

ILLINOIS POLLUTION CONTROL BOARD
December 19, 1991

IN THE MATTER OF:)
) R90-20
DIESEL VEHICLE EXHAUST) (Rulemaking)
OPACITY LIMITS)

PROPOSED RULE. SECOND NOTICE.

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

This matter is before the Board on its own motion. On November 27, 1991, we proposed a Second Notice package concerning diesel exhaust opacity. Due to the significant changes made from First Notice to Second Notice, we established a brief period in order to receive comment from the participants in this rulemaking. In total, the Board received five submittals. The commenters included Detroit Diesel Corporation (DDC, P.C. #131); Engine Manufacturers Association (EMA, P.C. #132); Illinois Environmental Protection Agency (Agency, P.C. #133); Regional Transportation Authority, (RTA, P.C. #134) and; the Chicago Lung Association and the Illinois Chapter of the Sierra Club (CLA/ICSC, P.C. #135).

DDC, while supporting the rule, alleges that an anomaly has been discovered during the California Roadside Smoke program that makes it likely that the entire family of DDC's 1987-1990 series 60 engines will fail the 55% opacity snap acceleration test. Indeed, DDC claims that the engine family will fail any opacity standard less than about 85%. DDC asserts, however, that the engines which emitted 89% over the snap acceleration test emitted only 13%-18% over the EPA federal smoke test, and that the engines have very low smoke levels under most other operating conditions.

DDC states that, while the engines can be recalibrated, it requires connecting each engine to a computer for reprogramming, a "logistically difficult" task for all existing engines. (P.C. #131, p. 1.) DDC notes that, for 1991, this anomaly has been corrected with revisions to the engine control software.

DDC proposes that the Board add the language that the California Air Resources Board adopted to address this problem. The language DDC proposed is as follows:

Exemptions from the opacity standards in Paragraph (a)(2) may be granted for engine families that cannot meet the standard because of inherent engine design characteristics or nonadjustable fuel metering parameters. Exemptions may be based on the voluntary submission of technical information by engine or vehicle manufacturers. Such technical information may include

certification test and/or snap-idle test opacity data. Alternative opacity standards would thereupon be established for the exempted engine families. (P.C. #131, p. 2.)

We first note that DDC's submittal is significantly at odds with the prior testimony in this proceeding of the EMA, which DDC states in its comment that it helped prepare and fully supports. However, DDC's comments also appear to be asserting that it has only recently discovered its problem, and our following discussion and proposed amendment are based on this assumption.

The Board declines to accept the amendment proposed by DDC. The language is much too broad, and DDC fails to justify the sweeping language. The amendment, as drafted, is not tailored to DDC's 660 series problem. It does not even provide that the problem be recently discovered. Rather, it sets up a mechanism of standard by exception, with rather loose justifications, of general applicability to all pre-1991 engine families. In other words, exemptions from the 55% standard may be granted, and alternative standards established, for "engine families that cannot meet the standard because of inherent engine design characteristics or nonadjustable fuel metering parameters". The record of this proceeding already fully supports the Board's conclusion that the standard was overwhelmingly supported by, and justified for, the engine families generally, and we decline to, in essence, open up this standard at the back end of this rulemaking. We note that under the Illinois system there are relief mechanisms available for asserting special circumstances should they occur after these regulations are adopted.

However, DDC arguably has timely placed its own newly discovered problem in the record of this proceeding for Board consideration. The problem is that DDC has not provided enough information at this juncture for the Board to even consider its request for relief, much less act upon it.

On balance, we believe that the best way to solve this problem is to add to the proposed regulation at Section 240.141 a new subsection (d). This subsection utilizes the adjusted standard procedure found at Section 28.1(b) of the Act and establishes levels of justification in the rule of general applicability. Section 28.1(b) states:

In adopting a rule of general applicability, the Board may specify the level of justification required of a petitioner for an adjusted standard consistent with this Section.

We note that the new subsection (d) specifies the DDC 1987-1990 Series 60 engines, and requires information addressing the uniqueness of the problem, submittal of all test data regarding

USEPA certification and the snap-idle test, economic and technical data regarding DDC's logistical problem noted above, the alternative opacity standard proposed, and the environmental effects.

Finally, we strongly advise DDC to file for an adjusted standard promptly; Section 28.1(e) of the Act provides for a stay of the applicability of the regulation only if "any person files a petition for an individual adjusted standard...within 20 days after the effective date of the regulation".

The comment submitted by EMA seeks to implement the same language as proposed by DDC. (P.C. #132, p. 1-2.) For the aforementioned reasons, we decline to adopt this provision. While EMA does not refer to DDC specifically, it sets forth an identical example. Absent more specification we decline to further address the issue in this proceeding.

The Agency's comment (P.C. #133) in response to our Second Notice proposal seeks to reinstate the visual opacity test as an enforcement mechanism. The Agency correctly states that it was the only participant in this proceeding who presented a qualified witness to discuss visual opacity, including both the certification of opacity readers in Illinois and the historical accuracy of the method. (P.C. #133, p. 1.) While the Board carefully considered this testimony, we are convinced that visual opacity is not an appropriate enforcement mechanism for this particular rulemaking.

For example, a great deal of the Agency's testimony centered on the "Method 9" procedure. This test method uses only certified smoke readers and was initially adopted for evaluating stationary sources. (Tr. at 40.) In fact, Mr. Berkely Moore, testifying for the Agency, stated that:

Use of the Method 9 procedure in its entirety with no changes, however, would likely be precluded for the opacity limitations which are being considered in this proceeding because Method 9 itself requires multiple readings, I should say specifically 24 readings at 15 second intervals over a six minute time period. And that six minute time period seems incompatible with the nature of a moving source.

In fact, it may be practical to limit the opacity readings to one only. In which case, no citation should be given unless the reading is somewhat above the standard.

I might say in this connection that of the average positive error, and by positive error, I mean an overestimate of opacity as recorded by a visual observation compared to that which an instrument would

show, never exceeds -- virtually never exceeds seven and a half percent for 25 readings. But if it is limited to one reading, it could be as high as 15 percent, but usually is less than 15 percent.

(Tr. at 38.)

Upon further questioning, Mr. Moore testified that the existing opacity regulation was not enforced by the Agency because it was not structured to do so and, further, that he know of no other entity enforcing the standard. (Tr. at 47.) Moreover, the record indicated that the "Method 9" procedure would be difficult to apply to a rapidly moving vehicle over the course of a ten-second timespan. (Tr. at 43-45.) Finally, the availability of modern smokemeters and the empiricism they provide convince us that the snap-idle test using these meters is superior to the visual opacity test. (R90-20, Opinion and Order (November 27, 1991), pgs. 2-5.) Accordingly, we will not revise our Second Notice package with regard to this issue.

The CLA/ICSC also submitted a comment asserting that visual opacity testing is an appropriate enforcement mechanism (P.C. #135.) The CLA/ICSC, who co-sponsored this rulemaking prior to First Notice, opposes our proposed Second Notice package. The co-sponsors object to the Board's reliance on local government, other state agencies or the legislature to secure enforcement of the standard. In addition, the CLA/ICSC maintains that our Second Notice proposal lacks guidance as to what types of enforcement mechanisms would be most effective. In this regard, CLA/ICSC asserts that the Second Notice proposal should outline the Board's expectations of the Agency or any other state agencies that need to be involved. The comment concludes by stating that our proposal will undoubtedly discourage local government, state agencies or the state legislature from taking the necessary action to enforce the revised opacity standard.

With respect to CLA/ICSC's position concerning visual opacity as an enforcement mechanism, the Board has adequately addressed that issue in today's Order in addition to our Opinion of November 21, 1991 in this docket. The rest of public comment 135 relates to what the Board should do in order to effect a viable enforcement program. At the same time, the CLA/ICSC recognizes that "the Board lacks the authority to require an inspection and enforcement program" and that "the Board does not have the authority to require such [enforcement] mechanisms." (P.C. 135 at 1.) Pursuant to the Illinois Environmental Protection Act ("Act"), the Board's task is to promulgate standards. Nowhere in this enabling statute lies the authority for the Board to direct other state agencies, let alone the state legislature. In fact, our power to regulate stems from a delegation by the state legislature.

We have recognized throughout this proceeding that the

regulation of diesel exhaust is somewhat unique. We also recognize that although the Agency is the nucleus of enforcement under the Act, any person can bring an enforcement action. Ill. Rev. Stat. 1989 ch. 111 1/2 par. 1031. Accordingly, we have attempted to engage local municipalities, pertinent state agencies and other "persons" who can enforce this standard. Concurrently, we have attempted to include the public in our revision of this technical standard, thereby framing the problem in an accurate way.

We have concluded that diesel smoke is a public health hazard and a nuisance. After evaluating all of the testimony, we have formulated a 55/40 percent opacity standard as registered by smokemeters. What happens in terms of enforcement remains to be seen. In our hearings, certain municipalities west of Chicago have indicated a willingness to act upon a standard. Similarly, the possibility of state agencies enforcing this standard is not inconceivable. In this regard, we would urge the CLA/ICSC to encourage those "persons" who do have the power to enforce to do so. Once this standard is finally adopted, there will be a wealth of enforcement opportunities where diesel exhaust is a problem.

Finally, the RTA commented that Section 240.241(c) should be modified to indicate that testing should occur at the normal operating temperature of the engine. The Board will revise this section in order to make this clear.

ORDER

The Board directs the Clerk to file the amendments adopted with the Joint Committee on Administrative Rules for Second Notice.

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

PART 240
 MOBILE SOURCES

SUBPART A: DEFINITIONS AND GENERAL PROVISIONS

Section	
240.101	Preamble
240.102	Definitions
240.103	Prohibitions
240.104	Inspection
240.105	Penalties
240.106	Determination of Violation
<u>240.107</u>	<u>Incorporations by Reference</u>

SUBPART B: EMISSIONS

Section
 240.121 Smoke Emissions
 240.122 Diesel Engine Emission Standards for Locomotives
 240.123 Liquid Petroleum Gas Fuel Systems
 240.124 Vehicle Exhaust Emission Standards
 240.125 Compliance Determination

SUBPART C: HEAVY-DUTY DIESEL SMOKE OPACITY STANDARDS AND
 TEST PROCEDURES

Section
240.140 Applicability
240.141 Heavy Duty Diesel Smoke Opacity Standards and Test
 Procedures

240.Appendix A Rule into Section Table
 240.Appendix B Section into Rule Table

AUTHORITY: Implementing Sections 9, 10 and 13 and authorized by Section 27 of the Environmental Protection Act (Ill. Rev. Stat. 1989, ch. 111-1/2, pars. 1009, 1010, 1013 and 1027).

SOURCE: Adopted as Chapter 2: Air Pollution, Part Vii: Mobile Sources, filed and effective April 14, 1972; codified at 7 Ill. Reg. 13628; amended in R85-25, at 10 Ill. Reg. 11277, effective June 16, 1986; amended in R90-20 at ___ Ill. Reg. _____, effective _____.

NOTE: Capitalization denotes statutory language.

SUBPART A: DEFINITIONS AND GENERAL PROVISIONS

Section 240.102 Definitions

All terms which appear in this Part have the definitions specified in this Part and 35 Ill. Adm. Code 201 and 211. Where conflicting definitions occur the definitions of this Section apply in this Part.

"Diesel Engine": All types of internal-combustion engines in which air is compressed to a temperature sufficiently high to ignite fuel injected directly into the cylinder area.

"Diesel Locomotive": A diesel engine vehicle designed to move cars on a railway.

"Driver": The same meaning as defined in the Illinois Vehicle Code, Ill. Rev. Stat. 1989, ch. 95-1/2, par. 116.1.

"Fleet": Five or more vehicles.

"Full Power Position": The throttle position at which the engine fuel delivery is at maximum flow.

~~"Heavy Duty Vehicle": A motor vehicle rated at more than 8000 pounds gross vehicle weight~~A vehicle with 8,000 pounds or greater manufacturer's maximum gross vehicle weight rating (GVWR).

"High Idle": That portion of a two-speed idle test conducted with the engine operating at a speed of approximately 2500 PRM.

"Idle Mode": That portion of a vehicle emission test procedure conducted with the engine disconnected from an external load and operating at minimum throttle.

"Light Duty Truck": A motor vehicle rated at 8000 pounds gross vehicle weight or less, which is designed for carrying more than 10 persons or designed for the transportation of property, freight or cargo, or is a derivative of such a vehicle.

"Light Duty Vehicle": A passenger car designed to carry not more than 10 persons.

"Model Year": The year of manufacture of a motor vehicle based upon the annual production period as designated by the manufacturer and indicated on the title and registration of the vehicle. If the manufacturer does not designate a production period for the vehicle, then "model year" means the calendar year of manufacture.

"Motor Vehicle": As used in this section "motor vehicle" shall have the same meaning as in the Illinois Vehicle Code (Ill. Rev. Stat. 1985⁹, ch. 95 1/2, par. 1-146).

~~"Opacity": A condition which renders material partially of wholly impervious to the transmittance of light, and causes the obstruction of an observer's view~~That fraction of light, expressed in percent, which when transmitted from a source through a smoke-obscured path, is prevented from reaching the observer or instrument receiver.

~~"Persons Liable": All persons owning, operating or in charge or control of any equipment who shall cause or permit or participate in any violation of these rules and regulations either as owner, operator, lessee or lessor.~~

"Smokemeter or Opacimeter": An optical instrument designed to measure the opacity of smoke or diesel exhaust gases using the light extinction method.

"Snap idle Cycle": Rapidly depressing the accelerator pedal from normal idle to the full power position, holding the pedal in the position for no longer than ten seconds or until the engine reaches maximum speed, and fully releasing the pedal so that the engine decelerates to normal idle.

"Test Procedure": The preparation, preconditioning sequence and smoke opacity measurement processes using the snap idle cycle for determining compliance with Section 240.141.

"Two-Speed Idle Test": A vehicle emission test procedure consisting of the measurements of exhaust emission in high idle and idle modes.

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

Section 240.107 Incorporations by Reference

The following materials are incorporated by reference and include no later editions or amendments:

- a) Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, PA 15096: Report J255a Diesel Engine Smoke Measurement (August, 1978).
- b) International Standards Organization (ISO), Case Postale 56, 1211 Geneve 20, Switzerland: ISO 393 (Working Draft, January 1991). Also available from American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036.

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

SUBPART B: EMISSIONS

Section 240.122 Diesel Engine Emission Standards for Locomotives

- ~~a) The visible emission standard in Section 240.121 shall not apply to diesel engines.~~
- ~~b) With the exception of subsection (e), diesel engines manufactured before January 1, 1970, shall not be operated in such a manner as to emit smoke which is equal to or greater than 30% opacity except for individual smoke puffs. Individual puffs of smoke shall not exceed 15 seconds in duration.~~
- e) ~~1) Diesel engines shall be operated only on the specific~~

~~fuels as specified in the engine manufacturers' specifications for that specific engine, or on fuels exceeding engine manufacturers' specifications.~~

- ~~2) Persons liable for operating diesel engine fleets wholly within standard metropolitan statistical areas shall furnish to the Environmental Protection Agency, once each year, proof that the fuel purchased and used in their operations conform to subsection (c)(1).~~
- ~~d) All diesel engines operated on public highways in Illinois coming from out of the State shall conform to subsection (b).~~
- e)

1)a) No person shall cause or allow the emission of smoke from any diesel locomotive in the State of Illinois to exceed thirty percent (30%) opacity.

2)b) Subsection ~~(e)(1)(a)~~ shall not apply to:

- A)1) Smoke resulting from starting a cold locomotive: for a period of time not to exceed 30 minutes.
- B)2) Smoke emitted while accelerating under load from a throttle setting other than idle to a higher throttle setting: for a period of time not to exceed 40 seconds.
- C)3) Smoke emitted upon locomotive loading following idle: for a period of time not to exceed 2 minutes.
- D)4) Smoke emitted during locomotive testing, maintenance, adjustment, rebuilding, repairing or breaking in: for a period of time not to exceed 3 consecutive minutes and an aggregate of 10 minutes in any 60 minute period.
- E)5) Smoke emitted by a locomotive which because of its age of design makes replacement or retrofit parts necessary to achieve smoke reduction unavailable. These locomotives shall be retired at the earliest possible time.

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

SUBPART C: HEAVY-DUTY DIESEL SMOKE OPACITY STANDARDS AND TEST PROCEDURES

Section 240.140 Applicability

This Subpart applies to all on-road diesel-powered vehicles with a 8,000 pounds or greater manufacturer's maximum gross vehicle

weight rating (GVWR) operating in the State of Illinois.

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

Section 240.141 Heavy-Duty Diesel Vehicle Smoke Opacity Standards and Test Procedures

a) The standard for heavy-duty diesel vehicle smoke opacity is as follows:

- 1) No 1991 or later model year heavy-duty diesel-powered vehicle with a federal peak smoke engine certification operating on the roadways within the State of Illinois shall exceed forty percent (40%) peak smoke opacity when tested in accordance with subsections (b) and (c).
- 2) Except for subsection (a)(1), no heavy-duty diesel-powered vehicle operating on the roadways within the State of Illinois shall exceed fifty-five percent (55%) peak smoke opacity when tested in accordance with subsections (b) and (c).

b) The smoke opacity measurement shall be carried out using a light-extinction type opacimeter capable of measuring and recording opacity continuously during the snap idle testing cycle. A strip chart recorder or an equivalent or better recording device shall be used in concert with the opacimeter to record opacity continuously, including peak values. The opacimeter shall be capable of providing opacity readings with sufficient resolution to obtain 0.5 second-averaged values. The peak 0.5 second-averaged value shall be used for showing compliance with the standard in subsection (a). Where the response time of the instrument is such that opacity is being measured at smaller than 0.5 second intervals, the meter shall have the capability of providing or allowing the calculation of 0.5 second-averaged values.

1) The opacimeter shall be either an in-line full-flow opacimeter; end-of-line or plume type full-flow opacimeter; or a sampling type partial flow opacimeter. The opacimeter and recording devices shall be calibrated according to manufacturers's specifications. Corrections for the effect of exhaust stack diameter shall apply to opacity measurements made using an end-of-line full-flow opacimeter; and

2) The opacimeter and recorder shall comply with specifications in the International Standards

Organization ISO 393 and in Society of Automotive Engineers (SAE) report number J255a entitled "Diesel Engine Smoke Measurement", incorporated by reference in Section 240.107.

c) The test procedure using the snap idle cycle shall occur under when the engine is at normal operating temperature. The test shall consist of preparation, preconditioning, and testing phases.

1) In the preparation phase, the vehicle shall be placed at rest, the transmission shall be placed in neutral, and the vehicle wheels shall be properly restrained to prevent any rolling motion. In the event of a roadside test, it shall be acceptable under this Section for the driver to apply the brakes during the test.

2) In the preconditioning phase, the vehicle shall be put through a snap idle cycle three or more times until successive measured smoke opacity readings are within ten percent (10%) of each other. The opacimeter shall be rechecked prior to the preconditioning sequence to determine that its zero and span setting are adjusted to manufacturer's specifications.

3) In the testing phase, the vehicle shall be put through the snap idle cycle three times.

A) The smoke opacity shall be measured during the preconditioning and testing phases with an opacimeter meeting the requirements of subsection (b) and shall be recorded continuously on the recorder during each snap idle cycle. The maximum 0.5 second averaged value recorded during each snap idle cycle shall be the smoke opacity reading.

B) The average of the three smoke opacity readings shall be used to determine compliance with the opacity standard in subsection (a).

d) Pursuant to Section 28.1(b) of the Act and 35 Ill. Adm. Code 106.Subpart G, any person petitioning for an adjusted standard from the 55% peak smoke opacity standard in paragraph (a)(2) for DDC 1987-1990 Series 60 engines shall establish its justifications by providing the following information at a minimum:

1) The specific characteristics common only to all the 1987-1990 Series 60 engines that result in

noncompliance with the 555 opacity standard.

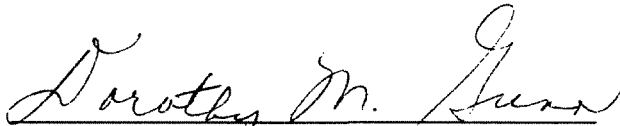
- 2) All USEPA certification and snap/idle test data.
- 3) Economic and technical data related to the logistical or other perceived difficulties encountered or that may be encountered if the existing 1987-1990 Series 60 engine software were to be reprogrammed so as to come into compliance.
- 4) The alternative opacity standard proposed and supporting data.
- 5) Supporting data showing that THE REQUESTED STANDARD WILL NOT RESULT IN ENVIRONMENTAL OR HEALTH EFFECTS SUBSTANTIALLY AND SIGNIFICANTLY MORE ADVERSE THAN THE EFFECTS CONSIDERED BY THE BOARD IN ADOPTING THE RULE OF GENERAL APPLICABILITY. (Section 28.1(c)(3) of the Act).

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

IT IS SO ORDERED.

Board Member R. Flemal dissented.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby testify that the above Opinion and Order was adopted on the 19th day of December, 1991 by a vote of 6-1.


Dorothy M. Gunn, Clerk
Illinois Pollution Control Board