PUBLIC COMMENT SUMMARY:

OPACITY PROVISIONS

UNDER

STANDARDS OF PERFORMANCE

FOR NEW STATIONARY SOURCES

OF AIR POLLUTION

Environmental Protection Agency
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711
August 1975

Introduction

On April 22, 1975 (40 FR 17778), the Environmental Protection Agency (EPA) issued a notice requesting comments from all interested persons on the opacity provisions under the standards of performance for new stationary sources of air pollution (40 CFR Part 60). The opacity provisions are included under 40 CFR 60.11 and Reference Method 9 of Appendix A. Comments were also requested on the report entitled "Reevaluation of Opacity Standard of Performance for Asphalt Concrete Plants."

Table 1 presents the number of persons commenting by affiliation category and Table 2 lists the name and affiliation of each person who commented. A summary of the comments and EPA's responses follows Table 2. Reference has been made in response to several comments to the "EPA Response to Remand Ordered by U. S. Court of Appeals for the District of Columbia in Portland Cement Association v. Ruckelshaus (486 F.2d 375, June 29, 1973)." Copies of this document are available upon request from the Emission Standards and Engineering Division, Environmental Protection Agency, Research Triangle Park, North Carolina 27711, Attention: Mr. Don R. Goodwin.

Comment Summary: Opacity Provisions

Table 1. Number of Commentators by Affiliation Category

Category	Code	Number Received
State or Local Air Pollution Control Agency	A	13
U. S. Environmental Protection Agency	B	3
Other Federal Agencies	C	1
Asphalt Concrete Pavement Associations	D	6
Asphalt Concrete Companies or Contractors	E	23
Asphalt Plant Equipment Manufacturers	F	1
Electric Utility Industry	G	6
Portland Cement Industry	H	6
Iron and Steel Industry	I	3
Consulting Firms	J	1
Instrument Manufacturers	K	4
Air Pollution Control Equipment Manufacturers	L	3
Miscellaneous	M	5
Total		75

Table 2. List of Commentators on April 22, 1975, Federal Register Notice

Comment Number	Commentator	Affiliation	Code
AC-1	J. W. Koontz	Prince George's County, Dept. of Health, Division of Air Pollution Control	A
AC-2	W. Simmons	State of Calif., Air Resources Board	A
AC-3	J. A. Redmond	State of Florida, Dept. of Pollution Control	A
AC-4	I. L. Dickstein	EPA, Enforcement Region VIII	B
AC-5	R. G. Lunche	Los Angeles County APCD	A
AC-6	H. N. Troy	Owens-Illinois	K
AC-7	D. M. Anderson	Bethlehem Steel Corp.	I
AC-8	M. C. Cordaro	Long Island Lighting Co.	G
AC-9	G. F. McGowan	Lear Siegler Inc.	K
AC-10	R. W. Heimsoth	Photomation Inc.	K
AC-11	W. Simmons	State of Calif., Air Resources Board	A
AC-12	W. R. Meyer	Commonwealth of Virginia, State Air Pollution Control Board	A
AC-13	D. M. Thomas	San Bernardino County APCD	A
AC-14	H. R. Smith	U. S. Department of Defense	C
AC-15	E. V. Fitzpatrick	EPA, Surveillance and Analysis Division, Region I	B
AC-16	Bill Stewart	Texas Air Control Board	A
AC-17	J. W. Gallion	Oklahoma, State Dept. of Health	A
AC-18	H. P. Wolfe	Limestone Sales, Inc.	E
AC-19	M. Feaster	Ritchie Construction Co., Inc.	E
AC-20	C. E. Minor	Asphalt Paving Association of Washington, Inc.	D
AC-21	P. E. Todd	Percy Todd Manufacturing Co.	L
AC-22	J. P. DiRenzo	Ackworth Materials Corp.	E
AC-23	S. W. Simmons	Eastern Industries, Inc.	E
AC-24	W. H. Vanderlinden, Jr.	Midstate Contractors, Inc.	E

Table 2 (continued)

Comment Number	Commentator	Affiliation	Code
AC-25	F. H. Eller	Interstate Equipment Co.	L
AC-26	J. E. Laird	The Maryland Asphalt Assoc., Inc.	D
AC-27	H. Ratrie	Ratrie, Robbins, & Schweizer, Inc.	E
AC-28	W. E. Hooper	Central Paving Co.	E
AC-29	R. G. Lunche	Los Angeles County APCD	A
AC-30	J. T. Via, Jr.	Tucson Gas & Electric Co.	G
AC-31	W. S. Smith	Entropy Environmentalists, Inc.	J
AC-32	B. R. Anthony	Washita Construction Co.	E
AC-33	E. M. Allen, Jr.	Murray Co., Inc.	E
AC-34	C. B. Eller	EPA, Surveillance and Analysis Division, Region IX	B
AC-35	E. Bartus	Unknown	M
AC-36	E. R. Berry	Asphalt Pavers Assoc., Inc.	D
AC-37	F. J. Crosby	Ward Pavements, Inc.	E
AC-38	W. R. McCormick	Southwestern Portland Cement Co., Eastern Division	H
AC-39	E. F. Arps	Tri County Asphalt Corp.	E
AC-40	T. D. Parnell	Hall & Barber, Inc.	E
AC-41	J. Critchfield	Associated General Contractors	E
AC-42	L. L. Warner	Southwestern Portland Cement Co., Eastern Division	H
AC-43	C. A. Fenet	R. E. Heidt Construction Co.	E
AC-44	B. B. Ross, Jr.	Carolina Asphalt Pavement Assoc., Inc.	D
AC-45	J. E. Mummert	Southwestern Portland Cement, Southwest Division	H
AC-46	D. Y. MacIver	Southwestern Portland Cement Co.	H
AC-47	M. F. L. Stewart, Jr.	Asphalt Manufacturers Assoc. of Western Pa.	D
AC-48	H. L. Haddock	Crowell Constructors, Inc.	E
AC-49	R. J. Bartell	Iowa Manufacturing Co.	F
AC-50	R. L. Yarbrough	University Asphalt Co.	E
AC-51	J. C. Snyder	The Buffalo Slag Co., Inc.	E

Table 2 (continued)

Comment Number	Commentator	Affiliation	Code
AC-52	F. D. Pickar	Arrowhead Blacktop Co.	E
AC-53	W. R. Cady	Allied Chemical	E
AC-54	C. J. Heath	Precipitation Assoc. of America, Inc.	L
AC-55	S. J. Acquaviva	Golden Glades Materials, Inc.	E
AC-56	D. S. Cahn	Amcord	M
AC-57	V. L. Sewell	Texas Industries, Inc.	M
AC-58	R. L. Smith	Warren Bros. Co.	E
AC-59	J. F. Denton	Warren Bros. Co.	E
AC-60	W. R. Meyer	Commonwealth of Virginia, State Air Pollution Control Board	A
AC-61	C. M. Brown	Republic Steel Corp.	I
AC-62	H. E. Dunkelburger, Jr. and T. L. Garrett	Covington & Burling representing Warren Bros. Co.	E
AC-63	M. C. Cordaro	Long Island Lighting Co.	G
AC-64	R. H. Berby	Kaiser Cement & Gypsum Corp.	H
AC-65	R. Dworek	United States Steel Corp.	I
AC-66	J. L. Gilliland	Ideal Basic Industries, Cement Division	H
AC-67	L. V. Barnhardt	The Fountain Sand and Gravel Co.	M
AC-68	W. C. Achinger	Wayne County Dept. of Health, Air Pollution Control Division	A
AC-69	H. Wong-Woo	State of California, Air Resources Board	A
AC-70	J. R. Jannarone	Con Edison of New York	G
AC-71	H. N. Troy	Owens-Illinois	K
AC-72	J. B. Moore	So. Calif. Edison Co.	G
AC-73	T. N. Combs	Webster, Kilcullen & Chamberlain representing National Asphalt Pavement Association	D
AC-74	T. McKie	Unknown	M
AC-75	P. A. Krenkel	Tennessee Valley Authority	G

Comment Summary and EPA Responses

The comments on the opacity provisions are categorized and presented according to the provisions to which they primarily pertain. Following each summarized comment is a coded listing of all commentators who commented on that issue (see Table 2) and their affiliation (see Table 1).

Section 60.11

1. The provisions of §60.11(e) are a necessary step toward establishment of reasonable opacity standards. AC-65(I)

   Response: No response necessary.

2. EPA should add provisions similar to those of §60.11(e)(2) which would allow establishment of alternative opacity standards for fugitive emission sources. Suggest ambient air sampling around the facility. AC-65(I)

   Response: The suggested alternative provisions are not necessary and would defeat the purpose of opacity standards for fugitive emission sources. Opacity standards are established for fugitive emission sources to require the owner or operator to direct proper attention to maintenance and housekeeping practices at the facility as well as to proper ducting of all emission points. Opacity standards for fugitive emissions are established at a level such that if the facility is properly designed, and proper maintenance and housekeeping practices are implemented, the standards can be met easily.

3. The provisions of §60.11(e) are meaningless if State and local air pollution control agencies do not adopt a similar exception procedure because the source will still be subject to the more restrictive local regulation. EPA should deny establishment of special standards under §60.11(e) if the State or local air pollution control agency does not also allow such petitions. AC-66(H), AC-68(A)

   Response: EPA believes that the provisions of §60.11(e) are necessary and meaningful without States adopting similar exception procedures. The EPA regulation bases determination of compliance with opacity standards of performance on single sets of 24 observations taken in accordance with Method 9, while most State and local regulations base compliance on an opacity level which is not to be exceeded except for allowed time periods. Since the standards and the methods of determining compliance are not comparable, whether or not a source requires an exemption from the local regulation is dependent on the level of the local opacity standard and the duration of the time

exemption. Obviously, such an analysis must be conducted on a case-by-case basis and cannot be adequately addressed here. It is expected that very few special opacity standards will need to be established under the provisions of §60.11(e) since opacity standards of performance are established at levels which consider maximum expected effects of stack diameter, particle diameter, and other significant variables.

4. Disagree with the provisions of §60.11(e) since it allows the Administrator to establish alternative opacity standards without requiring the source to first demonstrate compliance with all applicable standards. AC-16(A)

   Response: The provisions of §60.11(e)(3) clearly require the owner or operator to demonstrate that the facility was operated and maintained in a manner to minimize the opacity of emissions during the performance test; that the performance tests were properly conducted; and that the facility and its associated air pollution control equipment cannot be adjusted to meet the applicable opacity standard.

5. The provisions of §60.11(e) in effect grant waivers from opacity standards for certain sources. These provisions are in conflict with existing EPA policies and ignore health effects of pollution by allowing increased emissions of fine particles. AC-5(A), AC-29(A)

   Response: The provisions of §60.11(e) are not in conflict with EPA policies, but provide consideration for anomalous sources which cannot be adjusted to comply with the opacity standard. Special opacity standards will be established under the provisions of §60.11(e) only if it can be demonstrated that: (1) the facility was operated in a manner to minimize the opacity of emissions from the source, (2) the performance tests were properly conducted and showed the facility to be in compliance with the applicable mass or concentration standards, and (3) the facility and control equipment cannot be adjusted to meet the applicable opacity standards. Establishing special standards under these conditions is consistent with EPA's policy that where opacity and concentration or mass standards are applicable to the same source, the opacity standard will not be more restrictive than the concentration or mass standard.

The health effects of emissions from a source category are reflected in the development of the concentration or mass standard and in the determination of the best system of emission reduction considering costs. The concentration or mass standard for a given source category is established at a level which will result in the design, installation, and operation of the best adequately demonstrated system of emission reduction. Any associated opacity standard is established at a level which will require proper operation and maintenance of the air pollution control system but will not require the design and installation of a more efficient control system. Establishment of separate opacity standards for anomalous sources which cannot be adjusted to comply with the source category opacity standard does not exempt these sources from compliance with the concentration or mass standard, which is the more restrictive of the two standards. The impact of the emission source on ambient air quality, thus, is minimized to the level achievable by best control technology, and further reductions are not achievable at a reasonable cost. Any separate opacity standard established under §60.11(e) will be set at a level which requires proper operation and maintenance of the control system. EPA does agree with the commentator that opacity standards can be a means of regulating fine particulate emissions; however, EPA also believes that it is preferable to expressly regulate these emissions in the size range of interest. Therefore, opacity standards of performance are not used for the purpose of regulating fine particle emissions.

6. Section 60.11(e) will make enforcement of opacity standards overly complex because there will be different opacity standards for different plants in the same source category. AC-5(A)

   Response: Opacity standards of performance are established at levels such that well-controlled plants with stack diameters and other parameters in the expected range can comply with the opacity standard if they comply with the concentration or mass standard. EPA believes that the situations where special standards are required will be very rare. The provisions of §60.11(e), therefore, are not expected to make enforcement of opacity standards overly complex. In addition, EPA believes that it is not unreasonable to expect the enforcement officer to familiarize himself with the applicable standards for a facility prior to surveillance of that facility.

7. The provisions of §60.11(e)(2) would be unnecessary if EPA obtained data representative of the entire source category and did not establish overly stringent opacity standards. AC-52(E), AC-59(E), AC-62(E), AC-73(D)

Response: Opacity standards are not established at an overly restrictive level for facilities using best systems of emission reduction. EPA establishes opacity standards at a reasonable level which is based on data from facilities operating within the known range of variables. The provisions of §60.11(e) were established to provide accommodation for situations where operating and design variables are outside of the expected range. As was indicated in the November 12, 1974, Federal Register publication, the situations where use of the special standards provisions is necessary are expected to be extremely infrequent.

8. EPA should not allow instrument data to take precedence over opacity observations by qualified observers. AC-5(A), AC-29(A)

Response: Section 60.11(b) does not allow instrument data to take precedence over observations by qualified observers, but rather in certain situations and under certain conditions allows their use merely as probative, not conclusive, evidence. Observations taken in accordance with Method 9 by qualified observers still remains the primary and accepted means of determining compliance with opacity standards of performance.

9. Use of in-stack transmissometers to establish compliance with opacity standards is an unacceptable approach in cases where condensation of particulate matter occurs upon emission to the atmosphere (e.g. SO_3 or HCl in the effluent gas stream). AC-5(A), AC-29(A)

Response: As noted in the discussion of the November 12, 1974 (39 FR 39872), revisions to 40 CFR 60.11 and Reference Method 9, in-stack transmissometers are not used to establish compliance with opacity standards. Section 60.11(b) specifies that Reference Method 9 is the means for determining compliance with opacity standards; however, data from in-stack transmissometers may be submitted as probative, but not conclusive, evidence of compliance. EPA agrees that in-stack measurements of opacity could possibly be a meaningless indication of actual plume opacity when the effluent contains condensable compounds. In any submittal of data from continuous monitoring by transmissometer, EPA would consider the relevancy of these data to the question of the plume opacity in addition to reviewing the evidence submitted by the source owner showing that the transmissometer meets Performance Specification 1 in Appendix B, that the transmissometer has been properly maintained and calibrated, and that the data have not been tampered with in any way. Obviously, such a review must be conducted on an individual case basis. Even in situations where the results from continuous monitoring by transmissometer are accepted as probative evidence, the results of opacity readings by Method 9 remain presumptively valid and correct.

For source categories whose emissions contain appreciable amounts of condensable compounds and have applicable opacity standards, EPA does not require installation of an in-stack transmissometer. Should a facility unexpectedly have appreciable quantities of condensed compounds such that in-stack measurement of opacity is meaningless, the provisions of §60.11(i) allow the owner or operator to request exemption from the monitoring requirement.

10. Method 9 observations should be subordinate to data from in-stack transmissometers since these data are more accurate than Method 9 observations, in-stack transmissometers are the primary reference during observer certification, and transmissometer data do not vary with illumination and other environmental conditions. Method 9 should be retained only for use at facilities without in-stack transmissometers. AC-6(K), AC-8(G), AC-56(M), AC-62(E), AC-70(G), AC-71(K)

    Response: Method 9 has been demonstrated to be of sufficient accuracy for determining compliance with opacity standards when the positive error is taken into consideration in determining possible violations. In addition, Method 9 is being retained as the primary and accepted means for determining compliance in order to have a consistent regulatory and enforcement approach for all stationary sources. Data from in-stack transmissometers are not accepted as the means for demonstrating compliance with opacity standards because of the difficulties involved for the enforcement agency in verifying that the transmissometer has been properly calibrated, operated, and maintained. However, in-stack transmissometer data may be submitted as probative (but not conclusive) evidence of the actual opacity of emissions.

11. Since §60.11(b) allows the use of in-stack transmissometers as probative evidence of compliance, EPA should develop criteria for reduction of the transmissometer data. Factors that should be considered include averaging periods, data reduction of transitory peak periods, correction of the data to stack exit diameter values, the effects of non-uniform processes, and the effect of air inleakage after the transmissometer and before the stack exit. AC-63(G)

    Response: Such criteria have been developed and are part of the specifications on continuous monitoring which will be promulgated in the Federal Register in the future.

12. The provisions of §60.11(e) represent an unnecessarily cumbersome method of handling a situation which may occur frequently. AC-67(M)

    Response: EPA agrees with the commentator that the establishment of special opacity standards would be a cumbersome approach if many of these situations occurred. However, as indicated in the responses

to comments 6 and 7 of this section, EPA does not expect to establish many special opacity standards. Obviously, if any given source category requires a large number of special standards, the opacity standard would have to be thoroughly reevaluated.

13. The provisions of §60.11(e) unjustifiably shift to the owner or operator the burden of proving the unachievability of the opacity standard. This procedure raises serious constitutional questions particularly when viewed in the context of the Clean Air Act, which imposes criminal and civil penalties for noncompliance. AC-62(E)

Response: Opacity standards of performance are established at levels which require proper operation and maintenance of well-controlled facilities operating within the expected range of operating variables. The provisions of §60.11(e) provide necessary flexibility for establishment of special standards for facilities operating outside the expected range of operating variables. EPA expects that situations requiring special opacity standards are unlikely, but the provisions of §60.11(e) were established to provide flexibility for any unforeseen situations.

The term "burden of proof" as used in the comment, refers to the duty of a party to prove affirmatively a claim asserted in a judicial case, and the constitutional issues of shifting the burden of proof relate more specifically to criminal actions in a court of law. The notion of burden of proof, therefore, is not applicable to section 60.11(e) which is concerned with administrative, not legal, action. In the event that legal action, whether civil or criminal, is taken to enforce these standards under section 113 of the Clean Air Act, as amended, EPA has the burden of proving that the alleged violation has in fact occurred.

Section 60.92(a)

1. The available opacity data clearly indicate that a 20 percent standard is too lenient and a no visible emission standard should be promulgated. Experience with nine asphalt concrete plants in Prince George's Co. (Md.) indicate that a no visible emission standard is a reasonable standard. AC-1(A)

Response: Review and analysis of the opacity data and the conditions under which the data were obtained shows that a no visible emissions standard (zero percent opacity) is inappropriate. The opacity standard was established at 20 percent to allow for any situations where a plant is operating with an atypically large stack diameter and/or emits particulates with atypically small mass mean diameters. For such situations, a standard of zero percent opacity could be more restrictive than the concentration standard and would be inconsistent with EPA policy. Therefore, a zero percent opacity standard was not promulgated.

2. A 20 percent opacity standard for asphalt concrete plants is well within levels achievable by available control technology. AC-74(M)

Response: No response is necessary.

3. The opacity standard has not been demonstrated to be achievable because it was based on three plants which were arbitrarily selected for Method 5 testing, on the basis of no visible emissions, from a total of 64 well-controlled facilities. EPA has never presented a justification for excluding these other facilities from study which may have disproved EPA's assumption that well-controlled asphalt plants should have no visible emissions. EPA also has never explained why additional data from plants other than those tested by Method 5 were not obtained. AC-62(E), AC-73(D)

Response: EPA believes that the opacity standard of 20 percent has been adequately demonstrated by observations and calculations to be achievable by facilities that use properly designed, installed, operated, and maintained baghouses or venturi scrubbers. The three facilities observed by EPA were originally selected for Method 5 testing because they were good examples of well-designed and well-operated fabric filter collectors and venturi scrubbers, the facilities were amenable to Method 5 testing, and they were available for testing during the desired period. The facilities were not arbitrarily selected for emission testing on the basis of no visible emissions as alleged by the commentators; in fact, one facility was observed to have visible emissions during the EPA pre-survey. The bases for selection of the facilities for testing were discussed in Volume I of "Background Information for New Source Performance Standards: Asphalt Concrete Plants..." APTD-1352 (a, b, c) and in response to comment I-20 in Volume III. EPA would like to reiterate that these 64 asphalt concrete plants were not all equally well controlled; in fact, many installations with low-efficiency collectors were observed at the request of local asphalt assocations and were presented as examples of "good housekeeping" rather than best control technology.

Additional opacity data were not obtained from asphalt concrete plants other than those previously tested by EPA for several reasons. The intent of opacity standards is to ensure proper operation and maintenance of the control system on a continuous basis. The opacity data were obtained at asphalt concrete plants with known proper maintenance practices and with a previously established emission concentration. Observation of control equipment with unknown levels of emission control and unknown operation and maintenance practices could have resulted in data which would not be representative of the desired levels. (The resultant data may have been too lenient or too stringent.) Such data would not have been useful for establishment of the opacity standard. Since the opacity standard was established at a level in excess of the

observed levels, and was established at a level which takes into consideration the maximum expected effects of stack diameter, particle size, and other significant variables, this process does not prejudice owners and operators of well-controlled asphalt concrete plants operating within the expected range of variables.

4. The opacity standard is insufficiently supported by the data bases which consist of only 15 hours of observations obtained at three facilities. Such limited data can hardly be considered a typical cross-section of the industry which operates under widely varying conditions. Specifically, EPA should have observed asphalt concrete plants operating with greater than 10 percent minus 200 mesh feed material. EPA should submit these data for review to the National Bureau of Standards to determine the appropriateness of use of such a limited data base. AC-47(D), AC-49(F), AC-52(E), AC-59(E), AC-62(E), AC-67(M), AC-73(D)

Response: Section 111 of the Clean Air Act requires that standards of performance "reflect the degree of emission limitation achievable through application of the best system of emission reduction which (taking into account the cost of achieving such reduction) the Administrator determines has been adequately demonstrated." Neither the language of section 111 nor the legislative history of the Act provides any guidance on the amount of data necessary for justification of a standard of performance. In any case, the Act does not require the standard to be based on control levels which all existing plants are capable of achieving. The Act requires that standards of performance be based on the application of best available technology; therefore, the data bases of the standard are necessarily limited. It was the Administrator's judgment that 15 hours of Method 9 observations on best controlled facilities combined with additional information provided by State and local air pollution control agencies was sufficient justification for establishment of a 20 percent opacity standard. (The reevaluation report did not discuss the information received from State and local air pollution control agencies or the data summarized in Volume II of the "Background Information for New Source Performance Standards:..." APTD-1352 because all the observations were of unknown duration or no information on emission concentrations was available. This information was not the primary basis of the opacity standard.) The data bases of this standard are sufficient and the opacity standard is established at a clearly achievable level as evidenced by comments 1 and 2 of this section.

The standards of performance are not intended to reflect performance of a typical cross-section of the industry. The opacity standard is established at a level which will ensure continued proper operation and maintenance of the control systems of interest (baghouses or venturi scrubbers) and takes into consideration the effects of the normal range of operating variables on opacity. EPA believes that asphalt concrete plants operating under typical conditions, and with emission concentrations less than 90 mg/dscm, will have plume opacities significantly less than the level of the standard (20 percent). The opacity standard is also achievable by facilities operating with variables at the extreme values of their expected ranges, such as facilities with an effluent with a mass mean diame-

ter of one micron. Emissions from an asphalt concrete plant using greater than 10 percent minus 200 mesh feed material will not have an average size smaller than one micron since particles smaller than one micron are not generated by rock crushing and grinding operations. Therefore, observation of asphalt concrete plants using large quantities of minus 200 mesh material was not considered necessary.

5. The particulate matter emission tests and the opacity observations were conducted approximately two years apart. The data, therefore, are not comparable and cannot be used to justify the opacity standard. AC-59(E), AC-62(E), AC-66(H), AC-73(D)

Response: In response to comments received on the proposed opacity standard, additional opacity observations were conducted at three well-controlled asphalt concrete plants. These data were summarized in Table 1 of the reevaluation report. (Because the data were already reported in Volume II of the "Background Information for New Source Performance Standards: ...," the data bases of the proposed standard were not summarized in the reevaluation report.)

The opacity observations were conducted in September 1973 at three well-controlled facilities after it was determined that no extensive changes and repairs had been made to their control devices in the period since the original emission tests. (Facility B, also tested by EPA in 1971, was not observed because it had shut down for the winter due to insufficient business.) It was believed that at best the control devices would be performing at the same efficiency demonstrated during the performance test. EPA also recognized that these control systems could possibly have been operating less efficiently than during the emission tests and could possibly result in opacity data biased slightly in favor of the source category. Use of such data to establish an opacity standard is not prejudicial to the source owner or operator. During the development of the standard of performance, National Asphalt Pavement Association (NAPA) alleged that older fabric filter collectors would "seep" particles and thus would emit more particulate matter than a new filter in optimum condition. Observation of the two fabric filter collectors two years after the original tests certainly could have determined if "seepage" was in fact a problem.

EPA used the concentration data from the previous emission tests as an indication of the probable emission rate of the facility. EPA recognized that the concentration of emissions from the facility could have increased over the previously measured levels if the performance of the control systems had deteriorated.

All three well-controlled facilities had no visible emissions despite the range of the originally measured concentrations of particulate matter. Therefore, it was concluded that emission concentrations less than 90 mg/dscm which are emitted from typical

stack diameters are invisible to a human observer and the exact emission concentration of these facilities was not a critical question. This conclusion is somewhat affirmed by a personal communication with commentator AC-68 which indicated that asphalt concrete plants with an effluent concentration of about 180 mg/scm (0.08 gr/scf) were observed to have plumes of 5 to 10 percent opacity. These observations are consistent with the in-stack transmissometer data reported in reference 2 of the reevaluation report. For the above reasons, these opacity observations which were obtained two years after the emission tests were conducted are considered to be representative of emission levels achievable by well-maintained and well-operated fabric filter collectors or venturi scrubbers. The opacity standard which was developed from these observations is achievable by well-controlled asphalt concrete plants and is supported by the opacity data.

6. The opacity observations conducted at the three facilities in September 1973 are invalid because neither an in-stack transmissometer nor revised Method 9 was used to obtain the data. Examination of the field data reveals the observations were not taken at 15-second intervals and calculation of six-minute average values from these data is not valid. AC-59(E), AC-73(D)

   Response: EPA disagrees with this comment concerning the validity of the opacity data obtained at the three facilities observed in September 1973. The opacity observations of emissions from the control devices of these facilities were taken according to practices taught at EPA smoke schools and Method 9 as it was then written. The observation practices employed by the observers are comparable to those required by the revised Method 9. Specifically, the observers read the emission points from a position with the sun located in the quadrant to their back, 90° sun angle (the revised method relaxed this criterion to 140° sun angle); they read steam plumes at the point of dissipation or prior to condensation; and the observer's line of sight was perpendicular to the plume direction. Some of the observers did not record as much information on weather conditions as required by the revised method. This omission only slightly affects the ability to assess the contrast conditions and hence any bias that may exist in the data. However, this omission does not prejudice asphalt concrete plant owners or operators since no visible emissions were observed and the standard was established at a level higher than was observed. In addition, some of the observers did not record every reading made at 15-second intervals because the control device consistently had no visible emissions. It is known that the observers did observe the emissions from the control device at 15-second intervals and that their conclusion that no visible emissions from the control device occurred during the entire observation period is valid.

Observations were also made of fugitive emission sources when emissions were noticed. Some of the observations of fugitive emission points were taken at 15-second intervals, and these data were those used to calculate the six-minute average values. The opacity standard for fugitive emission points was also based on engineering judgment of levels achievable at a well-designed and operated asphalt plant. This judgment is based on inspection by the EPA observers of the two asphalt concrete plants that had visible fugitive emissions. These inspections revealed that visible fugitive emissions could have been prevented by proper enclosure of the emission area, by proper operation of the dryer (or by adequate sizing of the fan for the plant), and by operation of the plant at an adequate draft to prevent escape of emissions. One of the three asphalt concrete plants observed had no visible fugitive emissions in addition to no visible emissions from the control device. Inspection of this facility revealed that the absence of visible fugitive emissions was due to proper enclosure and ducting of all potential emission points as well as proper design and operation of the dryer. EPA, therefore, concluded that all visible fugitive emissions observed at the other facilities could have been prevented by proper design, operation, and maintenance of the asphalt concrete plant. For these reasons, the 20 percent opacity standard for points of fugitive emissions from an asphalt concrete plant is not an unreasonable requirement, and new facilities can be designed and operated to comply with this standard.

7. The reported transmissometer data do not support the standard because the accuracy of the transmissometer is questionable, and the data are irrelevant to the actual plume opacity. The study shows the impossibility of obtaining meaningful opacity measurements by any technique. AC-73(D)

Response: The commentator quoted passages from the report "In-Stack Transmissometer Measurement of Particulate Opacity and Mass Concentration" (reference 2 of the reevaluation report) to prove the alleged inaccuracy of the transmissometer data. (In addition to in-stack transmissometer measurements, this study also evaluated plume opacity measurements by a sun photometer and by a telephotometer.) Review of the quoted passages from the report reveals that they referred to the difficulties of obtaining measurements by the sun photometer and in no way reflect on the operation of the in-stack transmissometer. In-stack transmissometers are calibrated using neutral density filters and are not calibrated relative to sun photometer measurements. The accuracy of the transmissometer is not questioned in the report, and it was recognized in the report that the instrument very accurately measured in-stack opacity. For the above reasons, it is believed that the trans-

missometer data are useful for evaluating the opacity standard. Additionally, the in-stack opacity measurements are not irrelevant to plume opacities as claimed by the commentator. Although only a limited number of plume opacity measurements could be obtained by the sun photometer due to its operational problems, the plume opacity data and the in-stack opacity data show good agreement (Figure 5-3 of the report).

8. Data submitted by the Los Angeles APCD in a comment on the proposed standards of 0.031 gr/dscf and 10 percent opacity showed that a plant with an emission rate of 0.015 gr/dscf exhibited opacity levels of 10 and 15 percent. Therefore, the 20 percent opacity standard is obviously unachievable for any plant with an emission rate near 0.04 gr/dscf. AC-73(D)

Response: The data from the Los Angeles APCD do not prove or disprove the achievability of the 20 percent opacity standard for facilities with an emission rate of 90 mg/dscm because of the difference in the methods used to determine compliance. Determination of compliance with the EPA opacity standards is based on the average of 24 consecutive observations taken at 15-second intervals. An asphalt concrete plant could have emissions with single readings in excess of 20 percent opacity and still have a six-minute average value less than 20 percent opacity. The method used by the Los Angeles APCD involves timing the duration of each opacity level observed, and emissions in excess of 20 percent opacity for time periods greater than three minutes per hour are considered to be in violation of the Los Angeles standard. The Los Angeles opacity standard allows emissions in excess of 20 percent for three minutes per hour to consider the effects of startups, shutdowns, soot blowing etc. on emissions. Thus, the 10 and 15 percent opacity levels reported by Los Angeles could have included a startup or shutdown episode which can result in higher than normal emissions from the asphalt concrete plant. EPA's procedure is to exclude emissions during startup and shutdown periods from determination of compliance with opacity standards. Opacity standards established by EPA are not based on emissions levels during abnormal operation periods.

9. EPA has not taken into account all variables that affect apparent opacity because the analysis is based on a theoretical projection of a limited amount of data from an incomplete study and from tests on a limited number of atypical plants. Therefore, EPA has not demonstrated the 20 percent opacity standard to be achievable. AC-59(E), AC-62(E)

Response: EPA considers the achievability of the 20 percent opacity standard for the asphalt concrete plant to be adequately demonstrated. A primary basis of the opacity standard is the Method 9 observations at three well-controlled plants; however, the effects of normal variations in operating variables on plume

opacities were considered in the reevaluation report. The expected variations in operating variables which would significantly affect apparent plume opacity (particulate size, particle shape, stack diameter, etc.) were determined from review of available information. This information consisted of data from the plant in the transmissometer study, particle size data reported in the literature for asphalt concrete plants with cyclone control only, fractional collection efficiency curves for baghouses and for venturi scrubbers ($\Delta P \geq 20$ inches w.g.), some qualitative shape data, refractive indices reported in the literature for specific compounds, and stack diameters given in 30 test reports which were available. The established range of variables was used to determine a maximum probable opacity, as well as typical opacity levels expected, for asphalt concrete plant emissions at a concentration of 90 mg/dscm using Bouguer's law (AP-30 pp 29-35). The opacity standard is achievable by any facility with emissions less than 90 mg/dscm which are discharged from a stack diameter less than 4.8 meters. Also, comments 1 and 2 of this section indicate that the standard is reasonable and achievable.

10. The 20 percent opacity standard is not as conservative as claimed by EPA because the possibility of a 7 1/2 percent error in Method 9 observations would make a facility with a 14 percent opacity plume appear to be in excess of the 20 percent standard. AC-67(M)

    Response: The error of the method is considered at a time of enforcement of the standard. An opacity value of 21.5 percent (14 plus 7.5 percent) would not necessarily result in an enforcement action against the source because that level is clearly within the range of error of the method. Consequently, enforcement action would not be taken until appropriate consideration was given to the accuracy of the method.

11. EPA's data show that any asphalt plant with a 3.3 meter stack diameter and emitting particulate matter with a mass mean diameter of one micron would exceed 20 percent opacity despite use of a perfectly functioning baghouse. Therefore, the standard should be revised upward. AC-73(D)

    Response: An asphalt concrete plant which discharges the control device emissions at a concentration of 90 mg/dscm through a 3.3 meter stack and has a mass mean particle diameter of one micron would have an equivalent opacity less than 20 percent, as calculated using the equation on page 30 of AP-30. Therefore, the opacity standard does not require an upward revision.

12. EPA should revise the 20 percent opacity standard for asphalt concrete plants upward to account for the greater light scattering effect of particles in the size range of one to two microns, which were calculated to be emitted from baghouses and venturi scrubbers. AC-73(D)

Response: Light scattering properties of irregular particles in the size range of one to two microns were considered in the calculations in the reevaluation and were the basis of the decision to not revise the standard.

13. The opacity standard for asphalt plants should be greater than that for Portland cement plants because the concentration standard for asphalt plants is greater (0.04 vs. 0.03 gr/dscf). AC-73(D)

Response: The opacity standard for asphalt concrete plants should not be greater than the standard for Portland cement plants. The equivalent values of the two opacity standards result from the slightly larger stack diameters (up to 4.6 meters) employed on control equipment on Portland cement kilns than are used on asphalt concrete plant control devices. Another factor that contributes to the equivalent opacity standards despite different concentration or mass standards is that particulate matter emitted by Portland cement kilns is generally spherical while that emitted from asphalt concrete plants is highly irregular in shape. Conner and Hodkinson in "Optical Properties and Visual Effects of Smoke Plumes" (AP-30) stated that irregular transparent particles smaller than two microns attenuate less light than spherical particles of the same projected area. The combination of use of slightly larger stack diameters and slightly greater amount of light scattering per particle counterbalances the difference in concentration.

14. Weather conditions frequently can prevent obtaining meaningful opacity observations. NAPA believes it is unwise to promulgate a standard that may be enforced in some areas of the country while other areas are essentially immune from enforcement. The opacity standard is thus unwise and unfair. AC-73(D)

Response: EPA disagrees that some areas of the country will be essentially immune from enforcement of opacity standards. Observations taken under low contrast and luminescence conditions will have a negative error and negative bias. The existence of low contrast conditions will not preclude an observer from conducting an opacity surveillance, but will reduce the possibility of citation for violation of opacity standards due to observer error. Such observations are not prejudicial to the owner or operator. In addition, it should be remembered that inclement weather conditions will not prevail at all times, and observations can be conducted during the high contrast periods when they occur. The purpose of opacity standards is to ensure continued proper operation and maintenance of the control device; thus, on occasion opacity observations might be supplemented by full inspection of the facility regardless of the observed opacity level. Consequently, EPA believes that opacity standards can be applied nationwide in a fair manner.

15. The standards of performance for asphalt concrete plants were never intended to require control of fugitive emissions. EPA never examined the degree of fugitive dust control feasible in well-ducted asphalt concrete plants. The data to support this extension were obtained after promulgation of the standards (March 8, 1974 Federal Register) and just prior to the reevaluation of the opacity standard. In the reevaluation report EPA, for the first time, indicated that fugitive emission sources are regulated by the opacity standard. AC-59(E), AC-62(E)

Response: The standards of performance for asphalt concrete plants have always regulated fugitive emissions as shown by designation of dryers; systems for screening, handling, storing, and weighing hot aggregate; systems for loading, transferring, and storing mineral filler; systems for mixing asphalt concrete; and the loading, transfer, and storage systems associated with emission control systems at "affected facilities" in the promulgated regulation. EPA's intent to regulate fugitive emission sources has been clearly stated from the beginning. Efficient ducting and other fugitive emission control methods were investigated in the original study on the standard and additional data were obtained in September 1973 before, not after, promulgation of the regulation. The memorandum referred to by the commentator merely reconsidered these data in light of points raised in Warren Brothers et al. v. Environmental Protection Agency (No. 74-1338).

16. The reevaluation report was the first time EPA had argued that opacity standards are necessary for regulation of fugitive emissions. AC-73(D)

Response: The reevaluation report may have been the first time EPA published a discussion of methods for regulating fugitive emission sources; however, previous standards of performance have used opacity standards to regulate fugitive emission sources and the discussion in the report should not be surprising. EPA's intent to regulate major sources of fugitive emissions in an asphalt concrete plant was clearly expressed in the proposed and the promulgated standards. The proposed and promulgated regulations designated the major sources of fugitive emissions as "affected facilities" which are subject to the standard of performance. The application of the opacity standard of performance to fugitive emission sources was indicated clearly by the discussion in Volume I (p. 9) of the "Background Information for New Source Performance Standards:..." (APTD-1352 a, c) and in Volume III (p. 13) which discussed control of fugitive emission points. Much of this discussion was included in the preamble to the promulgation of the standards of performance for asphalt concrete plants in the March 8, 1974, Federal Register.

Fugitive emission points or operations in other source categories also have been regulated by opacity standards. Examples of such standards are the standard of performance for Portland cement plants [§60.62(c)] and the opacity standards regulating fugitive emissions from electric arc furnaces in the steel industry. [§60.272 (a)(3)]. These standards clearly show that EPA has always regulated fugitive emission sources where necessary and where feasible control procedures exist.

17. Examination of the field data which were used as the bases of the opacity standard revealed the occurrence of readings in excess of 20 percent opacity. AC-59(E)

Response: It is true that some individual readings in excess of 20 percent opacity were recorded for fugitive emissions; however, six-minute averages of the observations taken at 15-second intervals on the fugitive emission sources are all less than 20 percent opacity (10 percent maximum value). The standard for fugitive emissions was not established at greater than 20 percent because inspection of the two plants having visible emissions, together with the fact that one plant had no visible emissions, shows that all of the fugitive emissions observed could have been prevented by proper design, operation, and maintenance of the asphalt concrete plant. The data show no process variations that would cause visible fugitive emissions during normal operation periods.

18. The field data include observations on emission sources in the plant yard which are not specified in the regulation. These data indicate that the opacity standard is applicable to all emission sources in the yard. AC-59(E)

Response: The opacity standard is only applicable to emissions from the designated affected facilities which are: dryers; systems for screening, handling, storing, and weighing hot aggregate; systems for loading, transferring, and storing mineral filler; systems for mixing asphalt concrete; and the loading, transfer, and storage systems associated with emission control systems. Observation of other points and activities in the plant yard does not indicate that they are regulated.

19. Fugitive emissions which cannot be shown to be in excess of the concentration standard should not be used as a justification for a separate opacity standard. AC-62(E)

Response: Fugitive emissions are not used as a justification for a separate opacity standard. Opacity standards are used here to regulate fugitive emission areas in order to assure efficient ducting and proper design and operation of the plant. Opacity standards are also established as a means of ensuring continued proper operation and maintenance of the control device.

20. Fugitive emissions should be regulated only if these emissions cross property lines and create a nuisance for neighboring property owners. Most fugitive emissions in an asphalt plant are large particulate that falls out in the plant yard. AC-67(M)

Response: The suggested regulatory approach is essentially that which operated prior to enactment of the Clean Air Act. Historically, demonstration of nuisance and injury to an adjoining property owner has been difficult to prove and has been an unsatisfactory system for the adjoining property owners and other victims of pollution. If fugitive emissions contain particulate matter of sizes as large as alleged by the commentator, then proper design and operation, and proper ducting of the plant will reduce product losses and reduce operating costs for the owner.

21. Object to further tightening of the opacity standard. AC-51(E)

Response: The opacity standard has not been tightened by the revisions to Method 9 (39 FR 39872) or by the reevaluation of the standard (40 FR 17778).

22 The opacity standard for asphalt concrete plants should be based on observations on asphalt plants alone, not on projections of data from Portland cement plants. AC-52(E)

Response: The opacity standard for asphalt concrete plants is based on observations at three well-controlled asphalt concrete plants and on calculations of expected opacities for the known range of stack diameters and expected size distributions of effluent from asphalt concrete plants. Data from Portland cement plants were not used in the reevaluation of the asphalt concrete plant opacity standard.

23. EPA has never satisfactorily considered the problems of obtaining valid opacity observations at asphalt concrete plants where production is interrupted by frequent startups and shutdowns. AC-62(E), AC-73(D)

Response: As provided by the provisions of §60.11(c), opacity standards of performance do not apply during periods of startup, shutdown, and malfunction. Valid opacity observations can be obtained at asphalt concrete plants by the observer recording the startups and shutdowns as evidenced by the periods of burner operation. Verification of these instances of startups and shutdowns can be accomplished by checking with the owner or operator before and/or after the observations are made and by checking the periods of operation from the burner chart. Frequent startups and shutdowns may complicate determination of compliance with opacity standards based on six-minute average values. Regardless of the frequency of startups and shutdowns the observer will have to observe the process until at least one six-minute period of continuous observation is recorded; use of a shorter observation period for determination of compliance is not presently allowed.

24. An asphalt concrete plant operator does not maintain records of the exact time the dryer is started up or shut down. Thus, in order to avoid falsely citing a plant for violation of the opacity standard, the observer should synchronize his watch with the plant operator. AC-30(G), AC-49(F)

Response: Absolute synchronization of the observer's watch with the plant operator's is not necessary because the observer, or an assistant, can record the periods of observed burner operations. The observer can also obtain this information from the burner chart.

General

1. Prior notification of surveillance should be given before conducting opacity observations in order to provide due process to the owner or operator. In addition, to allow for meaningful review of the evidence, the owner or operator should be allowed to witness the inspection or should be notified of the results immediately following completion of the inspection. Prior notification, or witness of the inspection, will also allow synchronization of the observations with asphalt concrete plant operations to insure that periods of startup, shutdown, or malfunction are not included and will provide the owner or operator an opportunity to identify and correct any problems. AC-18(E), AC-19(E), AC-20(D), AC-21(L), AC-22(E), AC-23(E), AC-24(E), AC-25(L), AC-26(D), AC-27(E), AC-28(E), AC-31(J), AC-32(E), AC-33(E), AC-35(M), AC-36(D), AC-37(E), AC-39(E), AC-40(E), AC-41(E), AC-43(E), AC-44(D), AC-47(D), AC-48(E), AC-49(F), AC-50(E), AC-52(E), AC-53(E), AC-55(E), AC-58(E), AC-73(D)

Response: Due process of law does not require that a person who must comply with a law be notified in advance that his behavior during a certain period will be monitored. Due process does require that the individual be notified of the alleged violation and be permitted to review the evidence against him in a meaningful way. It is EPA's practice to provide the owner or operator with such an opportunity for meaningful review.

EPA inspectors will notify the plant owner or operator in advance of the opacity observations unless there is reason to believe that such notification could result in modification of emissions. The usual procedure followed in evaluating a facility for determining compliance with opacity standards is to request entry to the plant in order to conduct a complete inspection. If the operations of the source are such that emissions cannot be modified to be nonrepresentative of actual emissions or if the layout of the facility requires observation from within the plant premises, then the owner or operator is notified prior to conducting observations. However, if there is reason to believe that prior notification could result in nonrepresentative emissions, notification is provided by the inspector immediately following completion of the observations. Thus the opacity standard and the enforcement procedure provide the owner or operator an opportunity for meaningful review and do not violate due process of law.

Prior notification for the purpose of allowing sychronization of the observer's time records with the plant operator's time is not necessary. If an observer (or an assistant) observes the burner end of the dryer of an asphalt concrete plant, the periods of burner operation will be apparent from the appearance of the flame. Thus, a record may be made of the occurrence of any startups or shutdowns, and the observer can exclude observations made during those periods. Inspection of the burner chart would provide further verification of the occurrence of startups and shutdowns. Notification that an inspection is about to occur or has occurred provides adequate opportunity for the operator to check for the existence of startups, shutdowns, and malfunctions during the observation period and to independently record critical data such as meterological conditions, general operating conditions, etc.

As is true with any law, the opacity standard and test method could be applied in a manner which would violate due process of law. In achieving widespread compliance with these regulations, however, it will be in the best interest of EPA to apply them in such a way as to satisfy the requirements of due process of law. Ultimately, the issue of whether in the application of any law the rights of an individual to due process have been violated would be a matter for the court hearing the case to decide.

2. Opacity standards violate the intent of section 111 of the Act which requires that standards represent levels of emission reduction achievable by application of best control technology. Since EPA has not established a sufficient relationship between opacity and concentration of emissions from asphalt concrete plants, the opacity standard is invalid. AC-62(E)

   Response: The argument represented by this comment was set forth in the brief of one petitioner in the U.S. Court of Appeals (D.C. Circuit) challenge to the asphalt concrete plant standard of performance. A detailed response to the argument may be found in EPA's reply brief filed on July 30, 1975, copies of which are available upon written request from the EPA Public Information Center (PM-215), 401 M Street, S.W., Washington, D.C. 20460 (specify - Supplemental Brief for Respondent, National Asphalt Pavement Association et al. v. Train Nos. 74-1332, 74-1388). As discussed in that response and in the reevaluation report, it is EPA's belief that the relationship between mass emissions and opacity has been amply demonstrated; that the opacity standard of 20% does represent the level of particulate emission reduction achievable by the application of the best available control technology; and that it therefore fulfills the requirements of section 111 of the Clean Air Act.

   Congress did not specify which test methods or which units must be used by EPA to express its emission standards under section 111 of the Clean Air Act. Particulate emission standards can be expressed in many ways, including pounds per hour, grams per dry standard cubic meter, and pounds per ton of feed. For a given category of well-controlled stationary sources, opacity can be established as an indicator of particulate matter emissions and proper operation and maintenance of the control system. Opacity standards established in this manner are a reasonable indicator of the emission reduction achievable by application of best control technology. Therefore, opacity standards of performance may be used as a means of controlling emissions under section 111 of the Clean Air Act.

3. Opacity standards are established by EPA expressly as a "means of ensuring that control equipment is properly maintained and operated at all times when performance tests are not being conducted (40 FR 17779)." Therefore, opacity standards are maintenance provisions and their use as legally enforceable standards violates the intent of section 111 of the Act. Opacity does not have to be an enforceable standard in order to accomplish the purpose of ensuring proper operation and maintenance of the control system. AC-58(E), AC-62(E)

Response: Section 111 of the Act requires EPA to set emission standards, which reflect "the degree of emission limitation achievable through application of the best system of emission reduction which (taking into account the cost of achieving such reduction) the Administrator determines has been adequately demonstrated." Section 111(e) of the Act requires that new sources continue to be in compliance with the standards throughout their operational life. To meet this Congressional mandate EPA establishes opacity standards at a level which will require proper operation and maintenance of the control systems on a continuous basis. Use of concentration or mass standards alone would not accomplish this mandate because it would be possible for a source to inadequately operate or maintain pollution control equipment at all times except during periods of performance testing. It takes two weeks or longer to schedule a typical performance test. If only small repairs were required (e.g. pump or fan repair or replacement of fabric filter bags), such remedial action could be delayed until shortly before the test was conducted. For some types of air pollution control equipment, such as scrubbers, the energy input (pressure drop across the system) could be reduced when performance tests were not being conducted and could result in increased emissions of particulate matter. EPA believes that opacity standards are a necessary supplement to concentration standards. The use of opacity as legally enforceable standards is clearly within the intent of the Act.

4. EPA failed to make available for public comment prior to promulgation of the standard the data which were relied upon to justify the opacity standard for asphalt concrete plants. EPA also failed to provide for meaningful public comment on the revisions to Method 9. Such actions are unfair and contrary to the spirit, if not the intent, of the Administrative Procedures Act (APA). Where a federal agency becomes significantly involved in an issue, the fact that the agency ultimately decides to take no action or affirm a prior decision does not shield the agency from the requirements of APA. AC-32(E), AC-59(E), AC-62(E)

Response: EPA's notice of April 22, 1975 in the Federal Register (40 FR 17778) invited public comment on the Reevaluation of the Opacity Standard of Performance for Asphalt Concrete Plants, the revisions to Reference Method 9, and the revisions to 40 CFR §60.11. Therefore, the issues relating to administrative procedures are moot.

5. EPA has not shown that separate enforceable opacity standards are necessary. Use of opacity as a rebuttable presumption of violation of the concentration or mass standard should be equally effective ensuring proper operation and maintenance of the control system. AC-21(L), AC-23(E), AC-37(E), AC-38(H), AC-42(H), AC-44(D), AC-49(F), AC-51(E), AC-59(E), AC-62(E), AC-67(M)

   Response: Opacity is used an an independent enforceable standard, rather than a rebuttable presumption of violation of the applicable concentration or mass standard, because opacity standards are the most practical and economically sensible means of ensuring that control equipment is adequately maintained and operated at all times. A performance test conducted after a source was observed to be in violation of the opacity standard would not in EPA's opinion necessarily resolve the question whether, at the time of the observed violation, the source was meeting the concentration standard. During the period between the observed violation of the opacity standard and the time of the performance test, the owner or operator in some cases could take remedial action to bring a non-complying source into compliance. That is, the owner or operator could delay making small repairs, such as replacement of fabric filter bags, or pump or fan repair, until shortly before the performance test is conducted. For some types of equipment such as scrubbers, the energy input could be reduced when performance tests were not being conducted. Therefore, the emission test results obtained from the performance test would not be indicative of the facility's actual emission rate at the time of the observed violation. EPA believes that the only other means of ensuring continued compliance with the standards of performance would be through use of a continuous monitoring system or through performance tests conducted at such frequent intervals as to yield similar results.

6. Opacity standards violate the intent of section 111 of the Act because opacity standards are not subject to an accurate, reproducible, and objective test procedure. AC-73(D)

   Response: The United States Court of Appeals for the District of Columbia on May 22, 1975, Portland Cement Association v. Ruckelshaus, 513 F.2d 506, Civ. 72-1073 upheld EPA's position that opacity is sufficiently reliable to be used as a measure of pollution or as an aid in controlling emissions. This decision was based in part upon EPA's showing in the remand response that trained observers were consistently able to read opacity with errors not exceeding +7.5 percent based on single sets of the average of 24 readings.

Opacity standards can be applied to all regulated parties with fairness and uniformity. Compliance with opacity standards is determined by use of a consistent methodology whose error is taken into account in determining whether violations exist. (See also response to comment 2 of this section.)

EPA believes that the use of opacity standards to control emissions is within the intent of the Act and that the standards are subject to an accurate, reproducible, and objective test procedure.

7. While for any given set of conditions opacity and concentration of particulate matter can be related, there are 23 other variables which affect the accuracy of opacity observations significantly enough to make apparent plume opacity meaningless as an indicator of emission concentration. Opacity standards, therefore, should be deleted from regulations establishing standards of performance. The commentator recognizes the need for routine reliable measurements of mass emissions and would be pleased to cooperate with the EPA in the development of reliable techniques for direct measurement of mass emissions. AC-72(G)

Response: The commentator discussed 24 variables which allegedly affect plume apparent opacity in a manner such that opacity is a meaningless indicator of emission concentration. The variables and their effects on plume apparent opacity which were discussed are: (1) effluent concentration, (2) stack diameter, (3) mean particle size, (4) polydispersity of emissions, (5) refractive index, (6) particle density, (7) stack gas temperature, (8) stack exit velocity, (9) water vapor, (10) ambient temperature and humidity, (11) color of plume, (12) wind speed, (13) wind direction, (14) wind turbulence, (15) background, (16) distance of observer from stack, (17) effect of non-level terrain, (18) sun angle, (19) time of day, (20) day of year, (21) longitude, (22) latitude, (23) observer-sun angle, and (24) allowed observer error.

EPA agrees with the commentator that these variables can affect, to varying degrees, the apparent opacity of plumes. The commentator's analysis assumed that none of these variables except concentration are considered in the development of opacity standards, in the method for determining compliance with opacity standards, or in the analysis of the data and any consideration of enforcement actions. EPA contends that this assumption is in error because the maximum expected effect

of variables which significantly affect apparent plume opacities are considered, and any source which is meeting the applicable concentration or mass standard will also be meeting the applicable opacity standard. If a source is exceeding the opacity standard, it is due to the failure of that source to properly maintain its air pollution control equipment, and if tested the source would have emissions in excess of the applicable concentration or mass standard.

The 24 variables which allegedly make opacity standards unsuitable for ensuring continued proper operation and maintenance of air pollution control equipment consist of four types: (1) factors related to the source category and its operations, (2) factors related to opacity observations, (3) factors considered in the determination of compliance, and (4) factors with an insignificant or non-prejudicial effect on apparent plume opacities. The first seven variables discussed by the commentator (effluent concentration, stack diameter, mean particle size, polydispersity of emissions, refractive index, particle density, and stack gas temperature) are factors specific to the source category and its operations which are considered by EPA in the development of opacity standards. These factors can significantly affect apparent plume opacity. The maximum expected effects of normal variations in these factors on opacity are used to ensure that the opacity standard for a source category is established at a level no more restrictive than the corresponding concentration or mass standard. In addition to the above consideration of these factors, should a source have a stack of larger than expected diameter or have other anomalous operating conditions which preclude achieving the opacity standard, the provisions of §60.11(e) allow the owner or operator to petition EPA for establishment of a separate opacity standard. Thus, ample consideration of the effects of these factors is provided under the opacity provisions of standards of performance.

Factors which are considered in the procedure for obtaining opacity observations include the commentator's variables: distance of observer from stack, observer-sun angle, wind direction, water vapor, and ambient temperature and humidity. Method 9 includes specific requirements on maximum observer-sun angle, observer's line of sight, observer orientation with respect to the plume, etc., such that the effects of the variables mentioned by the commentator on plume apparent opacity are minimized. In addition, Method 9 provides specific instructions for reading of steam plumes.

Factors related to any bias and error in the opacity data are viewing background, plume color, wind turbulence, and observer error. EPA has determined that the maximum positive error associated with readings made by qualified observers while reading plumes under high contrast conditions and using the procedures of Reference Method 9 is 7.5 percent opacity based on single sets of the average of 24 consecutive readings. This maximum positive error considers the combined effects of the variables related to observer position, bias, and observer accuracy on opacity observations made under high contrast conditions. These factors and any other additional errors introduced by viewing

conditions are considered in the determination of compliance with opacity standards. Therefore, these factors will not result in citations of a violation due to errors of the method.

The remaining factors (stack exit velocity, wind speed, effect of non-level terrain, sun angle, time of day, day of year, longitude, and latitude) have an insignificant effect on apparent plume opacity or result in readings which are biased low and do not prejudice the owner or operator (with the exception of the first three, all of these factors relate to the effect of variations in luminescence contrast upon plume apparent opacity). The effect of most of the factors in the four categories and EPA's consideration of them are discussed in the "EPA Response to Remand Ordered by U.S. Court of Appeals for the District of Columbia in Portland Cement Association v. Ruckelshaus (486 F.2d 375, June 29, 1973)."

Opacity standards of performance will be retained in regulations establishing standards of performance. EPA believes that the opacity concept is both technically sound and that opacity standards provide the most practical and inexpensive means to ensure that control equipment necessary for a source to meet the applicable concentration or mass standard is adequately maintained and operated between performance tests. EPA's study on the accuracy of opacity observations demonstrated that qualified observers are consistently able to read opacity within +7.5 percent. This field evaluation shows that the use of observer aids or special monitoring equipment is not necessary. For the above reasons, EPA does not consider it necessary to undertake a special study for development of a monitoring technique to ensure continued proper operation and maintenance of control equipment. In addition, other sufficiently accurate and reliable monitoring techniques also presently exist. In-stack transmissometers have been shown to have sufficiently stable operations and can be sufficiently related to emissions to accomplish this purpose. Other techniques such as sun photometers, telephotometers, or use of visual comparators by trained observers measure light scattering by plumes and can compensate for the effects of variations in ambient lighting and other contrast conditions on apparent plume opacities.

8. Considering the inaccuracies of Method 9 and the large number of uncontrollable variables, opacity standards are not a reliable means of ensuring that control equipment is properly maintained and operated. AC-48(E)

Response: As shown in the response to the remand in Portland Cement Association v. Ruckelshaus, 486 F.2d 375, June 29, 1973, observers trained and certified in accordance with procedures of Method 9 are consistently able to read opacity with positive errors not exceeding 7.5 percent based on single sets of the average of 24 observations. On the basis of this review, EPA concluded that the error tolerance of the method is reasonable and is within the limits considered normal by the scientific and engineering community. EPA believes that opacity standards are a reliable means of ensuring proper operation

and maintenance of the control system for three reasons. First, opacity standards are established at levels which are in excess of observed and expected opacities for facilities operating in compliance with the concentration or mass standard. Second, the positive error of 7.5 percent associated with Method 9 readings is considered at the time of enforcement. Finally, the provisions of §60.11(e) provide a means for an owner or operator to petition for establishment of a special opacity standard for an affected facility which meets the mass or concentration standard but fails to meet the opacity standard. The result of these three factors is that only facilities clearly in violation of the concentration or mass standard will be in violation of the applicable opacity standard. Therefore, opacity standards are a reliable means of ensuring that control equipment is properly maintained and operated.

9. Because of technological advances made in recent years to monitoring equipment and the large number of uncontrollable variables affecting readings of plume opacity, the validity of opacity as a statutory requirement has been eliminated. AC-57(M)

Response: The validity of opacity as a statutory requirement has not been eliminated by recent advances in monitoring equipment. There are a large number of industries which do not extensively monitor process and control equipment variables and whose emissions cannot be monitored by use of an in-stack transmissometer. Opacity standards are the only economically sensible means available for routine surveillance of such facilities by a regulatory agency. Therefore, the need for a consistent methodology for routine surveillance of all facilities requires that evaluation of proper operation and maintenance be determined by use of opacity standards.

10. Emissions from baghouses are not constant but vary throughout the cleaning cycle. An opacity standard, therefore, is not a reliable measure of emissions and should not be a legally enforceable standard. AC-59(E)

Response: Opacity readings are capable of providing more real time information on emissions than do present concentration or mass measurement techniques. The occurrence of necessary peak emission periods in a production or operation cycle is taken into consideration in the development of the applicable opacity standard for a source category. Thus, cyclical emission patterns will not result in an overly restrictive opacity standard. EPA believes that a properly developed opacity standard is a reliable measure of emissions and opacity should be a legally enforceable standard.

From EPA's experience a properly sized, well-tuned, and well-operated baghouse on an asphalt concrete plant (which is the application to which the commentator was referring) is clearly capable of complying with the 20 percent opacity standard. The standard also clearly does not preclude visible puffs during the cleaning cycle or at any other time.

11. Opacity as measured by human observers is not scientifically accepted to be related to mass or concentration of emissions. EPA's predecessor agency published several documents which dispute EPA's position on opacity as shown by statements on p. 53 of "Air Quality Criteria for Particulate Matter" (AP-49) and the conclusions of a study on "Optical Properties and Visual Effects of Smoke-Stack Plumes" (AP-30). A paper authored by H.P. Buetner in the September 1974 issue of the Journal of the Air Pollution Control Association also states that opacity regulations chiefly control visual appearance, not the quantity of emissions. AC-62(E)

Response: The above referenced material does not show the unacceptability of assessments of opacity by human observers. With respect to the conclusions quoted from "Optical Properties and Visual Effects of Smoke-Stack Plumes" (AP-30), Method 9 has always recognized the effects of illumination, background, and viewing conditions on plume opacity. In order to limit and consider the effect of these variables Method 9 provides specific instructions on allowable observer positions and requires the observer to record the environmental conditions during the observation period. From this information an independent assessment may be made of the accuracy and the bias of the data. The effects of the above factors on apparent plume opacity are considered in Method 9, development of opacity standards, and in determining compliance with opacity standards of performance.

The discussion quoted from Chapter 3 of "Air Quality Criteria for Particulate Matter" would be a valid criticism of opacity standards if variables other than concentration which affect opacity were ignored in the development of the standards. EPA submits that these variables (stack diameter, particle size, particle shape, particle density, particle refractive index, etc.) are not ignored in the standard setting process, and with proper consideration of these factors opacity is a reasonable measure of emissions.

Finally, the referenced article from the September 1974 issue of JAPCA is irrelevant to the question of acceptability of visual assessments of opacity. The article discussed in general the author's opinion of deficiencies of opacity standards. The comments in this article are not valid criticisms of opacity standards as established by EPA because the effect of stack diameter and other variables on opacity are considered in the development of the standard. Opacity standards which are established considering all relevant factors can be used as an indication of emissions.

12. Data presented in Table 1 of the reevaluation report and part of the data bases for the Portland cement plant standards show that in spite of wide variations in concentration levels, the opacity was consistently reported as being zero percent. These data illustrate the inappropriateness of opacity as an emission standard. AC-66(H)

    Response: These data do not indicate the inappropriateness of use of opacity as an indicator of emissions. The variations in the concentrations associated with no visible emissions for the various source categories are due to the variations in the light scattering properties of the particulate matter in the different plumes, variations in the path lengths observed, and the factor of the physiological contrast threshold value. For the cited data the light scattering characteristics of the effluent and the path lengths were such that reported apparent plume opacities of zero percent are not unreasonable.

13. An opacity standard in addition to the concentration standard is unnecessary and is merely another method of harassing the operator of an asphalt concrete plant. The opacity standard should be deleted. AC-35(M), AC-39(E), AC-42(H)

    Response: As discussed in response to comment 5 of this section, opacity standards are a necessary supplement to concentration or mass standards and will not be deleted. The intent of the opacity standard for asphalt concrete plants is to ensure continued proper operation and maintenance of the plant and the control system in order to reduce emissions, not harassment of the operator. Considering the number of new asphalt concrete plants and other new stationary sources, it is highly improbable that any enforcement agency has sufficient personnel to capriciously harass any given source category or any given facility.

14. Agree with EPA that opacity standards are a reliable, inexpensive, and useful means of ensuring that control equipment is properly maintained and operated. AC-71(K)

Response: No response is necessary.

15. Opacity standards are a necessary enforcement tool and should be retained for as many sources as possible, including asphalt concrete plants. Violation of an opacity standard is indicative, to a high degree of probability, of violation of the mass standard. AC-60(A)

Response: No response is necessary.

16. EPA should establish opacity standards referenced to a stack diameter, and field observations should be corrected to this diameter by use of a chart. This would result in uniformly equitable opacity standards. AC-70(G)

Response: While the suggested approach would result in uniform opacity standards for all facilities in a given source category, the approach would be difficult and cumbersome to implement. Errors in estimates of stack diameters could be made either by the operator or the observer and could result in significant errors in the "corrected" opacities. EPA believes that a preferable approach is to establish the opacity standards at a level based on the largest expected stack diameter for the source category. Thus, sources with the largest expected stack diameters are not prejudiced by the opacity standard.

17. The definition of opacity in subpart A should be revised to specify that opacity is the average of 24 consecutive observations taken at 15-second intervals according to the test method in Appendix A. AC-70(G)

Response: The revision suggested by the commentator is neither necessary nor appropriate. The reference method (Method 9) for determining compliance with opacity standards clearly specifies that opacity shall be determined as an average of 24 consecutive observations taken at 15-second intervals. Also, the suggested revision would preclude the use of "alternative" and "equivalent" methods of determining the opacity of emissions. Retention of such flexibility is necessary for reasonable application of the provisions of Part 60. Therefore, the definition of opacity will not be revised as suggested.

18. The assumption that the properties of the particulate matter emitted by a source will remain stable over a long time period and that the functional mass-opacity relationship will remain constant may not be valid. AC-71(K)

Response: Unless there are major changes in the process, the feed materials characteristics, or operation of the control device, significant changes in the particulate matter emitted by a plant should not occur and the mass-opacity relationship will remain reasonably constant. Minor changes in the operations of the source will not meaningfully alter the opacity of emissions. Since opacity standards are established at levels which consider the maximum effects of the normal range of particle characteristics and stack diameters at well-controlled facilities, minor changes in the characteristics of particulate matter emissions with time will not affect the ability of the source to comply with the opacity standard.

19. Refractive index of the particulate in the effluent is an important variable in the mass-opacity relationship. It may be incorrect to assume that the refractive index will be constant for a given category of stationary sources. AC-71(K)

Response: For monodisperse particles with diameters between 0.05 and 2.0 microns, the particle extinction coefficient and angular scattering patterns (for monochromatic light) do vary significantly with the particle refractive index. As the particulate in the gas stream become more polydisperse, more irregular in shape, and of varying composition, the effect of refractive index on the particle extinction coefficient (when measured in visible light) diminishes. The particle extinction coefficient approaches the geometrical scattering value of two for particle diameters between 0.3 and 0.7 micron, and the oscillations in the value of the coefficient are damped. For calculation of plume opacity in visible light, the use of a single refractive index is not unreasonable if the mean particle diameter is greater than 0.7 micron or if the particles in the effluent are highly disperse. (AP-30)

20. EPA's estimate of the refractive index of emissions from asphalt concrete plants is inaccurate because the refractive index due to mineral filler and dust adhering to gravel was neglected. (Mineral filler could be drawn into the fugitive air system and exit through the baghouse stack.) AC-59(E), AC-62(E)

Response: The relative importance of refractive index on the calculated plume opacity is discussed in the response to comment 19 of this section. In addition, the use of a refractive index of 1.5 is not unreasonable; it is the refractive index of

most commonly occurring transparent materials (AP-30). If neglect of the refractive indices due to mineral filler and dust adhering to gravel was in error, the effect on the calculated opacity is believed to be insignificant. (The commentator did not show how the neglect of these items resulted in an opacity standard prejudicial to asphalt concrete plants.)

21. Particle size data obtained at the one asphalt concrete plant studied showed mass mean diameters of 0.9 and 5 microns for the two runs for which there were no controlled leaks in the baghouse. These size data cannot be used as part of the justification of the opacity standard, considering the disparity between runs and between the results calculated in the projection analysis. AC-73(D)

Response: The use of both the measured particle size data and the projected size data to establish the range of effluent particle sizes and the maximum expected effect on light scattering by the effluent is reasonable because their use considers both typical and maximum light scattering conditions. The use of these data, thus, did not result in an opacity standard prejudicial to asphalt concrete plant owners or operators. In the reevaluation of the opacity standard, the opacity associated with mass mean particle diameter of one micron was calculated to determine the maximum light scatter expected for asphalt concrete plant plumes. This calculation and the consideration of the maximum effect of stack diameter variations were the basis for retaining the 20 percent opacity standard.

It was appropriate to use these particle size data in the reevaluation of the opacity standard because review of all the data obtained indicated that the run showing a mean size of 0.9 micron was anomalous. In addition to the data mentioned by the commentator, four other determinations of mean particle size were made. Of this total of six measurements, five showed a mean particle size of five to six microns, while the sixth run reported a mean size of 0.9 micron. There was no correlation between the mean particle size of the effluent and the amount of controlled alteration (size of the open area) of the baghouse. Visible emissions (opacities greater than two percent) were associated with effluent concentrations in excess of 40 mg per actual cubic meter and with mean particle size diameters of five microns. It was concluded that typical emissions from this asphalt concrete plant had a mean size of five microns and that the 0.9 micron value resulted from a sampling error. This conclusion is consistent with data obtained using a multi-wavelength transmissometer. These data showed that light scattering by the effluent varied with the wavelength of the incident light in close agreement with the optical characteristics predicted from light scattering theory for silica particles with mass mean diameter of five to six microns and geometric standard deviation of 2.5. (Light scattering efficiency of a particle is a function of the particle's size and the wavelength of the incident light.)

The discrepancy between the measured size data and the calculated sizes results from the assumptions and data used in the analysis. The projection analysis assumed use of less efficient control devices than well-controlled asphalt concrete plants would employ and finest expected inlet particle size distributions. These assumptions may have biased the analysis toward a more lenient opacity standard. This process did not prejudice the industry. Therefore, the resultant discrepancy between the values obtained by the procedures does not invalidate their use in establishing an opacity standard.

22. EPA used a 1967 publication on smoke plumes, a study by Midwest Research Institute (MRI) on fine particulate emissions, and a highly theoretical journal article to develop the asphalt opacity standard. Extension of the information in these theoretical publications to asphalt concrete plants is invalid because asphalt concrete plant emissions are not specifically addressed and the data are merely theoretical calculations, not empirical data. AC-59(E)

Response: The cited references are relevant to the question of the asphalt concrete plant opacity standard. The 1967 study on smoke plumes also included a discussion on the light scattering properties of particles, Bouguer's Law, and the solution of Mie theory equations for several cases. Extension of this material to the evaluation of the asphalt concrete plant opacity standard is valid since the theories have not been disproven. The MRI report was used as a source of information on the particle size distribution of particulate matter emissions from cyclone controlled asphalt concrete plants. This information is obviously highly relevant to the question of the asphalt opacity standard. The "highly" theoretical journal article was a second source of information on light scattering properties of particles. This information was combined with other data to estimate the effect of specific variables on the opacity of asphalt concrete plant emissions and resulted in the decision not to revise the opacity standard to a lower level.

23. Fugitive emission sources cannot be read as accurately as sources with a stack discharge. EPA apparently recognized this when establishing the opacity standard for asphalt concrete plants but ignored it for Portland cement plants (§60.62(b)(2) and §60.62(c)). The standards in §60.62(b)(2) and §60.62(c) should be raised to 20 percent opacity. AC-40(H)

Response: The difference in the opacity standards for asphalt concrete plants and Portland cement plants does not result from an inconsistent regulatory approach. In both cases the

accuracy of the method is to be considered at the time of enforcement. Standards of performance are established on the basis of demonstrated levels of control achievable by the industry in question. Information on control of fugitive emissions at asphalt concrete plants indicated that a 20 percent standard is reasonable. Similarly, information on control of emissions from the clinker cooler, raw mill system, etc., in Portland cement plants indicated that a 10 percent opacity standard is reasonable. The opacity standards of §60.62(b)(2) and §60.62(c) will remain at 10 percent.

24. EPA fails to consider the area of emission from fugitive emission sources when establishing opacity standards for them. AC-59(E)

Response: The areas of the fugitive emission points were not considered in the reevaluation of the opacity standard because the intent of the standard is to require adequate enclosure of these emission points and proper ducting of the collected emissions. One asphalt concrete plant observed had no visible fugitive emissions and had no visible emissions from the control device. Inspection of the two plants with visible fugitive emissions showed that all visible fugitive emissions could have been prevented by proper design, operation, and maintenance of the asphalt concrete plant. Consideration of the fugitive emission area was not necessary because the intent of the standard is to discourage open areas and insufficient fan capacity for the dryer load.

25. A facility which discharges an effluent of 90 mg/dscm from a 4.8 meter stack would have an opacity greater than 20 percent. Many Portland cement plants use stack diameters greater than 4.8 meters and thus their opacity standard should be increased. AC-66(H)

Response: In EPA's study of the Portland cement industry, the largest expected stack diameter found was 4.6 meters. Larger diameter stacks are unlikely due to engineering and economic considerations. The standards of performance for Portland cement plant kilns is approximately equivalent to 70 mg/dscm, not 90 mg/dscm. This lower concentration of particulate matter, a larger mean particle size, and maximum expected stack diameter of 4.6 meters indicates that the opacity standard for Portland cement plants should not be revised upward. If a stack of diameter greater than 4.8 meters were installed on a Portland cement plant kiln and the facility is unable to comply with the opacity standard despite compliance with the mass standard, the provisions of §60.11(e) allow the owner or operator to request establishment of a separate opacity standard. For the above reasons, the opacity standard for Portland cement plants will not be revised to a level based on the effect of anomalously large stack diameters.

26. Particulate matter emissions from asphalt concrete plants do not contribute to the endangerment of public health, and local regulations already adequately control these emissions. AC-51(E), AC-54(L), AC-55(E)

Response: The Clean Air Act, as amended, directs the Administrator to promulgate standards of performance for new stationary sources which he determines may contribute significantly to air pollution, but it does not provide him with specific criteria or guidelines to determine what is a significant source. Therefore, to make such a determination, the Administrator must rely upon judgment. In the case of particulate matter - a pollutant for which national ambient air quality standards have been established - the Administrator considers all sources to contribute to the endangerment of public health or welfare.

The presence of particulate matter in the air is the result of numerous diverse mobile and/or stationary sources. Because ambient concentrations of particulate matter depend upon a number of factors such as distribution of sources, topography, height at which the pollutant is emitted, and meteorological conditions, a source may have a significant impact in one location and not in another. This makes it meaningless to develop a firm definition of "significant source" that could be applied nationwide.

The Act provides the Administrator a variety of regulatory authorities which may be used singly or in combination to achieve the purposes of the Act. For particulate matter, the Administrator has determined that a comprehensive air quality management strategy is needed to protect public health and welfare and to enhance the quality of our air resources. This air quality management strategy is based on the adoption and enforcement of State implementation plans approved by the Administrator and on standards of performance for new stationary sources promulgated by the Administrator. State implementation plans are designed to achieve and maintain national ambient air quality standards as required under section 110 of the Act, and standards of performance are established to facilitate the maintenance of national ambient air quality standards while allowing industrial growth. Ideally, the Administrator should issue standards of performance for all sources of particulate matter at one time. This would provide the maximum degree of enhancement of the nation's air resources. Clearly, EPA has neither the resources nor information to establish standards of performance for all sources of particulate

matter at one time; therefore, a selection process is used which helps establish priorities for standard setting. In this selection process EPA examines uncontrolled emission rates, proximity to urban areas, stringency of State/local regulations, number of plants, and growth rates. A comparative analysis of the air quality impact of emissions from some 80 sources of particulate matter showed asphalt concrete plants to be ranked within the first 20 source categories. In an analysis of emission rates and expected impact on air quality of standards requiring best demonstrated control technology for 114 sources of particulate matter emissions, the asphalt concrete industry ranked number 13 in the amount of reduction in particulate emissions that would result from application of best control technology.

The objective of standards promulgated under section 111 of the Act is to prevent new air pollution problems from developing by requiring affected sources to use the best systems of emission reduction at a cost and within a time frame that is reasonable. These standards are not intended to be directly related to ambient air quality but are intended to prevent new air pollution problems from developing. Attainment and maintenance of national ambient air quality standards is covered by State implementation plans and regulations as provided under section 110 of the Act.

27. Installation of control equipment with 99.9 percent plus collection efficiency will result in unbearable costs and will eliminate many small asphalt firms. AC-52(E), AC-55(E)

Response: This issue was discussed previously in response to comments on the proposed standard of performance. The standard of performance was promulgated on March 8, 1974. Since putting this standard into effect, no information has been received that indicates a need for a reanalysis of the costs and economic impact of the standard. The discussion of this issue presented in Volume III of "Background Information for New Source Performance Standards: ..." (APTD-1352 c) is still applicable and is repeated in full below.

The promulgated standard of 0.04 gr/dscf requires installation of best available control technology (considering costs) which for asphalt concrete plants is considered to be well-designed, -operated, and -maintained baghouses or venturi scrubbers. This concentration standard of 90 mg/dscm (0.04 gr/dscf) still requires collection efficiencies of 99.9+ percent. It is our judgment that the incremental investment required by the final standard will generally not create any serious additional financing problems for new asphalt concrete plants.

Asphalt concrete plants meeting State emission standards should be able to increase prices to cover the added cost of pollution control according to the February 1972 Economics of Clean Air (Annual Report of the Administrator of the Environmental Protection Agency to Congress, March 1972). Because the annual costs for a new plant meeting the final standard closely approximates the cost for an existing plant meeting a typical State standard, our judgment is that a new plant will not be placed at a competitive disadvantage. These judgments have been reinforced by NAPA's public comments that were submitted to EPA on July 24, 1973. On page 49 of their comments they stated:

> The National Asphalt Pavement Association, as it has indicated on many occasions to EPA, submits that the legitimate goal of protecting the environment and reducing emissions will be achieved by the imposition of a .06 standard rather than the .031 standard. It is submitted by the industry that this will result in an improvement of the emission levels by 99.8% and is consistent with the goal which has been stated of 99.7% by the Environmental Protection Agency. Further, it is submitted that the reduction is achievable at a reasonable cost without unduly endangering the existence of the industry or forcing the use of other alternative products. Thus, it is submitted that it is important that the standard be .06 and not .031.
>
> It is important that it be recognized that if the standard is .06 the equipment which will be required to be purchased will be either a venturi scrubber with a minimum 20-inch pressure drop or a baghouse with a 6 to 1 air-to-cloth ratio. It is submitted that there will be a significant improvement in the environment with an .06 standard. The .06 standard will further require that the plants be kept in good operating repair and condition or they will fail to meet the .06 standard. A .06 standard will avoid the problems of the size and shape of the particulates and also other problems which cannot be answered at the present time.

NAPA's conclusion is that the cost for a venturi scrubber with a 20-inch pressure drop or a baghouse with a 6:1 air-to-cloth ratio is reasonable. It is EPA's contention that this equipment will achieve the final standard (0.04 gr/dscf). Thus, NAPA's conclusion that cost for this type of equipment is reasonable reinforces our judgment that the cost to meet the final standard is reasonable.

The costs resulting from the standard to an owner or operator are considered reasonable for all sizes of plants; there is no economic penalty to small plants. The standard does not apply to existing plants. If an operator of a small plant decides to modify an existing plant or build a new plant, the costs of complying with the standard of performance will be increased 6 to 10 percent over the costs of complying with State regulations.

28. EPA should provide some accommodation in regulations to consider situations where it is impossible to establish opacity standards. Specifically, for some steam generators opacity can vary markedly without any change in mass emissions of the facility (as determined by Method 5 testing.) AC-75(G)

Response: The suggested exemption of specific facilities is not necessary. During the development (or reevaluation) of the opacity standards of performance for a given source category, all variables affecting opacity are thoroughly investigated. If the analysis indicates that certain operating (or other) conditions merit separate standards, section 111 of the Act allows the Administrator to distinguish between such situations and establish separate standards of performance for separate classes of sources.

Method 9

Paragraph 1

1. Restriction of Method 9 to stationary sources reduces the generality of the method. AC-14(C)

Response: This is true; however, the special problems such as the tunnel effect which can occur with plumes from mobile sources require further consideration and are beyond the scope of Method 9 which is a reference method for determining compliance with standards of performance for stationary sources.

Paragraph 2

1. Paragraph 2.1 should be amended to require the observer to be located two to three stack heights, but less than a quarter mile, from the stack. If the observer is located closer than two stack heights from the source, the observed opacity will be greater than the actual opacity due to the increased path length through the plume and the exponential dependence of opacity on path length. AC-3(A) AC-14(C), AC-63(G), AC-64(H), AC-69(A), AC-70(G), AC-72(G)

Response: An observer located near the stack has the potential to observe opacities which are greater than the true opacity. This effect is not, however, a result of the distance from the stack; rather it is a result of the angle between the line of vision and the direction of the plume. A low angle would produce an increased path length which, as indicated in the comment, would result in high readings. Paragraph 2.1 makes clear that observations are to be approximately perpendicular to the plume direction. This criterion is sufficient to preclude readings taken at low angles and consequently longer than actual path lengths.

2. Method 9 should include more explicit instructions regarding allowable observer positions. Method 9 should require the observer to fully document any compromise (or greater error) positions used due to physical limitations at the site. AC-3(A), AC-7(I), AC-43(E)

Response: Method 9 as promulgated on November 12, 1974, requires the observer to clearly document all pertinent information. The required records include clear identification of the source of the emissions, nature of the facility, date of observations, explicit records of the observer's location with respect to the emission source and the sun, description of sky condition, plume background, wind speed, and wind direction. This information can be used for an independent assessment of whether the observer was located in conformance with the specified criteria. If the information indicates that the observer was not located in accordance with the criteria, then the field data can be used to assess the effect of the nonconformance on the accuracy of the data.

3. Method 9 should expressly prohibit observers from taking observations from positions which are outside the maximum range permitted by the specifications of paragraph 2.1. AC-46(H)

Response: The criteria governing observer positions are established to minimize the maximum positive error associated with Method 9 observations. Express prohibition of positions not strictly in conformance with these criteria is not necessary if the additional error introduced by nonconformance is considered in determining possible violations. The magnitude of this increased error can be estimated only through a careful assessment of the observer location, background, and other environmental factors. This error assessment is necessarily done on an individual basis. Obviously, any error estimate is open to rebuttal.

4. How is the observer to determine with any accuracy that the sun is located within a 140° sector to his back? At the extremes of this angle, compliance with this specification may be arguable. AC-42(H), AC-46(H), AC-56(M)

   Response: This criterion is designed to ensure that readings are not taken from positions which could result in unacceptably high errors. It is true that determination of conformance with the 140° angle specification requires careful documentation if the observer is located near the extremes of the range. With carefully documented information on the relative position of the sun, observer and plume, the calculation of the angle is a straightforward procedure. In any case, the 140° angle does not represent a sharp break point beyond which unacceptably large errors occur, and small errors (±10°) in the observer-sun-plume position are not critical.

5. Method 9 should be revised to require the observer to keep the sun at least in a 120° sector and preferably in a 90° sector to the observer's back. The present specification of 140° will allow the sun to be within 20° away from being perpendicular to the observer's line of sight. Observations taken at the extreme range of the 140° sector will be affected by the angular scattering patterns of small particles. Specification of a 90° or 120° sun angle would minimize this problem. AC-45(H) AC-46(H), AC-56(M), AC-59(E), AC-64(H), AC-70(G)

   Response: It is necessary to prevent positive errors which can result from observation of the forwardly scattered light, as noted in the comment. The forward scatter contribution to the apparent opacity of a plume can be important at observer-sun angles greater than 180°. The contribution of forward scatter is minimal when the observer is positioned with the sun in a 140° to 160° sector to his back. The 140° sector requirement is considered adequate and has been shown in field tests to preclude significant errors. Specification of 120° sector or 90° sector angles is more restrictive than field data indicate is necessary.

6. Method 9 should require two simultaneous observations taken 45° to 90° apart to consider the effect of sun angle on the plume's apparent opacity. AC-45(H)

   Response: See response to above comment.

7. As presently written, Paragraph 2.1 precludes taking opacity readings when the sun is directly overhead or during overcast conditions when the position of the sun is relatively unimportant. AC-16(A)

   Response: Paragraph 2.1 as written does not prohibit the taking of opacity readings when the sun is overhead because the observer sun angle specification does not prohibit angles greater than 70°. While paragraph 2.1 is not intended to prohibit taking readings during overcast conditions, slightly more restrictive criteria than necessary are established.

8. The requirement to read across the shorter axis of rectangular stacks should be deleted to preclude usage of rectangular stacks solely for circumvention of opacity standards. AC-2(A), AC-11(A), AC-34(B)

   Response: It is unlikely that a source would construct a rectangular stack in order to circumvent the opacity standard since the mass or concentration standard is more restrictive and must be met regardless of the level of the opacity standard. Similarly, it would not be reasonable for EPA to require readings to be made through the longer path length, as this would in some cases make the opacity standard more restrictive than the concentration standard.

9. Method 9 does not provide any guidance on correct observer location, etc., for situations when the wind is blowing perpendicular to the longer axis of a rectangular stack or other emission area. AC-7(I)

   Response: The observer position criteria specified in paragraph 2.1 are designed to result in data with minimum positive errors. Like the other methods in Appendix A, Method 9 does not discuss special situations which may require changes to the procedures and exercise of judgment by the personnel conducting the test. If conditions at the time of observation prevent the observer from positioning himself strictly in conformance with these criteria, then larger positive errors will occur. The magnitude of these errors can only be estimated through a careful assessment of the observer's position on a case-by-case basis. Method 9 requires recording of sufficient information on the contrast conditions, observer location with respect to the sun and the emission point, meteorological conditions, emissions sources observed, and plume characteristics such that an independent assessment of the accuracy of the data can be made. Any such assessment of the error associated with

the readings is subject to rebuttal by interested parties. In any case, an observer should not take readings through the length of the plume. With situations of this type, the observer should consider evaluating the source at another time under different meteorological conditions or should consider possible compromise orientations with respect to the stack or sun. If observations are made under the latter conditions, then the observer should assess the magnitude of the increased positive errors that may result and consider this error in determining any possible violations. The validity of any such error assessment would be subject to challenge by any alleged violator in any enforcement proceedings that occur.

10. Since all plumes from closely spaced multiple stacks will be dispersing in the same direction, accurate opacity readings are improbable. AC-57(M)

    Response: Under normal meterological conditions, plume rise will be sufficient to allow observation of each plume individually. Readings of single plume widths taken in conformance with the criteria of Method 9 can be assumed to accurately evaluate the source's emissions within the error of the method. Close-in mixing and co-dispersion of several plumes is possible only during certain periods of extreme meteorological conditions. The occurrence of such meteorological conditions does not justify reading multiple stacks colinearly. If observations are made during periods when reading of single plumes is not possible, Method 9's record keeping requirements will provide sufficient information to allow an independent assessment of the accuracy of the data. Inability to conform with the criteria of Method 9 will require careful assessment of the accuracy of the data for that observer-plume-sun orientation.

11. The type equipment or process responsible for the emissions should be recorded on the observation sheet. AC-23(E)

    Response: Figure 9-1 is considered to provide a record of sufficient information to identify the process and equipment. Note that records of the facility, control device, and point of emissions are required on the form.

12. Reading of a plume that has doubled back on itself should be expressly prohibited (paragraph 2.3). AC-46(H)

    Response: Paragraph 2.1 of Method 9 implies that only one plume width is to be observed. EPA does not agree that an express prohibition is necessary. Smoke readers are trained to read apparent plume opacities by viewing perpendicular to the plume and through one plume width. Experience with qualified observers has not shown any readings of doubled back plumes or that

such situations present any problems.

13. The specifications of paragraph 2.3 are arbitrary because the point of maximum opacity in the plume varies with time. A single observation point should be used to give a representative and consistent picture of plume opacity. AC-16(A), AC-45(H)

Response: The requirements of paragraph 2.3 are not arbitrary and will result in a representative evaluation of emissions. For stationary sources which do not exhibit a steam plume, the point of greatest opacity will occur in the immediate vicinity of the point of emission. The plume, consequently, will be evaluated at a single observational area. Although unlikely, should any situations occur in which non-representative evaluation of the process would result from reading the emissions at the point of greatest opacity, the emission cycle and process operations would be considered in the development of an opacity standard (if any) and application of Method 9 to that source.

14. The provisions of paragraphs 2.3 and 2.3.2 are contradictory. Paragraph 2.3 should specify that all observations, except those for attached plumes, be made on emissions at the stack exit. AC-42(H), AC-64(H)

Response: The provisions of paragraphs 2.3 and 2.3.2 are not contradictory. Paragraph 2.3 clearly specifies reading at the point of maximum opacity where condensed water vapor is not present. This point will occur someplace near the stack exit before appreciable cooling and dispersion of the plume has occurred. For a detached steam plume, the point of maximum opacity will be near the stack exit, and paragraph 2.3.2 merely clarifies that readings are to be made at that point.

15. Taking observations of the plume at 15-second intervals places an undue burden on the observer. Method 9 should require readings at 30-second or 60-second intervals. AC-13(A)

Response: Method 9 requires observing at 15-second intervals in order to assure that the emissions are adequately characterized by the observer. Observation at 30-second or 60-second intervals would not sufficiently characterize emissions from many sources with intermittent or rapidly changing emissions. Considering the need for an accurate and representative assessment of the emissions, observation at 15-second intervals does not place an undue burden on the observer.

16. In order for Method 9 to be valid legally, "uncombined water vapor" must be defined. AC-16(A)

Response: Every term in a regulation or test method is not, and need not, be specifically defined in order to be legally valid if the meaning of the term is understood from standard usage. Terms or phrases are defined in the general provisions of Part 60 of Title 40 or in the specific subpart when the absence of a definition could perhaps result in misinterpretation of the term or regulation. EPA does not believe that definition of "uncombined water vapor" is necessary because the meaning of the term is understandable from standard usage. Recent revisions of Method 9 (39 FR 39872) have clarified the procedures by which "uncombined water vapor" is to be excluded from evaluation of the source emissions.

17. Attached water vapor plumes are not amenable to meaningful opacity observations because of residual water vapor associated with the dust nuclei. AC-42(H), AC-51(E), AC-57(M), AC-64(H), AC-72(G)

Response: EPA believes that attached steam plumes can be meaningfully evaluated for the purpose of determining compliance with opacity standards. As shown in "EPA Response to Remand Ordered by U.S. Court of Appeals For the District of Columbia in Portland Cement Association v. Ruckelshaus (486 F.2d 375, June 29, 1973)," steam plumes can be readily distinguished from plumes containing particulate matter and the point of dissipation of the condensed water vapor is easily determined. Method 9 requires the observer to read attached steam plumes after the condensed water vapor has dissipated. At the point where all water droplets have evaporated and are no longer visible, the concentration of particulate matter in the plume has been diluted considerably below that at the stack exit. Only if the plume exceeds the opacity standard at that point can an observer consider a citation for violation. This procedure allows operators of wet processes the benefits of dilution and does not result in unjustifiable citation of sources for violation of opacity standards.

Residual particulate matter observed in the plume following evaporation of the condensed water vapor will not be more visible due to an adhering layer of condensed water on the particles. Shortly after evaporation of all water droplets in the plume, any film of water adhering to particles also

will have evaporated to the equilibrium value. For emissions from most stationary sources, the effect of the equilibrium residual layer of water on the effective size and the combined light scattering properties of the particulate in the plume is insignificant.

18. Method 9 should specify a longer minimum observation period than six minutes, for example, 15 minutes. One six-minute period is not necessarily representative of operations of the source and is unduly influenced by transitory excursions. AC-14(C), AC-42(H), AC-45(H), AC-46(H), AC-56(M)

Response: In evaluating the accuracy of Method 9, it was determined that 24 readings taken at 15-second intervals were sufficient to assure acceptable accuracy and to obtain a representative evaluation of the emissions. Use of longer averaging periods are not necessary to consider the effects of transitory high emissions. That is, if brief periods of high concentration emissions are an inherent, unavoidable feature of the process, the opacity standard will have been established at a level which considers these emissions. For sources in which transitory high emissions are not an inherent, unavoidable feature of the process, transitory excursions are indicative of improper operation and maintenance of the control system and process and such emissions should not be allowed. An observation period longer than six minutes in not considered necessary.

19. Opacity observations should be averaged over the time period required to conduct a Method 5 test on the source in order to better relate opacity to mass emissions. This longer averaging period does not represent an unreasonable burden on the observer. AC-65(I)

Response: Averaging opacity data for the period required for Method 5 tests so as to better relate it to the mass emissions is unnecessary for facilities with stable emission rates. Method 5 tests are conducted for periods of one hour or longer to assure collection of sufficient mass to minimize errors due to recovery and weighing of the collected particulate matter. If the effluent concentration fluctuates little, averaging the opacity data over the Method 5 test duration would serve no useful purpose and would complicate enforcement of opacity standards.

While it can be argued that for any batch process opacity observations should be averaged over the period of a Method 5 test to better relate them to mass emissions, EPA does not believe this is necessary for the purpose of opacity standards. (In-stack transmissometers or other

plume opacity data are averaged over the period of the concurrent mass measurements in order to develop a functional mass opacity relationship. Data from such studies serve a different purpose than do opacity standards.) Opacity standards are established to insure continued proper operation and maintenance of the control system. If the opacity standard for a batch process is established at a level which reflects the level of control required during the peak emission period by the concentration or mass standard, the opacity standard will insure proper operation and maintenance of the control system and the observations need not be averaged over the period of a Method 5 test.

20. Method 9, specifically paragraph 2.5, should allow use of alternative averaging periods. Use of 21 consecutive readings taken at 15-second intervals has proven to be adequate for enforcement purposes and should be allowed. AC-16(A)

Response: The provisions of Method 9 establish criteria which are designed to minimize the maximum positive error associated the readings. The maximum positive error associated with single sets of 24 consecutive readings taken at 15-second intervals in accordance with the criteria of Method 9 has been quantified. EPA is presently evaluating the maximum positive error associated with averaging opacity observations for periods less than six minutes and different methods for determining compliance with opacity standards. Depending upon the results of this study, revisions may be made to the methods allowable under Part 52 of Title 40 for determination of compliance with opacity standards and may be considered for Reference Method 9 of Appendix A to Part 60. If any of the methods are revised to allow different averaging periods, any determination of compliance must consider the maximum positive error associated with the averaging period in determining possible violations of applicable opacity standards.

Until the appropriate revisions are made to the methods, use of existing procedures is possible under the general provisions of Part 60. The provisions of 40 CFR 60.8(b) allow use, upon approval by the Administrator, of "alternative" or "equivalent" methods for determining compliance with applicable standards. If a State or other air pollution control agency desires to use a procedure differing from the revised Method 9, it may do so provided the "alternative" or "equivalent" procedure can be demonstrated to produce results adequate for determination of compliance. The use of average values of single sets of 21 observations taken at 15-second intervals, therefore, could be an allowable procedure upon an adequate demonstration of the accuracy of the procedure.

21. The method of averaging opacity observations should be clarified for cases where the applicable opacity standard of performance includes a time exemption. AC-63(G)

Response: Opacity standards of performance with time exemptions are being reevaluated and will be revised to levels based on six-minute average values. If an opacity standard of performance is established with a time exemption, procedures will be specified for determining compliance with such a standard.

Paragraph 3

1. EPA should require the use of Ringelmann charts or other reference opacity charts for reading opacities because the ability of observers to remember opacity levels fades with time, and recertification every six months does not adequately correct this problem. AC-70(G)

   Response: Method 9 does not preclude field use of observer aids such as visual comparators; however, field evaluation of the capability of an observer to accurately read plumes has shown that such aids are not necessary. Recertification every six months has been found to be of sufficient frequency to ensure acceptable observer accuracy.

   Use of Ringelmann charts is unacceptable because they are not the basis for opacity observations. Ringelmann charts are used to measure the relative blackness or grayness of emissions and as such are not applicable to Method 9.

2. The certification procedure still fails to require the observer to qualify on predominantly low opacity plumes. AC-7(I)

   Response: The certification procedure has proven to be adequate for training observers to read low opacity plumes. The average observational error associated with plumes of known opacity was discussed in the "EPA Response to Remand Ordered by the U.S. Court of Appeals for the District of Columbia in Portland Cement Association v. Ruckelshaus (486 F.2d 375, June 29, 1973)."

3. Method 9 should require that test results on unsuccessful attempts for certification should be retained. AC-7(I)

   Response: Retention of scores on all unsuccessful runs would serve no useful purpose.

4. Observational errors of less than 7.5 percent opacity are achieved only after several hours of practice on plumes of known opacity, even for previously certified observers. Therefore, Method 9 is not as reliable as claimed by EPA. Method 9 should be revised to require preliminary qualification of the observer followed by a 24-hour

delay during which the observer would not again be exposed to known plume opacities. At the end of the 24 hours, in order to be a certified smoke reader, the observer would be required to pass the test for certification a second time. AC-45(H), AC-46(H), AC-57(M)

Response: As discussed in the "EPA Response to Remand..." qualified observers are able to assign opacity levels to plumes with positive errors less than 7.5 percent opacity. This evaluation included field assessments of observer accuracies in addition to tests conducted using a smoke generator. In none of these field tests did the observers have the benefits of practice runs. Therefore, the suggested revision is unnecessarily restrictive in view of the acceptability of results from present procedures.

5. Method 9 should require observers to qualify on wet plumes. AC-46(H), AC-57(M)

Response: EPA is currently investigating techniques which could be employed in smoke schools to further enhance an observer's ability to accurately identify contaminated water plumes. Procedures used by State and local regulatory agencies to observe contaminated water vapor plumes are being reviewed also, and the use of such training aids as movies and apprenticeship training will be considered.

6. Method 9 should include procedures for evaluating opacity at night. AC-2(A), AC-11(A), AC-34(B), AC-69(A)

Response: EPA recognizes the advantages of obtaining opacity readings at night; however, sufficient data have not been obtained to justify extension of Method 9 to reading at night.

7. Method 9 should require the observer to qualify without the benefit of practice runs on a different stack diameter than that on which he was trained. It is a poor assumption that the observer can read all stack diameters accurately when trained on one stack diameter alone. AC-46(H), AC-57(M)

Response: Field tests under varying conditions on different sources and different stack diameters have shown that observers certified according to Method 9 using a smoke generator are capable of reading opacity with a maximum positive error of 7.5 percent regardless of the stack diameter. Therefore, the assumption is valid and Method 9 will not be revised.

8. Training and certification on fugitive emission sources should be part of Method 9. Without such training, Method 9 is an unreliable procedure for determining opacity of fugitive emissions. AC-46(H), AC-58(E), AC-73(D)

   Response: Training and certification on fugitive emission sources is not necessary because the factors affecting apparent plume opacity are the same for fugitive emission sources as for emissions from a stack. Specifically, as discussed in response to comment 7 of this section, the path length through which the emissions are viewed does not affect the capability of observers to accurately assign opacities. (The path length does affect the apparent opacity which a given concentration level effluent will exhibit.) The effects of luminescence and color contrast between the emissions and the background on apparent plume opacity will be the same as experienced with observations of emissions from stacks. The velocity at which the gases move through the observer's line of vision has no effect on opacity. Apparent opacity of fugitive emissions and emissions from stacks are affected in the same manner; therefore, the existing training procedures are adequate and Method 9 is a reliable and valid procedure for evaluating fugitive emissions.

9. EPA should require the reading of light colored plumes against a dark background because the errors are reduced. AC-46(H)

   Response: Observations made against less contrasting backgrounds have a negative bias and negative error which increase as color and luminescence contrast decrease toward zero. A negative bias decreases the possibility that a plant owner will be cited for violation of opacity standards due to observer error. Readings taken under such conditions need not be prohibited.

10. Method 9 should not require the observer to repeat all 50 observations if he only fails on one set of 25 observations. Completion of full certification should then only depend on meeting the criteria for 25 readings on the other color smoke. AC-3(A), AC-34(B), AC-69(A)

    Response: This relaxation of the requirements for certification has not been proven necessary or to result in equivalent results. The Method 9 certification criteria have been proven acceptable and should not be modified unless it can be shown that equivalent or better quality data are obtained from the revision.

11. Zero and span drift of the smoke meter should be checked after each run, and any run in which the drift exceeds ±4 percent, instead of the ±1 percent specified, should be dropped. AC-2(A), AC-11(A), AC-34(B), AC-69(A)

    Response: A zero and span drift of ±4 percent is unnecessarily large and will result in unacceptable errors. The present requirement of ±1 percent is capable of being met and will be retained.

12. Opacity observers should not be trained on equipment less accurate than in-stack transmissometers used on many sources. AC-14(C)

    Response: A transmissometer meeting the criteria specified in Table 9-1 of Method 9 is acceptable for use on a smoke generator. Smoke generators produce very fine particles, generally less than 0.5 micron. Because there are fewer significant variations in angular scattering components, the angle of view and angle of projection criteria can be less restrictive for smoke generators than for in-stack transmissometers installed in industrial sources. The transmissometers will achieve equivalent accuracy.

13. Several of the smoke meter specifications in Table 9-1 do not apply to either split or dual beam transmissometers. AC-9(K)

    Response: The criteria specified in Table 9-1 are applicable to the large majority of smoke generators' smoke meters. Alternative specifications may be approved for those few cases where split or dual beam transmissometers are used on smoke generators.

14. A percent rise should be included in the response time specification. AC-14(C)

    Response: Within the limits of visual perception of the recorder trace, the rise is to be 100 percent and thus was not specified.

15. The thirty minute warm-up period for the smoke meter is longer than necessary and wasteful of both time and energy. AC-12(A), AC-14(C)

Response: EPA's experience has shown that drift is common during warmup of the smoke meter. A thirty minute warm-up period is required to prevent this and to assure a valid test.

General Comments on Method 9

1. Concur with the November 12, 1974 Federal Register revisions to Method 9 and the provisions of §60.11(e). AC-30(G), AC-56(H),

   Response: No response is necessary.

2. Method 9 should establish more definitive criteria for reading opacity and training of observers. AC-38(H)

   Response: Method 9 has been demonstrated to produce accurate results and, therefore, the criteria are deemed adequate.

3. Method 9 should specify who may certify observers. AC-14(C)

   Response: The criteria, not the organization performing the certification, are the important factors. Any organization may establish a smoke school provided it adheres to the minimum criteria of Method 9.

4. EPA should establish only certification guidelines rather than mandatory requirements for states which already have established smoke schools. AC-16(A)

   Response: Minimum criteria, not guidelines, are considered necessary in the reference methods which are applicable to standards of performance in 40 CFR Part 60.

5. Method 9 should allow observations to be made only under weather conditions comparable to those existing during the observer's certification or the certification procedure should be expanded to include training under varying conditions of cloud cover and background, and on industrial plumes. AC-7(I)

   Response: It has not been shown necessary to limit observations to weather (contrast) conditions prevalent during the observer's certification test. Field evaluation of industrial plumes by observers trained under a variety of conditions has not shown that training conditions affect accuracy.

6. Method 9 is a subjective and imprecise procedure. Too many variables (wind speed, plume color, illumination, background,

and wet plumes) affect the apparent opacity for the method to yield reproducible and accurate results. AC-6(K), AC-20(D), AC-21(L), AC-22(E), AC-23(E), AC-35(M), AC-38(H), AC-48(E), AC-49(F), AC-50(E), AC-51(E), AC-57(M), AC-58(E), AC-73(D)

Response: EPA's "Response to Remand Ordered by U.S. Court of Appeals for the District of Columbia in Portland Cement Association v. Ruckelshaus (486 F.2d 375, June 29, 1975)" extensively discussed the accuracy and reliability of Method 9 and the effects of variables on plume apparent opacity. To summarize the relevant sections of the report; it is known that maximum opacities and maximum errors are associated with observations conducted against contrasting backgrounds. Under conditions presenting a less contrasting background, the apparent opacity of the plume decreases and approaches zero as the color and luminescence contrast decrease toward zero. Consequently, a significant bias and error can be made when viewing under less contrasting conditions. The positive error associated with readings conducted against a contrasting background was determined in this study. Based on the results of a total of 769 sets of 25 readings, it was determined that qualified observers can (with a very high confidence level, 99.3% of the readings) read plumes with an error less than 7.5 percent. EPA, therefore, concluded that Method 9 has a reasonable error tolerance and the method is a valid and reliable basis for determining compliance with opacity standards.

7. Experience with the effect of meteorological conditions, cloud cover, and ambient lighting on apparent plume opacities for a light blue plume from an oil-fired steam generator contradicts the effects indicated to be expected in the discussion in the November 12, 1974 Federal Register or in the PCA remand response. AC-30(G)

Response: The data presented by the commentator do not contradict the discussion and information presented in the "EPA Response to Remand...". The data show that plume visibility and apparent opacity decrease as color and luminescence contrast decrease. Under such conditions a negative bias results. The negative bias resulted in the discussed light blue plume being invisible against light backgrounds. The plume only became visible when a sufficiently contrasting background such as hillside or dark clouds was used.

8. Opacity readings taken in the field are not as accurate or reproducible as those taken for certification at a smoke school. In field observations the sun angle is determined at the observer's discretion and by the physical limitations of the site. In addition, vertical observation angles vary, and multiple sources may be present. AC-45(H), AC-57(M)

Response: While all these situations may occur in the field, tests under field conditions have demonstrated that observations of acceptable accuracy can be obtained in the field by qualified observers. See "EPA Response to Remand..." for discussion of field tests.

9. The November 12, 1974 Federal Register revisions to Method 9 are appropriate in light of experience with the procedure. Method 9 should be further revised to accommodate situations where an exemption is necessary (e.g. base period opacity and an exemption) and to avoid inadvertently outlawing their use by local agencies. AC-3(A), AC-15(B), AC-68(A)

Response: EPA is presently evaluating the maximum positive error associated with averaging periods other than six-minutes and different methods for determining compliance with opacity standards. Depending on the results of this study, revisions may be made to the methods allowed under Part 52 of Title 40 for determining compliance with opacity standards and may be considered for Method 9 of Part 60. The use of opacity standards of performance based on six-minute average values should not invalidate existing local procedures and opacity standards with time exemptions. Existing State opacity procedures and regulations should continue to be legally valid just as existing regulations for NO_x, sulfur oxides, and particulate matter remained legally valid after EPA established different test procedures than those used by many State agencies. There is no reason why the different test procedures cannot coexist.

10. An alternative procedure for determining compliance with opacity standards which include a time exemption cannot be established because no valid criteria can be developed. Statutory prohibition of emissions in excess of a standard is the only logical basis for regulation of sources with intermittent periods of high emissions. AC-16(A)

Response: No response is necessary.

11. The averaging concept is not suitable for regulating emissions from many industries. Intermittent emissions in excess of those permitted for startups, shutdowns, soot blowing, etc., should not be allowed. AC-4(B)

Response: EPA believes that the average opacity concept is suitable for regulating most industries when an average standard at an appropriate level is selected. Opacity standards thus established will not allow emissions in excess of control levels determined to be achievable by well-controlled facilities in that industry.

12. The use of six-minute average values to determine compliance allows a new source to emit more particulate matter to the atmosphere than an existing facility is allowed under a SIP regulation. The commentators strongly disagree with these revisions. AC-17(A), AC-29(A), AC-68(A)

Response: Whether or not an opacity standard of performance will allow greater emissions than the existing State regulation is dependent on the control systems used to comply with the respective standards, the levels of the standards, and the length of the time exemption allowed in the SIP regulation. In general, due to the time exemptions in State regulations the differences between the two methods are largely superficial, and the total amount of particulate matter emitted is similar or the standard of performance is more restrictive. Six-minute averages of opacity observations are used to ensure taking sufficient readings to ensure acceptable accuracy, and to obtain a more representative picture of the actual emissions from the source.

13. Use of separate opacity standards for each new source category and averaging the opacity observations makes enforcement of opacity standards a nightmare. This approach should be dropped because this long chain of determination and averaging is far more than can be expected from enforcement personnel. AC-5(A), AC-29(A)

Response: Use of separate opacity standards for each new source category is necessary in order to insure the establishment of opacity levels which are reasonable indicators of proper operation and maintenance of the control system. Adoption of a single

opacity standard for all new sources would not accomplish this purpose and could be unjustifiably restrictive for some sources. Opacity standards should reflect the degree of emission reduction, not establish unrealistic goals. The calculation of six-minute average values and knowledge of applicable standards should not unduly tax the capabilities of enforcement personnel.

14. The average opacity approach does not have any court precedence establishing the legitimacy of its use. These revisions cast doubt on the legality of existing opacity standards and existing procedures used by State and local air pollution control agencies. AC-39(A)

Response: EPA's use of opacity standards of performance was affirmed by the U. S. District Court of Appeals for the District of Columbia on May 22, 1975, Portland Cement Association v. Ruckelshaus, 513 F.2d 506, Civ. 72-1073. These revisions to Method 9 do not invalidate existing procedures used by State and local air pollution control agencies since different methods for measuring the same parameter can coexist legally. For example, existing State procedures for measurement of particulate matter emissions from stationary sources continue to be legally valid despite the fact that some State procedures differ significantly from EPA's method for measuring particulate matter.

15. The November 12, 1974, Federal Register revisions to Method 9 will have an adverse effect on State agencies' regulations and enforcement activities. Owners and operators of stationary sources may attempt to pressure the agencies into relaxing the standards. AC-4(B)

Response: These revisions to Method 9 were determined necessary and appropriate to assure obtaining readings with an acceptable and known error tolerance for determining compliance with standards of performance for new stationary sources. Changes to Method 9 should not have an adverse effect upon State regulations and enforcement procedures if Method 9 was not the procedure used by the State for determining compliance. Existing State opacity procedures and regulations should continue to be legally valid just as existing regulations on NO_x, sulfur oxides, and particulate matter emissions remained legally valid after EPA established different test procedures than those used by most State agencies. The legal validity of any given test procedure depends on the regulatory intent (and penalties) of the standards which the procedure enforces, the appropriateness of the test procedure for determining compliance with the applicable standard, the error associated with the test procedure,

and the agency's consideration of that error in determining possible violations. Whether or not the revisions to Method 9 will have an adverse effect on some State procedures is dependent upon a complete review of the above factors. Such a review must be conducted on a case-by-case basis.

If a State air pollution control agency adopts the provisions of revised Method 9, there would be no reason to relax the applicable opacity standards and in some cases the agency may wish to revise some opacity standards downward. In order to maintain opacity standards and test procedures on a consistent basis, State agencies that do not revise their opacity method should not revise the applicable opacity standards due to Method 9 changes. The possibility of source owners or operators pressuring for relaxation of any applicable standard always exists and should be handled in a realistic manner.

16. The revised Method 9 places restrictions on the use of some opacity data without improving the quality of documentation. Existing procedures in Region VIII (and probably other regions) already require documentation far in excess of that required by the revised method. AC-4(B)

Response: The revisions of Method 9 improve the quality of the documentation as well as clarifying certain provisions and assuring minimum error tolerance to the data. Method 9 now requires that observations be supported by adequate documentation of the observer's position relative to the sun and plume, the emission source and facility and an adequate record of environmental conditions. Such record keeping requirements are necessary for valid use of the observations in any enforcement proceedings.

The minimum observation period of six minutes may be less than called for by existing procedures of many regions; however, it should be recognized that Method 9 does not place any restrictions on observation periods in excess of six minutes providing all data are reduced as six-minute averages. In addition, EPA enforcement guidelines suggest that while observation for six minutes is adequate, observation for longer periods of time (e.g. 30 or 60 minutes) is preferable for most sources.

17. Without meaningful documentation, there is no supportable evidence which can be used to verify the reported results and conclusions. AC-49(F)

Response: Method 9 requires the observer to make detailed records on the emission source, observation point locations, meteorological conditions, background and plume description. Such detailed information can be used to verify the conformance of the observer with Method 9 criteria and to calculate the errors associated with any deviations from the specified criteria. These records do provide meaningful documentation and are adequate for enforcement purposes.

18. Method 9's subjectivity is further increased by requiring the observer to calculate the opacity to the stack exit should meteorological conditions prevent observing the plume at the stack exit. AC-49(F)

Response: Paragraph 2.3.1 was added to Method 9 to clarify that for reading attached steam plumes the observer is to record the readings made at a point in the plume where all visible water vapor has evaporated and only particulate matter remains in the plume. The observer is in no case allowed or instructed to extrapolate the readings back to any hypothetical value at the lip of the stack. Method 9 has never instructed observers to extrapolate the readings on steam plumes back to the stack exit. Readings of attached steam plumes at the point of dissipation allows the operator of a wet process the benefits of dilution of the plume prior to evaluation of the emissions. This procedure does not unjustly cite the owner or operator for violations of the applicable opacity standard.

19. Because of the errors associated with reading opacity against a contrasting background, the owner or operator may be falsely cited for violation of an applicable opacity standard. AC-55(E)

Response: The probability of an owner or operator being falsely cited for violation of an applicable opacity standard is low because the average positive error of the method must be considered when determining possible violations of the standard.