust outlet, is the same as that imposed on motorcycles at oval and drag racing tracks and is the standard imposed by the AMA.

Rule 415: Exceptions

The exceptions are an important concept in the motor racing noise regulation and raised some controversy during the hearing. The exception incorporated in Rule 415(a) permits a race track operator to conduct three special motor racing events per calendar year without complying with the muffler and sound emission limit requirements of Rules 403 through 414. The prohibition after 10:30 or 11:00 p.m. against racing a vehicle that does not require a muffler will still be applicable even during special motor racing events. The purpose of this Rule is to allow three events per year (no longer than two consecutive days each) at which a substantial number of out-of-state vehicles compete at an Illinois facility. Because many other states do not currently impose muffler requirements, out-of-state drivers are unlikely to participate in Illinois events for which mufflers are required. Therefore, the muffler requirements are lifted for three events per year in which many out-of-state drivers participate.

Rule 415(b) allows an exception for motor racing facilities which conduct events on fewer than five days per calendar year. The Agency testified that it arrived at the number five based upon a determination of the impact only five days of racing would have upon nearby residents balanced against the costs of control (R.532). We find this exception to be reasonable.

Rule 415(c) provides an exception for motor racing events which may be held on fair grounds in conjunction with State or County fairs. Rule 415(d) provides an exception for facilities which are located two miles away from any residential dwelling units. The Board has made the determination that at a distance of two miles from a motor racing facility the noise has attenuated to the degree that the cost of a muffling requirement or decibel limit outweighs the benefits to be achieved.

Rule 415(e), which allows an exception for facilities whose emissions do not exceed background sound level by more than seven

dB(A) at any residential dwelling unit, incorporates similar reasoning to Rule 415(d). In such a situation the cost of compliance exceeds the benefits to be gained to the degree that an exception is warranted. Rule 415(f) allows an exception for existing facilities whose emissions comply with the daytime property-line octave band limits specified under Rule 202 of the Noise Regulations. Compliance with this standard would protect the public to the degree that the Board has determined desirable, although the exception applies even if the nighttime standards of Rule 203 are not being met. Emission levels complying with the daytime limits, even if higher than the nighttime limits, will still be lower than most racing facilities could achieve through muffling. We note that, although we have found that compliance with these numerical limits is not feasible statewide, we would encourage individual facilities to attempt to achieve such compliance. In individual situations, the application of barriers or acquisition of land may indeed be feasible and may bring about compliance with Rules 202 through 207, alleviating the requirement of compliance with the muffler requirements.

Rule 415(g) exempts new facilities which comply with the daytime and evening octave band limits. Again, these levels are stricter than those that most facilities will achieve through muffling. Construction of new facilities would allow for forward planning and consideration of land uses such that compliance with the property line limits could be achieved.

Rule 416: Compliance dates for Part 4

This Rule allows owners of existing facilities 90 days from the date of the Board's Order to comply with the regulation, and requires owners of new facilities to comply upon commencement of activities. Of course, the muffler and dB reduction requirements apply as of the dates specified in those Rules.

Economic Impact of the Regulations

Determination of the economic impact of the motor racing noise regulatory proposal requires reliance upon an extensive series of assumptions and calculations. The contractors who performed the economic impact study (Ex. 17), Economic Evaluation Associates (EEA), concluded that the cost of regulating motor racing noise exceeded the benefits to nearby communities by a 2:1 ratio for the R75-11 proposal and by a 10:1 ratio for the existing Rule 201. The Agency then performed an independent analysis using the same data. It concluded that benefits exceeded costs by a 9:1 ratio for R75-11, thus obtaining opposite results from those of EEA. In addition, a witness called on behalf of AMS presented his own analysis of the size of the population impacted by motor racing noise in Illinois with and without the regulation (R.178-191, Ex.3).

Before beginning our analysis, we note that AMS in a public comment filed February 27, 1978, implied that the conclusions reached in the economic impact study prepared by the IIEQ are binding upon the Board. Section 27(b) of the Act, however, states that the Board shall "consider those elements detailed in the Institute's study" (emphasis added) and determine "based upon the Institute's study and other evidence in the public hearing record" (emphasis added) whether the proposed regulation has any adverse economic impact. The Board must consider the economic impact study but is certainly not required to adopt its conclusions. Such a result would remove decision-making power from the Board and place it within the hands of the IIEQ. The Board has considered the study submitted by the IIEQ but is also required to consider other evidence in the record in making its determination. Such other evidence in this case included the extensive economic analysis performed by the Agency.

EEA determined that the direct costs of R75-11 consist of attendance losses, muffler costs, sound meter costs, and enforcement costs. The bulk of the cost associated with R75-11 comes from what EEA projects as a drop in attendance. The total yearly cost associated with all of these categories according to the EEA evaluation is \$797,770. Although the figures were somewhat adjusted during the economic impact hearings, EEA estimated in the study itself that the benefits from R75-11 totaled \$424,877, and benefits from Rule 201 totaled \$736,664. During the economic impact hearings, EEA increased its estimation of the benefits to \$648,000 (R.799).

EEA assumed certain costs to be common for all categories of racing facilities. These costs include: sound measuring equipment, assumed to be \$535 purchase price plus \$50 per year for maintenance and calibration; mufflers, assumed to be \$50 per pair, to be replaced annually; and enforcement, assumed to be \$7,412 for training, preparation of technical documents, and field investigation. The cost of sound measuring equipment and mufflers was obtained from manufacturers, and the cost of enforcement was obtained from the Agency.

The major cost in the EEA calculations, attendance effects, was calculated for both oval and drag racing facilities. For motorcycle racing facilities, no attendance loss was assumed as a result of R75-11 because the R75-11 emission standard for motorcycles is already in force in 85% of the Illinois facilities due to the parallel AMA requirement. EEA arrived at its projected attendance loss for oval facilities on the basis of both out-of-state experience and a survey of Illinois promoters, some of whom had already imposed a muffler requirement. Attendance loss experienced by out-of-state oval facilities has been negligible at most, but the promoters' survey in Illinois indicated promoters anticipate a 9.67% average yearly loss due to the R75-11 muffler requirement.

EEA assumed that the real loss would lie between the out-of-state experience and promoter expectations, and used an expected average attendance loss of 5% yearly. At a cost of \$5.50 per person, based upon an admission price of \$3.00 and cost of refreshments per person of \$2.50, a 5% loss in attendance would result in a \$353,582.00 loss in gross income. For drag racing facilities, there is no out-of-state experience to draw from in determining attendance loss. The promoter survey indicated an expected 48% drop in attendance, but EEA assumed a yearly 15% drop in attendance or \$208,601 average yearly loss.

The issue arising in relation to sports car facilities is not attendance loss but potential loss of driver participation. The promoter of Blackhawk Farms, the only sports car facility in Illinois, rents the facility out to two major clubs - Sports Car Club of America (SCCA) and Midwest Council of Sports Car Clubs (MCSCC), both of which conduct approximately 12 races at the facility per year. Attendance at these events is very small as most of the people who come are associated with either of the two major organizations. The relevant issue is, therefore, not attendance but driver participation. Experience at Waterford Hills in Michigan, the sports car racing facility currently imposing a requirement parallel to the relevant R75-11 requirement, indicates there may not be a significant loss of participation. A survey conducted by the Chicago Region of the SCCA (Ex. 6) would seem to indicate that many drivers are not racing at Waterford Hills because of the muffler requirement, but, as was noted by EEA, the accuracy of the survey is very questionable. However, because no midwest sports car tracks other than Waterford Hills require mufflers, the EEA report assumed a negative impact could be expected. EEA "guessed" that a 25% loss in participation would occur due to R75-11, resulting in a cost of \$61,875.

In calculating the benefits of reducing racing noise levels, EEA used as the monetary measure the increase in residential property values resulting from producing a quieter residential environment. Monetary benefits were calculated for thirty-five race tracks in Illinois in the following manner. An annual average day-night noise level (L_{dn}) was calculated for a series of distances from each race track with and without regulations. Distances were established by using 6 concentric rings around the track, each doubling the distance of the last up to two miles away. The area within each ring was considered an equal noise band 6 dB lower than the closer one. The population and number of homes in each noise band were estimated. For ten race tracks census block data was available which allowed actual counting of people in homes in each area. For the rest of the tracks, county population densities were applied to the areas involved to calculate numbers

of people. The "equivalent fully impacted population" for each track was then determined (See Ex. 17, ch. IX). The number of homes were estimated using the statewide average of 3.3 persons per single family dwelling unit. All estimates were adjusted to 1975 populations in homes, and future changes were projected through 1981. Home values were obtained from the census and adjusted from 1970 to 1975 dollars by using the housing cost index of the Consumer Price Index. The factor used for adjusting from 1970 to 1975 values was 1.165 (R.662). It should be noted that, although benefits were based on 1975 dollars, costs in the study were based on 1976 dollars.

A Racing Noise Index (RNI) for each band was calculated for regulated and unregulated conditions. The RNI is the difference between the annual L_{dn} for a track and ambient noise levels. Ambient levels were assumed to be 45 dBA for rural tracks, 55 dBA for suburban tracks, and 65 dBA for urban tracks, with tracks classified according to location. Using a property value measure developed by Nelson, a change in property values of 0.40% for each 1 dBA change in RNI was used to calculate the total benefits of the regulation. The benefits for each band were obtained by multiplying: (the number of dBA's of change in RNI resulting from regulation) x (the average home property value) x (0.004 factor for change in value). The band benefits were summed over all the tracks, yielding a total estimated annual benefit of \$320,341. Adjustment of that figure to allow for an additional increase in values of undeveloped residential land yielded a total adjusted benefit of \$424,877. Benefits of \$736,664 were estimated for Rule 201. During the economic impact hearings, EEA adjusted its estimation of benefits for R75-11 to \$648,000, due to certain computational errors in the study and an update of the population estimates (R.797-799).

During the economic impact hearings, the Agency presented its own analysis of the economic impact of R75-11. Although the Agency had several reservations about some EEA assumptions, it restricted its own analysis to working with EEA data and computations (R.840). Because the Agency used the basic procedure outlined above, only differences between the two studies will be presented here.

As to the cost estimate, although the Agency felt that based upon in-state and out-of-state experience the effect on attendance loss would be neutral, the Agency did include attendance effects in its cost estimate. However, the attendance effect was assumed to be temporary, disappearing by the fourth year that the regulation is in effect. The Agency used a 10% rate of attendance loss, and assumed that the loss the second year would be one-half that of the first year, the loss for the third year would be one-half of that of

the second year, and the fourth year there would be no attendance effect. The Agency assumed the \$3.00 admission price but used a price of \$1.25 rather than \$2.50 for the concession costs because they assumed a 100% mark-up in prices (Ex. 45, R.877-882). Similar calculations were done for drag racing facilities. For sports car racing facilities, although the Michigan experience seemed to indicate negligible participation loss, the Agency assumed a loss of participation occurring in the same manner that the attendance loss would occur for oval and drag racing facilities, that is, a loss diminishing to a negligible loss by the fourth year. The final Agency calculation of costs yielded \$67,000 for oval facilities, \$100,000 for drag racing facilities, and \$16,158 for sports car facilities, indicating total costs of \$183,200 annually for R75-11. As mentioned previously, EEA had calculated annual costs for R75-11 to be \$797,770.

In its calculation of benefits, the Agency differed with EEA in several respects. First of all the Agency updated the population data and estimated the population more specifically in relation to exact track location. County densities were used only when nothing else was available. For those tracks which the Agency could locate on county or topographical maps, it counted the number of residential dwelling units in the vicinity of those tracks. If a race track was in the vicinity of a town that did not have census block data, the Agency assumed a uniform population density in that city and assigned to the area of the city within any particular band that proportion of the city's population (Ex. 24). The Agency also updated EEA's calculation of the population around rural tracks (Ex. 25). The results of the Agency's analysis indicated that approximately 305,000 people live within 10 miles of Illinois race tracks. Furthermore, the Agency found that, based upon an annual average L_{dn} , the "equivalent fully impacted population" (FIP) in Illinois due to motor racing activities was 20,182 (R.873). EEA had found the FIP to be 16,068 (Ex. 17, p.138). The witness testifying on behalf of AMS found the FIP to be 10,592 without R75-11 and 4,529 with R75-11 (R.189). The Agency's analysis determined that R75-11 would achieve an 81% reduction in FIP (R.873). Using an hourly L_{eq} which measures the noise impact during the racing hours, the Agency determined the FIP to be 165,213 (R.874), compared to 201,828 calculated by EEA (Ex. 17, App. C). EEA, however, relied on the annual L_{dn} rather than the hourly L_{eq} .

In determining property values, the Agency used values which were more specific as to location, such as rural or urban. In updating property values from 1970 to 1975 dollars, the Agency used the U.S. Bureau of Census 1974 Annual Housing Survey home property values for the North Central United States to update to 1974 and

the homeownership component of the consumer price index to update from 1974 to 1975 (R.863, Ex. 33). The factor used for the increase in the value of houses in Illinois from 1970 to 1975 was 1.7057, significantly higher than the factor of 1.165 used by EEA. This difference accounted for the bulk of the difference in the benefits calculations between the two analyses. Additionally, property values were updated from 1975 to 1976 values so as to correspond to the 1976 values used in the cost estimates (R.885). Ambient noise levels were calculated for each track based on specific population densities rather than characterization of the tracks as urban, suburban or rural based upon location. Additionally, ambient levels were included in the calculation of noise levels obtained during race time, in contrast to the EEA report which did not include ambient levels. Finally, the Agency included the benefits of noise reduction for rental units in its analysis. For Blackhawk Farms, the Agency included benefits to residents living more than two miles from the track. The Agency's estimate of benefits yielded an annual value of \$1,602,000 as compared to the estimate costs of \$184,000. As to the individual categories, the Agency estimated benefits of \$1,450,000 for oval tracks, \$126,000 for drag racing tracks and \$92,500 for sports car facilities, all in 1976 dollars (Ex. 50). In a public comment filed April 10, 1978, the Agency changed its benefits calculation for sports car facilities to \$317,260.

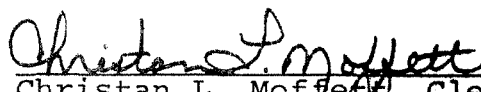
The Agency indicated that it considered its estimates to be conservative. As to cost, although the Agency included a loss of attendance in its calculations, the Agency's "best estimate" would be no attendance effects, thus reducing cost. The Agency used EEA's estimated time of actual vehicle operation as 25% of total racing time but considers that figure to be an underestimate. A higher percentage of racing time would increase the L_{dn} and, therefore, also increase the benefits from the regulation. Impacted land up to two miles from the tracks was used in the study, but the Agency indicated that additional further areas are also impacted and their omission was also an underestimate of benefits. Finally average sound levels rather than energy average sound levels were calculated for vehicles. The difference between the two methods of calculation was 1 decibel, which results in approximately a 13% underestimate of benefits.

As can be seen from the extreme differences between the EEA and EPA studies, the economic impact of this proposal in terms of a specific cost/benefit ratio is far from certain. The Board, however, is inclined to agree with the Agency's analysis. Based upon the evidence of actual experience, both in and out-of-state, we find that there is unlikely to be a significant attendance loss in the long run due to this regulation. In addition, we

find that inclusion of updated population, more accurate property values and a more accurate method of updating property values, and inclusion of ambient levels during race time in the estimate of benefits increase the accuracy of the benefit calculation. We therefore conclude that, although many of the assumptions in both EEA and EPA's analysis can only be verified on the basis of future experience, from our perspective today the regulations which we hereby adopt are economically reasonable. Because the figures are subject to so much variation, we decline to identify a specific benefit to cost ratio but find that there is substantial evidence indicating that adoption of R75-11 will significantly benefit the people of the State of Illinois.

Mr. Young dissents.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify the above Opinion was adopted on the 22ND day of June, 1978 by a vote of 4-1.


Christan L. Moffett, Clerk
Illinois Pollution Control Board