Visibility Protection under the Clean Air Act: Preserving Scenic and Parkland Areas in the Southwest

Jerome Ostrov
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I
INTRODUCTION

Mankind has long recognized an association between visibility and air pollution.1 Political consciousness in this country did not focus on the question of visibility protection, however, until 1959, when California established a visibility standard.2 During subsequent years, states and the federal government employed opacity standards3 to monitor compliance with other air pollution regulations such as mass particulate limitations.4

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2. Id. A visibility standard of 10 miles "when the relative humidity is less than 70%" still exists under California law. California State Implementation Plan, Table 20 at 147 (submitted by State of California to EPA as required by Clean Air Act § 110(a)(1), 42 U.S.C. § 7410(a)(1) (Supp. IV 1980); the full Plan is on file at EPA's Region IX Office in San Francisco, California).

3. The U.S. Supreme Court in 1974 held that emissions observable "in the open fields" could serve as a basis for determining a violation of Colorado's opacity requirements, even though an inspector of a division of the Colorado Department of Health had taken the opacity reading from a vantage point within the premises of the emitter. Air Pollution Variance Bd. of Colorado v. Western Alfalfa Corp., 416 U.S. 861, 864-65 (1974). See also Group Against Smog & Pollution v. EPA, 665 F.2d 1284 (D.C. Cir. 1981) (upholding federal opacity requirements for new basic oxygen process furnaces).

4. EPA regulations define "opacity" as the "degree to which emissions reduce the transmission of light and obscure the view of an object in the background." 40 C.F.R. § 60.2; (1981). The Court of Appeals for the District of Columbia Circuit, in National Lime Ass'n v. EPA, 627 F.2d 416 (D.C. Cir. 1980), noted EPA's explanation that "[t]he opacity level of
Notwithstanding these measures, visibility quality has declined precipitously in many areas of the United States during the last two decades. In the Northeast, visibility in non-metropolitan areas decreased ten to forty percent over mid-1950 levels. In the Ohio River Valley, summertime visibility decreased from a 1950's average of ten miles to a 1970 average of six miles. In the eastern Sunbelt, summertime visibility decreased from an average of twelve miles to seven miles. In Southern California, despite improved visibility conditions in recent years due to automotive controls, visibility during the best ten percent of the days decreased from forty to twenty-five miles.

Current median visibility is about ten miles in the center of the Los Angeles basin. Finally, in the Southwest—an area claiming some of the nation's most majestic landmarks and vistas—visibility deteriorated on the order of ten to thirty percent from the mid-1950's to the early 1970's.

Visible emissions is an indication of mass concentration of a particular pollutant and that "various studies have shown that opacity varies directly with mass concentration of particulate matter." 627 F.2d at 446.

5. See infra notes 6-12 and accompanying text.

6. OFFICE OF AIR QUALITY PLANNING AND STANDARDS, ENVIRONMENTAL PROTECTION AGENCY, PROTECTING VISIBILITY: AN EPA REPORT TO CONGRESS 4-15 (1979) [hereinafter cited as PROTECTING VISIBILITY].

7. ENVIRONMENTAL PROTECTION AGENCY, AIR QUALITY CRITERIA FOR PARTICULATE MATTER AND SULFUR OXIDES, DRAFT FINAL 9-58 (1980) [hereinafter cited as DRAFT FINAL PARTICULATE MATTER CRITERIA DOCUMENT.] Under the Clean Air Act, EPA must predicate ambient air quality standards on air quality criteria which "accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of such pollutant in the ambient air." 42 U.S.C. § 7408(a)(2) (Supp. IV 1980). EPA must review and, where appropriate, modify and reissue air quality criteria. 42 U.S.C. § 7408(c) (Supp. IV 1980). Simultaneously with any modification, EPA must propose revisions for affected ambient air quality standards. 42 U.S.C. § 7409(a)(2) (Supp. IV 1980).

Preparation of the DRAFT FINAL PARTICULATE MATTER CRITERIA DOCUMENT is the penultimate step preparatory to issuance of new ambient standards by the Agency. EPA staff issue a recommendation to the Administrator based on the DRAFT FINAL before proposing new standards. See infra text accompanying notes 76-81.

8. DRAFT FINAL PARTICULATE MATTER CRITERIA DOCUMENT, supra note 7, at 9-58.

9. J. TRIJONIS, VISIBILITY IN CALIFORNIA, FINAL REPORT TO THE CALIFORNIA AIR RESOURCES BOARD 16 (1980) [hereinafter cited as REPORT ON VISIBILITY IN CALIFORNIA]. The Trijonis report also noted that:

[Visibility at Downtown Los Angeles has gone through cycles: a sharp deterioration during the industrial expansion of the early 1940's; significant improvement with the onset of air pollution controls in the late 1940's and early 1950's; gradual deterioration from the early 1950's to the early 1960's as growth (especially in automotive traffic) evidently outstripped stationary source controls; and improvement from the middle 1960's to middle 1970's as automotive controls came into effect and stationary source controls were further tightened.]

Id. at 16, 160.

10. Id. at 16, 160.


12. TECHNOLOGY SERVICE CORP., EMPIRICAL STUDIES OF RELATIONSHIPS BETWEEN
Pollution particularly threatens the quality of visibility in the western United States. Adding any given quantity of pollution impairs visibility more in this relatively clean air than in the comparatively dirty air of the East. Adding the same increment of pollution to the latter will also have an adverse effect, but pre-existing poor visibility reduces the perceptible change.

Responding to this growing awareness that visibility was rapidly deteriorating, especially in national parks, wilderness areas, and many other parts of the country set aside for special protection, "Congress amended the [Clean Air] Act in 1977 to require 'aggressive steps' to remedy existing visual deterioration, and to prevent future impairment of those areas." New section 169A of the Clean Air Act codified the primary thrust of this congressional directive. The section required, first, that the Environmental Protection Agency (hereinafter EPA or the Agency), in collaboration with the Department of the Interior (DOI), pinpoint those so-called "Class I areas": pristine areas of the country in which visibility is "an important value." Second, section 169A requires the Agency to recommend to Congress methods for identifying and measuring visibility impairment, and for remedying impairment resulting from manmade air pollution.

Third, the new amendment directed EPA to promulgate visibility...
protection regulations within two years following its August 7, 1977 passage.\textsuperscript{20} These regulations were to provide guidelines to the states for protecting visibility in protected areas,\textsuperscript{21} and to direct each state containing a protected area to amend its air quality implementation plan (state plan or SIP) to contain provisions aimed at remedying existing visibility impairment and preventing any future degradation resulting from manmade pollution.\textsuperscript{22}

Prompted by a law suit filed by an environmental group,\textsuperscript{23} the Agency promulgated final section 169A regulations on December 2, 1980,\textsuperscript{24} some sixteen months after the publication date contemplated by the statute.\textsuperscript{25} Cries of protest from the regulated community\textsuperscript{26} and a flurry of requests for reconsideration\textsuperscript{27} immediately greeted the regulations, which had evolved from one of the most extensive rulemakings conducted by the Agency.\textsuperscript{28} Since promulgation of the rules, none of the thirty-six states containing protected areas have submitted visibility protection revisions to their implementation plans.\textsuperscript{29} EPA has neither responded to the requests for reconsideration nor attempted to enforce

\begin{enumerate}
\item\textsuperscript{20} 42 U.S.C. § 7491(a)(4) (Supp. IV 1980).
\item\textsuperscript{21} 42 U.S.C. § 7491(b)(1) (Supp. IV 1980).
\item\textsuperscript{22} 42 U.S.C. § 7491(b)(2), (a)(1) (Supp. IV 1980). Consistent with the nine months allowed for original submission of their State Implementation Plans, 42 U.S.C. § 7410(a)(1) (Supp. IV 1980), states presumably were to have nine months in which to submit revised plans pursuant to § 169A. This was in fact the position taken by EPA. \textit{See} 40 C.F.R. § 51.302(a)(1) (1981).
\item\textsuperscript{23} Friends of the Earth, Inc. v. Costle, No. 79-2311 (D.C. Cir. filed Nov. 5, 1979).
\item\textsuperscript{24} 45 Fed. Reg. 80,089 (1980).
\item\textsuperscript{25} \textit{See infra} text accompanying note 19.
\item\textsuperscript{26} \textit{See, e.g.,} Walker, \textit{The Seriousness of the Visibility Impairment Rules}, \textit{PUB. UTIL. FORT.} 104 (1981) (stating that "[t]he rules of visibility protection, especially integral vistas, have the potential to halt or, at the very least, cause extreme delay in resource development").
\item Not all commentary on the regulations has focused on their alleged severity, however. \textit{See, e.g.,} \textit{Protecting Visibility Under the Clean Air Act: EPA Establishes Modest "Phase I Program}, 11 ENVT. L. REP. (ENVT. L. INST.) 10,053, 10,058 (1981) ("As it stands today, EPA's visibility program is, on the whole, far less ambitious than one might have expected given the breadth of the congressional mandate . . . . Nevertheless, states choosing to do so can use the "reasonable progress" directive to implement ambitious visibility protection programs").
\item\textsuperscript{29} \textit{Interview with Dean Spencer, Office of General Counsel, Environmental Protection Agency (June 1982).}
Congress enacted section 169A specifically to protect numerous majestic vistas and panoramas, many of which are located near sources of pollution. A number of valuable deposits of oil, oil shale, uranium, natural gas, and low sulfur coal rest near many of these scenic areas. Power plants and copper smelters, the latter employing hundreds of people, are located in the Southwest and thus play a major role in that area’s visibility calculus. Likewise of concern are the region’s chemical manufacturing plants. Accordingly, regulations enacted pursuant to section 169A constitute important and sensitive elements of the legislative scheme for protecting visibility in the West’s pristine areas. This section is, however, only one part of a larger network of Clean Air Act requirements, all provisions of which must be implemented intelligently if the goal of preserving and protecting visibility is to be achieved.

Emphasizing the protection of visibility in the Southwest, this article examines the various Clean Air Act provisions whose enforcement affects visibility in the nation’s pristine areas, as well as the programs implementing these provisions. The article also discusses section 169A, focusing on the complementary roles played by other visibility-related provisions as well as on whether EPA’s recent visibility regulations satisfactorily foster this role.

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30. In response to this inactivity, at least one environmental group has notified EPA that it intends to sue. See Letter from Robert E. Yuhnke, Regional Counsel, Environmental Defense Fund, to Anne Gorsuch, Administrator, Environmental Protection Agency (Dec. 15, 1981).

31. See infra text accompanying notes 325-327.

32. “[V]ast reserves of oil, oil shale, uranium, natural gas, and low sulphur coal are found within the Four Corners Region.” Los Alamos National Laboratory, Report 4 to the National Commission on Air Quality: Alternative Air Quality Policy Analysis for the Four Corners Study Region xii (1981) [hereinafter cited as NCAQ Report 4] Hereinafter the terms “Four Corners”—depicting the general area where the states of Utah, Arizona, Colorado, and New Mexico meet—will be used synonymously with the term “Southwest.” The variety of interests filing requests for reconsideration typify the array of mineral and energy activities potentially affected by the section 169A regulations. See supra note 27.

33. See infra text accompanying notes 113-269.

34. See, e.g., Petition of Kerr-McGee, supra note 27, at 3 (Kerr-McGee’s Searles Valley, California chemical complex is bordered on several sides by three protected areas: Dome Land National Wilderness, Death Valley National Monument, and Golden Trout National Wilderness). Although section 169A affects other industries, the regulations do not govern surface mining of coal. See National Commission on Air Quality, To Breathe Clean Air 2.1-43 (1981) [hereinafter cited as To Breathe Clean Air].
PROBLEMS IN REGULATING DUE TO CHARACTERISTICS OF VISIBILITY DEGRADATION

Traditionally, "visibility" has been defined as visual range: the ability to see a target at a distance. Visibility also includes the ability to appreciate details of line, texture, color, and form. Furthermore, the contrast between an object and its surroundings is fundamental as the contrast between an object and its background is reduced, the object's image becomes less distinct, and the viewer's appreciation of what he is observing is less pronounced.

Accordingly, "visibility impairment" may be characterized as a reduction in visual range from some reference value; "a reduction in contrast between an object and the horizon sky at a known distance from the observer;" or "a shift in coloration or light intensity of the sky or distant objects . . . compared to what is perceived on a 'clear day.'" EPA's section 169A regulations define visibility impairment as any humanly perceptible change in visibility (visual range, contrast, or coloration) from that which would have existed under normal conditions.

The Earth's curvature and light scattering caused by gaseous molecules of air naturally limit visual range. At sea level, visibility is at best approximately 325 kilometers. In some western Class I areas,
visibility could reach this distance under pollution-free conditions.\textsuperscript{45}

The more pristine an area is, the more susceptible it is to visibility degradation brought on by pollution.\textsuperscript{46} The introduction of a small amount of pollutant into clean air is likely to be much more perceptible than a similar amount introduced into an already polluted environment.\textsuperscript{47}

Objects are visible only if light from the objects or from elements with which the objects are in contrast reaches the human eye.\textsuperscript{48} Small particles, referred to as fine particulate or aerosols,\textsuperscript{49} generally representing the oxidized products of sulfur dioxide (referred to as sulfates) and other reactive gases such as nitric oxides (nitrates), frustrate this process by scattering light in the intervening visual pathway.\textsuperscript{50} Such aerosols scatter light extremely efficiently, greatly reducing visual range.\textsuperscript{51} A small mass of aerosol one-half millionth of a meter (0.5\textmu m) in diameter can scatter a billion times more light than can the same mass of air.\textsuperscript{52}

Aerosols may reduce more than visual range.\textsuperscript{53} Haze formed by the particles may reduce the contrast between objects and the sky.\textsuperscript{54} Scattered air light appears blue in the absence of particulate, and dark objects appear increasingly blue with distance.\textsuperscript{55} The addition of a small amount of fine particulate (1 to 5 micrograms per cubic meter (\(\mu g/m^3\)))\textsuperscript{56} throughout the viewing distance tends to whiten the horizon sky, making distant objects look gray or washed out.\textsuperscript{57}

\textsuperscript{45} Id.

\textsuperscript{46} For example, “addition of 1\(\mu g/m^3\) to a clean atmosphere reduces visual range by 30 percent.” \textit{Protecting Visibility, supra} note 6, at 2-25, fig. 2-22. \textit{See also infra} Appendix A. By contrast, “addition of the same amount when background visual range is 35 km (20 miles) produces a 3 percent reduction.” \textit{Protecting Visibility, supra} note 6, at 2-25, fig. 2-22.

\textsuperscript{47} \textit{See Part I} Senate Hearings, \textit{supra} note 13. Though the introduction of as little as 3-5 \(\mu g/m^3\) of fine particles into a clean environment may have its most significant impact on the contrast detail of the objects under observation, a similar amount may not be perceptible in a polluted environment of 20 \(\mu g/m^3\). \textit{Protecting Visibility, supra} note 6, at 2-27. This comparison may be more fully appreciated when one considers that a 20 \(\mu g/m^3\) concentration for fine particles is within the range of values being considered by EPA as a means of protecting visibility in the east. \textit{See infra} text accompanying notes 82-85.

\textsuperscript{48} Bartlit, \textit{supra} note 37.

\textsuperscript{49} \textit{Protecting Visibility, supra} note 6, at 2-9.

\textsuperscript{50} Id. at 2-9.

\textsuperscript{51} \textit{Draft Final Particulate Matter Criteria Document, supra} note 7, at 9-25.

\textsuperscript{52} Id. This document provides a further example: a one-thousandth of meter (1mm)-thick sheet of transparent material, if dispersed as one-half of a millionth of a meter thick (0.5 \textmu m) particles, would be sufficient to scatter 99\% of the incident light, completely obscuring vision. Id.

\textsuperscript{53} Id. at 9-8.

\textsuperscript{54} Id. at 9-7.

\textsuperscript{55} \textit{Protecting Visibility, supra} note 6, at 2-27.

\textsuperscript{56} Id.

\textsuperscript{57} Id.
Aerosols can also travel long distances. Sulfate aerosols associated with midwestern coal-burning plants and other sources have been linked with the high incidence of summertime haze experienced by the New England and Middle Atlantic States. To date there has not been a concerted effort to confront the eastern regional haze problem, however, due primarily to the difficulty of developing models accurately predicting relationships between adverse visibility effects and those sources whose haze-implicated emissions emanate hundreds of kilometers from where the effects are observed. Due to problems which the Agency imputes to long distance modeling, EPA’s section 169A regulations eschew imposing any regulatory duties associated with multisource visibility impairment, also referred to as “regional haze.”

Sulfur compounds constitute the most significant chemical component of fine particulate in the eastern United States and in the Southwest. In California, sulfates appear to be more important in the Los Angeles basin, while nitrates take on greater significance in the more centrally located San Joaquin Valley. These relationships are not entirely certain, however, with at least one authority asserting that nitrates are responsible for two-thirds of the acidity in California.

The contribution of nitrates to aerosol levels in the arid Southwest is considerably less clear than in the case of sulfates. Nitric oxide

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58. Id. at 7.
59. For a general discussion of the sulfate problem in the East, see Ostrov, Interboundary Stationary Source Pollution—Clean Air Act Section 126 and Beyond, 8 Colum. J. EnvTL. L. 37 (1982) [hereinafter cited as Ostrov].
60. Long-range visibility models possess roughly the same characteristics as long-range air quality models that attempt to discern the effects of small particles, such as sulfates, formed from primary pollutants such as sulfur dioxide (SO₂) released many miles from the point of interest. Though the Agency has not adopted any long-range models, work continues on their development under the aegis of a United States-Canadian Working Group on Atmospheric Models. The results to date have been promising, with the Group reporting that models predicting relationships between pollution source areas and sensitive receptor areas in the East are “available for the initial development of pollution control strategies.” See Ostrov, supra note 59, at 55-56.
62. Protecting Visibility, supra note 6, at 4-4.
63. See J. Trijonis & K. Yuan, Visibility in the Southwest 81 (1978) (prepared for EPA) (estimating that 64%, 70%, and 72% respectively, of the incremental light extinction over natural visibility conditions at test sites near the Grand Canyon, Mesa Verde and White Pine National parks was due to sulfate aerosols).
64. Report on Visibility in California, supra note 9, at 135.
65. Id.
66. Because aerosols are implicated in both visibility degradation and acid rain, see Ostrov, supra note 59, at 41 n. 14, acid rain analysis acts as an approximation for analyzing visibility degradation.
68. An initial problem with the measurement of nitrates is that problems associated
emissions from power plants, automobiles, and other sources convert readily to nitrogen dioxide which, in turn, may convert to nitric acid vapor.\(^6\) Nitric acid vapor does not scatter light, however, and, absent humidity, is not likely to convert to light-scattering nitrate aerosol species.\(^7\) At least one authority asserts that nitrates are "not expected to be an important factor to regional light-scattering" in the Southwest during the peak summer tourism months, when temperatures are high and the humidity extremely low.\(^7\)

Though questions remain regarding the role of nitrates in visibility degradation, nitrogen dioxide—the initial oxidation product of nitric oxide emissions—does have generally-recognized adverse effects local to the source of emissions and subject, therefore, to regulation under section 169A.\(^7\) Nitrogen is found in the air we breathe as well as being a chemically bound element in fossil fuels. When subjected to high temperatures, the nitrogen is freed to combine with oxygen, forming nitrogen dioxide (NO\(_2\)). In an emission plume, NO\(_2\) will absorb light in the blue wave band, thereby imparting a brownish-red color to the plume, potentially discoloring affected areas.\(^7\) Power plant plume studies in arid regions such as the Southwest pinpointed NO\(_2\) as a primary cause of visibility degradation in areas near power plants.\(^7\)

Though EPA has recognized the light discoloration properties of

\(^6\) VISIBILITY PROTECTION, supra note 69, at 7.

\(^7\) See also infra text accompanying notes 70-71.

\(^69\) ENVIRONMENTAL PROTECTION AGENCY, USERS MANUAL FOR THE PLUME VISIBILITY MODEL (PLUVUE) (PB81-163297) 2 (1980).

\(^70\) Id.

\(^71\) Under Project VISTTA (Visibility Impairment due to Sulfur Transport and Transportation in the Atmosphere), the Agency conducted two major air pollution field tests during the summer and early winter of 1979 at and around the Navajo Power Plant at Page, Arizona. [This study hereinafter will be referred to as "VISTTA test" or "VISTTA study."] Scientists observed air masses from Southern California containing easily-measurable sulfate levels. Nitrate levels were barely detectable, however, and nitrate particles were not measurable in the power plant’s plume. See Blumenthal, Richards, Macias, Bergstrom, Wilson & Bhardwaja, Effects of Coal-Fired Power Plant and Other Sources on Southwestern Visibility (Interim Summary of EPA's Project VISTTA), 15 ATMOSPHERIC ENV'T 1968 (1981) [hereinafter cited as Interim VISTTA Study].

By comparison, Trijonis and Yuan attribute between 14 and 16% of incremental visibility degradation observed in the Grand Canyon, Mesa Verde, and White Pine National Park areas to nitrate aerosols. See VISIBILITY IN THE SOUTHWEST, supra note 63, at 81.

\(^72\) LOS ALAMOS NATIONAL LABORATORY, REPORT 2 TO THE NCAQ, AIR QUALITY IN THE FOUR CORNERS STUDY REGION, VOLUME II: REGIONAL ANALYSIS 33 (1981) [hereinafter cited as NCAQ REPORT 2].

\(^73\) PROTECTING VISIBILITY, supra note 6, at 2.4.2.

\(^74\) The authors of the Interim VISTTA study, supra note 70, found that NO\(_2\) was the dominant cause of plume coloration: "[F]or the [Navajo] plume we can conclude that the reddish-brown coloration of the plume is generally due to NO\(_2\)." Id. at 1963, and that "[f]or distances of 10 to 100 km, NO\(_2\) can dominate [light] extinction in the blue and green [wave lengths] as well as cause coloration." Id.
NO₂, its most recent assessment of the relationship between NO₂ and visibility concludes that "an ambient standard for NO₂ to protect visibility is not warranted at this time." The Agency offers two grounds in support of its position. First, although the Agency does not dispute the color-absorbing characteristics of NO₂, it cites recent scientific data suggesting that aerosols other than NO₂ also may be capable of imparting a brownish-red haze to the receiving environment. If so, asserts a staff paper, measuring instruments capable of detecting discoloration would be unable to determine the exact cause of pollution, thereby frustrating enforcement of the applicable NO₂ standard. Second, and conversely, the staff paper concludes that if the Agency required the use of ground-level NO₂ monitors instead of color-measuring instruments there would be instances in which plume coloration at a level sought to be prevented by ambient standards would not be reflected in high NO₂ ground level readings. This difficulty in detection also would frustrate attempts to implement the standard. The staff paper resignedly concludes that "[Clean Air Act] sections 169A and 165(d) may provide some control over the more noticeable brown plumes" appearing in pristine areas.

In contrast to its position on nitrogen oxides, the staff recommended adoption of an ambient standard to protect against the visibility effects of other fine particulates. Accordingly, the Agency’s Air Program Staff Review of the National Ambient Air Quality Standards for Particulate Matter concludes that the “impairment of visibility by fine particles over urban to multi-state regions clearly affects public welfare.” The staff therefore recommended “consideration of a fine particle secondary standard based primarily on the relatively well-defined quantitative relationships between fine mass and visibility.”

Possible values suggested for this ambient standard range from 25μg/m³, which the staff acknowledges would probably do no more than maintain the visual status quo in the East, to 8 μg/m³, which,
according to the staff, may be unattainable in the East. The proposed fine particle secondary standard is therefore practically useless in the pristine West, where ambient fine particulate levels as low as 1 to 4 μg/m³ could have adverse effects. The Agency staff recognized this consequence. Thus, again apparently looking to section 169A, the staff paper argues that, although the envisioned range of standards "would not of themselves protect sensitive scenic areas of the West, . . . these areas are directly and indirectly addressed by other provisions of the Clean Air Act." The Agency has so far failed to address adequately problems of visibility degradation in the Southwest. Since the ambient standard review program will not alleviate visibility problems in the Southwest, and the Agency is disinclined to address the problems of regional haze, the Agency’s inability to implement the section 169A program continues to be of paramount importance. Much is already known regarding the causes of visibility degradation in the Southwest, however, and programs are already in place which, if properly implemented, could go a long way toward section 169A’s twofold goal of remedying existing visibility impairments and preventing new ones. The next section of this article discusses these contributing factors and the programs already created to deal with them.

III
CLEAN AIR ACT REGULATION PRIOR TO ENACTMENT OF SECTION 169A

(A) Automotive Pollution in the California South Coast Air Basin

Many visibility problems experienced in the Southwest may originate in Southern California, an area suffering from some of the most severe air pollution problems in the nation. Bordered by mountains to the east and beset by climatic conditions conducive to temperature inversions, the Los Angeles area is a natural breeding ground for pollution. In the hot and humid climate of the area, exhausts from the area's ever-growing automobile population emit hydrocarbons and oxides of nitrogen (NOx) which photochemically react to form oxidants, especially ozone. Within this environment sulfur oxides find a recep-
tive chemical atmosphere in which to oxidize and form sulfates\(^8\) which are then carried eastward by prevailing west to east winds.

Several studies have associated polluted air masses moving from the South Coast Air Basin of California with adverse visibility effects in the Southwest.\(^9\) Consequently, all the factors just described which make Southern California naturally susceptible to air pollution also contribute significantly to the Southwest's visibility problem.

Although EPA officials express concern with sulfur oxide emissions in the South Coast Air Basin,\(^9\) the Agency has classified the area attainment for sulfur dioxide.\(^9\) Therefore, if the area's sulfate problems are to be reduced and the long-range transport of visibility-impairing haze minimized, the primary reduction in pollution will have to come from a battle against the contributory problems of NO\(_2\) and hydrocarbon pollution.\(^9\)

Automobiles may create one-third to one-half of California's hydrocarbon pollution\(^9\) and about one-third of its NO\(_2\) pollution.\(^9\)

\(^8\). See Protecting Visibility, supra note 6, at 6-11.

Volatile organic compounds [a term used synonymously with reactive hydrocarbons from automobile exhausts and other sources] can contribute to visibility impairment by increasing photochemical formation of sulfates, nitrates, and NO\(_2\) and by conversion into organic aerosols. Nitrogen oxides also participate in photochemical reactions. Therefore, the emission of . . . nitrogen oxides, and volatile organics are of significance to visibility impairment.

\(^9\) See also American Lung Association, Sulfates and the Sulfur Oxide/particulate Complex 2 (1976).

Although the formation of the components of SPC [sulfur oxides and their transformation products, e.g. sulfates] has not yet been completely chartered, the transformation appears to take place as follows: The first and basic step is the reaction of sulfur dioxide with oxygen to form sulfur trioxide (SO\(_3\)). This change usually takes place photochemically. The process is rather slow in clean air. But pollution speeds up the change. In the presence of nitrogen oxides and hydrocarbons, the sunlight affects this oxidation more quickly.

\(^9\) Id.; Report on Visibility in California, supra note 9, at 67.


\(^9\) Confidential communication with EPA officials.

\(^9\) 40 C.F.R. § 81.305 (1981). Nearby Kern County, located in the southern portion of the San Joaquin Valley, another area associated with pollution transport to the Southwest, see Reible, Ouimette & Shaip, Atmospheric Transport of Visibility Degrading Pollutants into the California Mojave Desert, 16 Atmospheric Env't 599, 600 (1981), is classified nonattainment for SO\(_2\). 40 C.F.R. § 81.305 (1981). California Air Resources Board (CARB) officials report that the primary sources of SO\(_2\) in Kern County are refineries involved in thermally-enhanced oil recovery, and that controlling emissions from such sources proceeds slowly. Confidential Communication with California Air Resources Board officials.

\(^9\) In contrast to its position on SO\(_2\), the Agency classifies the South Coast Air Basin nonattainment for both NO\(_2\) and ozone. 40 C.F.R. § 81.305 (1981). See also To Breathe Clean Air, supra note 34, at 2.1-25 (commission finding 115, that seven California counties exceed NO\(_2\) standard); Part 4 Senate Hearings, supra note 87, at 176 (statement of General Motors Corp. representative that the NO\(_2\) standard is being met in every area of the country except Southern California).

\(^9\) Compare Part 4 Senate Hearings, supra note 87, at 113 (automobiles and light duty
While the State of California traditionally has imposed new car emission standards more stringent in significant respects than required by the Federal National Emissions Standard Act, the State, until recently, battled EPA over virtually all other programs aimed at controlling auto emissions, especially the inspection and maintenance of in-use vehicles carrying pollution control equipment.

After California won several legal battles with EPA concerning automobile inspection and maintenance, the 1977 amendments to the...
Clean Air Act sparked renewed EPA efforts to regulate California car emissions. These amendments empowered the Administrator to extend for two successive five-year periods the deadline for states to meet photochemical oxidant standards. The Administrator could grant the second extension only if the state in question had submitted a plan that "established a specific schedule for implementation of a vehicle emission control inspection and maintenance plan." If any such state failed to submit a plan, the Agency could both refuse the second extension and impose severe sanctions. The Act banned construction of any new major stationary source that might contribute to nonattainment status in areas already nonattainment either for photochemical oxidants of for any other pollutant to which an ambient standard applied and for which an acceptable plan had not been submitted by July 1, 1979. In addition, the Act prohibited any award by the Administrator of grants to plan-deficient states, and prohibited the Secretary of Transportation from exercising his or her grant authority, subject to certain exceptions.

EPA issued a policy statement on May 19, 1978 delineating its criteria for approving state plans for areas currently nonattainment and for imposing the no-new-construction sanction. Approximately one year later, the Agency imposed the no-new-growth constraint on all nonattainment areas for which no suitable plan had been submitted, including the South Coast Air Basin region. EPA announced on December 12, 1980 that it was withholding grant money estimated to exceed $350 million from six California air basins, including the South Coast Air Basin, because the California legislature had yet to endorse the inspection and maintenance plan submitted to the Agency.

Despite the heavy impact of these sanctions and the benefits attributable to inspection and maintenance, it was not until August 27,
1982\(^\text{109}\) that the California legislature enacted a vehicle inspection and maintenance program.\(^\text{110}\) Though late in coming, one can only applaud the legislature's action.\(^\text{111}\) Not only will Los Angeles-area air quality\(^\text{112}\) benefit from the legislature's action, but there may be benefits as well for Southwestern visibility.

(B) Smelters and Sulfur Dioxide Pollution

The influence of the Los Angeles plume on visibility in the Southwest is to a large degree overshadowed by pollution from copper smelters in southern Arizona, New Mexico, and Nevada. Some of the nation's most spectacular national parks, such as the Grand Canyon, repose within the air basins affected by sulfur dioxide emissions from the Southwest's copper smelters.\(^\text{113}\)

Smelters are prolific sources of sulfur dioxide pollution. Of the nation's twenty-four smelters,\(^\text{114}\) the western smelters spew five percent of all the sulfur dioxide emitted in the United States.\(^\text{115}\) Ten of these appear to be as cost effective as stationary source measures aimed at the same problem, it does state that other (unspecified) measures may be more cost-effective. \(\text{Id.}\) at 120. Persons long familiar with the federal program echoed the same sentiment. Telephone interview with Bruce S. Carhart, former Inspection/Maintenance Coordinator, Office of Mobile Source Air Pollution Control, Environmental Protection Agency (April 12, 1982). Carhart asserts that at a cost of $600 per ton for hydrocarbon control, automobile inspection and maintenance cannot be matched on cost/efficiency grounds by other plausible alternatives, particularly the control of hydrocarbons from stationary sources. \(\text{Id.}\)


\(^\text{110}\) S.B. 33 (passage, Aug. 27, 1982; approved by Governor, Sept. 9, 1982; filed with Secretary of State, Sept. 10, 1982).

\(^\text{111}\) As a possible explanation for the legislature's earlier reluctance to adopt inspection and maintenance, it bears noting that many Californians have taken the view that inspection and maintenance is capable of no more than a 3-3.6% improvement in air quality at a disproportionately high price. \(\text{See Part 4 Senate Hearings, supra note 87, at 95 (testimony of Jerry C. Connors, quoting Tom Quinn, Chairman, California Air Resources Board) (3% improvement projected); id. at 104 (statement of R. Appleby, Department of Automotive Engineering, Automobile Club of Southern California) (at a cost of $210 million in the South Coast Air Basin alone, inspection and maintenance is estimated to yield only a 3.6% reduction in manmade hydrocarbons).}\)

\(^\text{112}\) The severity of Los Angeles' air pollution problem is underscored by projections that by 1987, the current deadline for achieving the hydrocarbon-influenced ozone standard, pollutant levels are likely to reach a level three times the statutory limit. \(\text{Part 4 Senate Hearings, supra note 87, at 11.}\)

\(^\text{113}\) For example, the Grand Canyon National Park is located within 200 to 300 miles from the main smelter area in southwest Arizona. \(\text{See Protecting Visibility, supra note 6, at 4-25, fig. 4-13.}\)


\(^\text{115}\) Letter from Richard D. Wilson, Director, Office of Air, Noise and Radiation, Envi-
are located near the Mexican border with two located in New Mexico, seven in Arizona, and one in west Texas near the boundary with New Mexico. From 1970 to 1972, the seven Arizona smelters emitted ten times the sulfur dioxide released in the entire Los Angeles Air Basin. Although these seven smelters increased sulfur dioxide capture from 15.7% during 1972 to 53.5% in 1981, pollution levels increased in three out of the four years following enactment of the Clean Air Act Amendments of 1977.

Not until copper strikes shut down the western smelters during the nine-month period extending from July 1967 to March 1968 could scientists fully appreciate the relationship between sulfur dioxide pollution from Arizona's copper smelters and visibility degradation in the surrounding air basins. At the time of the strike, copper smelters were thought to account for as much as ninety percent of sulfur dioxide emitted into the Rocky Mountain Southwest. EPA's report to Congress on visibility degradation related scientific findings of a sixty percent drop in sulfates during the strikes at the Grand Canyon and Mesa Verde, some 200 to 300 miles from the main smelter area in southeastern Arizona.

Although EPA regarded the scientists' conclusions as statistically significant with high confidence levels, industry leaders continued to dispute the relationship between smelter sulfur dioxide emissions and visibility degradation in the Rocky Mountain Southwest. On July 1, 1982, Mr. Wilson's letter also notes that a "substantial amount of these emissions chemically transform into solid sulfates and sulfuric acid." Id.


117. Phelps Dodge owns smelters at Ajo, Morenci, and Douglas, Arizona. Id. at 2. Magma owns a smelter in San Manuel, Arizona. Id. at 4. The Inspiration smelter is located at Hayden, New Mexico. Id. at 3.

118. ASARCO operates a smelter at El Paso, Texas. Id. at 2.


120. During 1977, sulfur dioxide from all Arizona smelters averaged 1009 tons per day. The figures for 1978, 1979, 1980, and 1981 were 1061, 1209, 874, and 1197 tons per day, respectively. See Part 3 Senate Hearings, supra note 114, at 34 (testimony of Priscilla Robinson, Director, Southwest Environmental Service).

121. PROTECTING VISIBILITY, supra note 6, at 4-24-4-27.

122. Id.

123. Id.

124. See, e.g., Part 3 Senate Hearings, supra note 114, at 77-78 (statement of David Swan, Vice President for Environmental Issues, Kennecott Copper). Mr. Swan cites the
1980, however, another strike shut down nine of the area's copper smelters, providing scientists with data that reinforced the conclusions reached after the first strike.\textsuperscript{125}

During the 1980 strike, government and university scientists compared sulfate readings from thirteen monitors positioned in such national parks and monuments as Organ Pipe Cactus and Gila Cliff Dwelling (referred to as the Basin and Range region), and the Grand Canyon, Bryce Canyon, and Canyon Lands (referred to as the Colorado Plateau).\textsuperscript{126} These regions contained more than twenty visibility-protected mandatory Class I areas.\textsuperscript{127} The study's authors found that sulfate concentrations decreased from fifty to ninety percent below 1979 concentrations under conditions similar to those existing at the time of the 1980 strike.\textsuperscript{128}

When sulfate readings from the summer of

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\textsuperscript{125} See \textit{The 1980 Smelter Strike}, supra note 119. A short discussion of this study may be found at \textit{Acid Rain Hearings}, supra note 67, at 205 (Report to Congress, Eastern States Attorneys General) ("The correlation between alterations in SO\textsubscript{2} emissions and downwind sulfate levels demonstrated by the Copper Strike of 1967-1968 was confirmed during the 1980 Copper Smelter Strike").

\textsuperscript{126} See \textit{The 1980 Smelter Strike}, supra note 119, at 2, 14 (figure caption 1).

\textsuperscript{127} \textit{Id.} at 2.

\textsuperscript{128} \textit{Id.} at 4-5, 6.

In order to assess the effect of the smelter strike on northern Arizona and southern Utah, two 72-hour periods with wind trajectories going from the smelter region to southern Utah were selected. The first period, September 24-27, 1979, had one of the highest sulfate levels for the entire year at the Grand Canyon. The second period, September 12-14, 1980, during the strike, had much lower concentrations . . . . For both periods, trajectories for all of the Colorado Plateau sites passed through the smelter region, with one exception . . . . In the first period, elevated sulfate concentrations of 3-6 \textmu g/m\textsuperscript{3} were measured as far north as Canyonlands National Park . . . , 600-800 km north of the smelters. High levels of copper, zinc, and lead accompanied the high sulfate concentrations. In the second period, the sulfate levels at the sites north of the smelters dropped to 0.2 to 0.7 \textmu g/m\textsuperscript{3}. Thus, when winds carry smelter plumes north, the smelters can contribute approximately 90\% of the sulfate mass in the Colorado Plateau.

\textit{Id.} at 4-5. Finally, the authors observed:

The decrease from the summer of 1979 to the summer of 1980 was 90\% at Tonto [in the Basin and Range area] and 50-70\% at other sites. These decreases are similar to the 60-70\% changes in sulfate concentrations observed during the 1967 strike.
1981 were taken into account—the 1981 summer period being one in which winds reaching the monitors were less predominantly from the smelter region than during the 1979 evaluation—the researchers found that “on average, the smelters were responsible for about 70% of the sulfate at near sites and 50% of the sulfate throughout the rest of the region.”129

I. Supplemental Control Systems (SCS) as an Interim Measure

The smelter industry’s probable financial inability to retool production processes immediately for control of SO₂ emissions complicated EPA’s efforts to create a control program. Many American copper smelters employ outdated processes, and are struggling for survival in the face of competition from newer smelters in other countries.130 Two major smelters closed in 1981131 and others suspended operations for substantial periods during 1982.132 Industry spokesmen argue that tax benefits and protective tariffs enable foreign plants to enjoy a favorable cost situation,133 though others question the importance of this alleged governmental promotion with regard to certain competitive foreign copper smelters.134

This agreement is reasonable since the sulfate levels during the nine month comparison in the late 1960’s were approximately the same as those during the two month summer period in 1979.

Id. at 6.

129. See Eldred, Ashbaugh, Cahill, Flocchini & Pitchford, Sulfate Levels in the Southwest During the 1980 Copper Smelter Strike 9-10 (May 1982) (unpublished manuscript).


133. See Anaconda Closure Study at Part 6 Senate Hearings, supra note 130, at 418, for a discussion of Anaconda’s decision to close its smelter in Montana and process its copper concentrates in Japan.

134. See Dresher & Rodolf, Smelter Pollution Abatement: How the Japanese Do It, ENGINEERING & MINING J. 67 (1981), in which the authors, an academician and a former smelter superintendent, report on a fact-finding mission to Japan, and conclude as follows:

[T]he present generation of Japanese smelters was constructed in the last 10-12 years and has been continually modified to meet air pollution control requirements. It was not apparent to the tour group that these smelters received any special tax or capital money loan treatment by the Japanese government in constructing these facilities.
Not until the early 1970's did copper smelters in the United States begin installing sulfuric acid plants on their process gas streams, enabling the smelters to capture a significant percentage of the sulfur dioxide (SO\textsubscript{2}) off gases, and providing sulfuric acid as a saleable byproduct. The relatively limited market for sulfuric acid in the west and the costs of shipping the byproduct elsewhere depressed the sulfuric acid market shortly thereafter, discouraging further investment in expensive acid plant equipment. These pollution-capturing devices could capture SO\textsubscript{2} emissions only from the smelter's "strong" gas streams, leaving "weak" SO\textsubscript{2}-laden streams—which account for forty to fifty percent of overall sulfur dioxide emissions—unaffected.

Recognizing this problem, EPA proposed an interim approach to enable these smelters to meet applicable ambient standards without immediately investing in control equipment other than sulfuric acid plants. Basically, this plan required these copper smelters to complement acid plant sulfur dioxide control by curtailing production whenever meteorological conditions were such that a violation of ambient standard for SO\textsubscript{2} would be likely to occur.

Courts have found such "supplemental control systems" (SCS), as well as tall stacks and other methods of dispersing pollutants, violative.

\textit{Id.} at 72.

Whatever the advantages of the Japanese smelter industry vis-a-vis government tax and protective tariff policies, the control of smelter pollution in Japan is uniformly high, with smelter sulfur dioxide abatement averaging between 90 and 99\%. \textit{Part 3 Senate Hearings, supra} note 114, at 47 (testimony of John Bartlit). Sulfur dioxide abatement in Arizona ranges from 2\% at the Phelps Dodge smelter in Douglas, to 87\% at the Kennecott smelter at Hayden. \textit{See Smelter Statistics, supra} note 116. The Japanese smelter industry is considerably newer and is better positioned to market the sulfuric acid byproduct obtained from sulfur dioxide control than is its American counterpart. See infra text accompanying notes 137-138.

135. For example, employing acid plant control technology, Phelps Dodge's smelters at Ajo and Morenci, Arizona, are able to capture 57\% and 54\%, respectively, of the smelters' SO\textsubscript{2} off gases. ASARCO's Hayden, Arizona smelter captures 50\% of the smelter's SO\textsubscript{2} off gases. Data obtained from Smelter Statistics, see \textit{supra} note 116.

136. \textit{Brief for Appellee at 3, Kennecott Copper Corp. v. EPA, 684 F.2d 1007 (D.C. Cir. 1982) [hereinafter cited as EPA Smelter Brief].}

137. \textit{See Part 3 Senate Hearings, supra} note 114, at 103.

138. Nevertheless, by 1975 only two smelters lacked acid plants: Phelps Dodge's Douglas smelter and Kennecott's McGill, Nevada smelter. \textit{See Kennecott Copper Corp. v. Train, 526 F.2d 1149, 1151 (9th Cir. 1975), cert. denied, 425 U.S. 935 (1976).} (In 1975, EPA recognized that it was not economically feasible to control SO\textsubscript{2} from the smelter to the level required by the ambient standard for SO\textsubscript{2}. As an interim measure, EPA required that only emission cutbacks commensurate with the use of an acid plant would be required).

139. \textit{See Brief for Appellant at 5, ASARCO & Magma Copper Company v. EPA, Nos. 80-2039 & 81-1173 (D.C. Cir. 1981):} "Treatment of off gas from the [smelter's] reverberatory furnaces by acid plants is not technologically feasible, however, since "weak streams" contain too little SO\textsubscript{2} to sustain the catalytic reaction necessary for sulfuric acid production."


141. \textit{Requirements for Preparation, Adoption, and Submittal of Implementation Plans, 40 C.F.R. § 51 (1973).}
of the Clean Air Act as a permanent means of meeting ambient air quality standards. The Agency accordingly took the position that SCS and the attendant use of tall stacks were permissible only as interim measures where the alternative would be "permanent production curtailment, shutdown, or delays in attainment of the national standards." Section 119 of the 1977 amendments codified most major aspects of the Agency's position on the use of SCS. With their passage, Congress reaffirmed its opposition to the use of dispersion techniques, but accepted EPA's policy regarding the limited and temporary use of SCS by smelters. Section 119 of the Act thus empowered EPA to allow qualifying smelters to capture less sulfur dioxide than otherwise required by the state implementation plan to meet SO\textsubscript{2} ambient standards. The sec-

142. See Big River v. EPA, 523 F.2d 16 (6th Cir. 1976), cert. denied, 425 U.S. 934 (1976); Kennecott Copper Corp. v. Train, 526 F.2d at 1149; NRDC v. EPA, 489 F.2d 390 (5th Cir. 1974). See also Dow Chemical v. EPA, 635 F.2d 559, 561 (6th Cir. 1980) (discussing earlier cases); Alabama Power Co. v. EPA, 636 F.2d 323, 389-90 (D.C. Cir. 1979).

143. See Kennecott Copper, 526 F.2d at 1151-52 n. 13, in which the court quotes the following statement of EPA:

EPA will approve such measures as intermittent production curtailment [SCS] and use of dispersion techniques, including tall stacks, as an addition to available constant control measures, until such time as the treatment of weak gas streams can be accomplished through reasonable retrofit control techniques . . . [SCS] will continue to be allowed where permanent production curtailment, shutdown or delays in attainment of national standards are the only other alternatives. [40 Fed. Reg. 5508 (1975)].


As a matter of overall policy, section 110(a)(2)(B) of the existing act requires constant emission reduction (as opposed to dispersion dependent technology such as tallstacks and/or intermittent or supplemental controls) as the means for attaining and maintaining national ambient air quality standards.

The smelter provision [in the Bill] does not change this ultimate requirement. It does, however, confirm the authority of EPA to pursue the Agency's present smelter policy, and supports the holding in Kennecott Copper v. EPA [sic], 526 F.2d 1149 (9th Cir. 1975), cert. den. 425 U.S. 935 (1976).

145. See H.R. REP. No. 294, supra note 144. See also Senator Muskie's description of the smelter relief provisions provided by § 119 of the Amendments:

As applied to smelters, the availability of a delayed compliance order is a relief measure which recognizes the unique economic circumstances of the industry. In consequence of these special circumstances, smelters may, during the term of a delayed compliance order, do what no other category of sources is permitted under the Clean Air Act. Specifically, smelters may employ dispersion technology devices such as tall stack and supplemental control strategy along with constant controls as an interim means of meeting ambient standards. By permitting this interim relief measure for smelters, there is no implied intent to relax the Clean Air Act's longstanding prohibition against the use of dispersion technology as a means of meeting ambient standards. Nor is there any intent to permit similar relief to other industries or sources, irrespective of cost considerations.


tion gives similar power to smelter states upon EPA approval. To qualify for this lower capture allowance, section 119 required a smelter to demonstrate that weak gas stream controls were not "reasonably available," thus rendering it unable to comply with SIP provisions designed to achieve applicable SO₂ ambient standards. This relief, not afforded any other industry, is available on a case-by-case basis through "nonferrous smelter orders" (NSO's). Such orders may extend a smelter's deadline for compliance with applicable SIP provisions for two successive and separately-evaluated five-year periods culminating on January 1, 1988. Special provisions apply to the two smelters lacking acid plants at the time of the 1977 Amendments.

2. Later Control Efforts: The Introduction of Multipoint Rollback

Arizona's SIP for SO₂ evolved haltingly. EPA did not promulgate the plan until January 4, 1978, five and one-half years after the date contemplated by the Clean Air Act of 1970. One month after promulgation, EPA "deferred the effectiveness" of the SIP provisions so that smelters could take advantage of the extended timetables for compliance provided by the Act's new NSO provisions. This stay was to remain extant until the Agency promulgated regulations interpreting...
the NSO provisions.\textsuperscript{156}

The Agency promulgated final NSO regulations on June 24, 1980.\textsuperscript{157} During the interim, on September 20, 1979, Arizona submitted its own proposed plan for smelter \(\text{SO}_2\) emissions.\textsuperscript{158} The 1978 stay remained in effect pending EPA analysis of Arizona's proposals.\textsuperscript{159} On November 30, 1981,\textsuperscript{160} EPA proposed approval of the Arizona submission without lifting its earlier stay.\textsuperscript{161}

The main working components of the \(\text{SO}_2\) emission reduction program are SIP provisions designed to attain applicable \(\text{SO}_2\) ambient standards.\textsuperscript{162} In a manner similar to most \(\text{SO}_2\) emission limitations programs, EPA's 1978 promulgation applicable to Arizona's smelters was predicated on a proportional rollback of (i) the smelter's emission level associated with the worst-case measured violation of the ambient standard for \(\text{SO}_2\) at the smelter site to (ii) an emission level that would eliminate impermissible air quality concentrations of \(\text{SO}_2\) under similar circumstances. This regulatory approach is referred to as single point rollback.\textsuperscript{163}

Arizona's 1979 submission was unique in that it envisioned smelter

\begin{footnotesize}
\begin{itemize}
\item 156. 43 Fed. Reg. 6945 (1978).
\item 159. \textit{See Part 3 Senate Hearings, supra} note 114, at 5 (testimony of Edward E. Reich); \textit{id.} at 37 (testimony of Priscilla Robinson).
\item 161. The prolongment of the stay and other matters are now the subject of a Petition for Rulemaking and Notice of Intent to Sue filed by the Environment Defense Fund on February 27, 1982 [hereinafter cited as EDF Smelter Petition]. In a related action, on December 17, 1981, EPA also proposed conditional approval of a New Mexico SIP revision governing \(\text{SO}_2\) emissions from the Chino Mines Company smelter in Hurley, New Mexico. \textit{The Federal Register} announcement notes that, in reviewing the New Mexico submission, the Agency would apply criteria developed in connection with its review of the Arizona submission. 46 Fed. Reg. 61,491-92 (1981). EPA approved the New Mexico submission on May 5, 1982. 47 Fed. Reg. 19,332 (1982).
\item 162. \textit{See supra} text accompanying note 146.
\item 163. Under single point rollback, a facility's emissions for each 3-hour (or, where appropriate, 24-hour) period of interest within the year are compared with recorded ambient concentrations for these same time periods measured at monitors positioned in critical sites near the facility. 45 Fed. Reg. 58,099, 58,101 (1981). EPA's regulations for \(\text{SO}_2\) allow one violation of the standard per year. 40 C.F.R. §§ 50.4(b), 50.5 (1981). Therefore in the usual case the second highest \(\text{SO}_2\) readings at each of the various monitor sites are compared with the applicable air quality standard. 43 Fed. Reg. 755, 757 (1978). If the reading exceeds the standard by, say, a factor of 2, the source must "rollback" its emissions by 50%. In the case of EPA's January 1978 promulgation, air quality modeling demonstrated that the monitors were not located at points of maximum pollution concentration. \textit{id.} To compensate for this deficiency, EPA based its rollback requirements on the highest, rather than the second highest, measured concentrations. \textit{id.} Normally, under such circumstances, EPA might choose to model (computer project) maximum \(\text{SO}_2\) concentrations, \textit{see e.g.,} Cleveland Electric Illuminating Co. v. EPA, 572 F.2d 1150, 1164 (6th Cir. 1978), \textit{cert. denied}, 439 U.S. 910 (1978). In the case of the Arizona SIP, however, the Agency asserted that complex terrain made such modeling inadequate. 43 Fed. Reg. 757, 759 (1978).
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SO₂ emission limitations based on a concept referred to as multipoint rollback (MPR).¹⁶⁴ As with the single point rollback approach, MPR uses monitored SO₂ concentrations at the location of the smelter. Unlike the single point rollback, however, it is not the specific emission level associated with the highest (or second highest¹⁶⁵) emission concentration that must be rolled back. Rather, the rollback percentage obtained by referring to the monitored readings is applied to the full range of emission levels that can be predicted for the smelter over as many periods of interest—in the case of SO₂, three-hour periods—as there are during the course of a year.¹⁶⁶

In the aggregate, any MPR program could be expected to yield more relaxed emission limitations than single point rollback.¹⁶⁷ This is

¹⁶⁵. See supra note 163.
¹⁶⁶. See generally 46 Fed. Reg. 58,099, 58,101-02 (1981). For example, if (1) the monitored concentration violated the standard by a factor of two at a time when the smelter was emitting 100 tons of SO₂ during the measured three-hour period; and (2) the smelter is expected to operate at the 100 ton level during most three-hour periods (70% of the time); and (3) it is also likely to operate at 200 tons per three-hour period (20% of the time) and at 300 tons per three-hour period (10% of the time), then, under single point rollback, the smelter’s emission limitation would be 50% of 100 tons, or 50 tons, per three-hour period for every three-hour period during the course of the year. The 50-ton limit would apply whether, under uncontrolled conditions, the smelter could be expected to emit 100 or 300 tons of SO₂.

For smelters that experience variable emissions, the 50 ton emission limitation in this hypothetical could be onerous, since it effectively means that emissions must be cut by 250 tons or 83%—as opposed to 50%. Otherwise it would not be possible to maintain an emission limitation sufficient to protect the ambient standard during peak periods when the smelter’s otherwise uncontrolled emissions can be expected to reach 300 tons per three-hour period. To offset this perceived burden, the MPR approach establishes an emission table or profile under which the degree of rollback required (50% in the hypothetical) is applied against the full range of emissions that can be expected from the facility. The MPR approach is computed in three steps:

(1) Three-hour emissions expected during the course of the year are weighted according to frequency of occurrence. The weighted values are added together so as to arrive at an average emission figure for the three-hour time period. (In the hypothetical, the average three-hour estimate would be 140 tons—0.7 x 100 tons + 0.2 x 200 tons + 0.1 x 300 tons.)

(2) The calculated three-hour average is then rolled back in accordance with measured ambient concentrations at the smelter (50% in the hypothetical). The resultant rolled back figure (0.5 x 140 tons, or 70 tons) represents the smelter’s three-hour emission limitation for any assortment of three-hour periods during the course of one year.

(3) The rollback factor is then applied against all emission levels expected to exceed the average three-hour emission limit. Separate emission limitations are established for above-average emission episodes in proportion to their expected frequency. In the hypothetical, three-hour emission levels of 200 tons are expected to occur 20% of the time and three-hour levels of 300 tons are expected to occur 10% of the time. Therefore, the smelter would be allowed to emit 100 tons (200 tons x 0.5) for any assortment of three-hour periods comprising 20% of the year and 150 tons (300 tons x 0.5) for any assortment of three-hour periods comprising 10% of the year. Consistent emission monitoring is required in order to keep track of the smelter’s emissions and determine whether it is in compliance with its promulgated emission “profile.”

¹⁶⁷. Id.
because the percentage emission reduction factor derived by MPR may be applied against emission levels higher than the emission level contributing to measured worst-case ambient conditions (as would be true of single point rollback). EPA estimates that the Arizona MPR proposal will permit twelve percent more emissions than under EPA's January 1978 promulgation, though the Agency acknowledges that, under certain assumptions, the increase could be as high as 300%. One environmental group has asserted that the Arizona proposal would "lead to over twice as much atmospheric loading of SO₂ as reinstatement of the 1978 SIP." However the level of incremental pollution increase associated with MPR is calculated, it appears that it will be substantial.

The staggering of emission limitations under MPR raises the distinct, and acknowledged, possibility that violations of the standard will occur. In addition, MPR breaks new ground in other troublesome respects. In general, MPR assumes that the measured concentrations and associated source emission profile in the year in which data is taken represent future years as well. Either may understate the real case, causing the attendant range of emission limitations to underprotect against later-year violations of the standard. While to a degree the same element of underprotection may inhere in single point rollback,

169. Id.
170. EDF Smelter Petition, supra note 161, at 16. EDF also observed that "the increase in allowable atmospheric loading would occur at the expense of visibility in the southwest and contrary to the national goal set by Congress in Section 169A of the Act." Id.
171. In the case of the New Mexico SIP revision governing the Chino Mines Company smelter, see supra note 161, projected emission levels under MPR assume a major production overhaul at the smelter that will increase SO₂ control from its present 60% level to a new control level of about 92%. See 46 Fed. Reg. 61,491 (1981). Accordingly, though emissions after the imposition of MPR will be lower than before, the favorable differential appears grounded in the planned production process changes and not due to the use of MPR. Because the planned process change at the Chino Mines Company smelter will have a more substantial impact than the governing MPR regulations, references to the New Mexico MPR provisions, which appear infra will be for illustrative purposes only. Comments pertaining to MPR in general and to facets of the Arizona MPR plan in particular, see, e.g., infra notes 201 & 202, also apply to the New Mexico plan.
172. See EPA's approval of the New Mexico SIP revision governing the Chino Mines Company smelter, supra note 161, in which the Agency stated:

The New Mexico approach relies on a statistical calculation of the probability that high emissions will coincide with poor dispersion conditions to demonstrate that the national ambient air quality standards (NAAQS) will be attained and maintained . . . . EPA believes that in evaluating the adequacy of a control strategy based on a statistical analysis, it is appropriate to accept a probability of violation that is sufficiently low. [47 Fed. Reg. 19,333 (1982)].

Discussions with EPA officials indicate a 26% computed risk that an ambient standard violation will occur under MPR. See also memorandum from Office of Air Quality Planning and Standards, Environmental Protection Agency (January 20, 1982) (entitled "Comparison of ExEx and MPR Methodologies") [hereinafter cited as MPR Memo] (calculating the probability of a violation under MPR to be 26%).
the single point rollback requirement that the source continuously meet
a specified emission limitation works to minimize the risk of later
violations.

Under MPR there is a twenty-six percent probability that a viola-
tion will occur. This raises questions as to whether a policy which
acknowledges the probability of ambient violations is proper under the
Act, as well as why twenty-six percent, as compared to, say, ten per-
cent is an acceptable risk.

MPR is a method which on average achieves the desired short-
term ambient standards. The concept nonetheless clashes with legis-
lative history opposing the use of averaging methods that go beyond
the temporal duration of the short-term standards.

Finally, the MPR concept is perilously similar to meteorologically-
based schemes such as those proscribed under the Act’s general disper-
sion technology prohibition. In allowing a range of emission limita-

173. MPR Memo, supra note 172, at 9. The EDF Smelter Petition, supra note 161, citing
other authorities, also calculates that there is a 26% probability that there will be a standard
violation under MPR. Id.

174. For example, under “ExEx”, a second method evaluated by EPA for calculating
violation probabilities, there would be a much lower probability of a standard violation than
under MPR. In the case examined in the MPR Memo, supra note 172, at 9, the probability
of a violation under ExEx was determined to be 10% as compared to 26% under MPR. For
prior EPA announcements evidencing the Agency’s interest in methods such as ExEx, see 45
(discussion of the ExEx method).

175. See description of MPR, supra note 166, in which the derivation of the MPR three-
hour “average” emission limitation is explained.

176. See H.R. REP. No. 294, supra note 144, at 92:
Any emission limitation under the Clean Air Act, therefore must be met on a con-
stant basis, not on an averaging basis such as, for example, would be the case if
averaging sulfur content of coal was allowed. The “averaging” method is not al-
lowable, precisely because it cannot provide assurances that the emission limitation
will be met at all times. This is so because inherent in the averaging method is the
fact that in determining the average emissions from a source, at times the emission
limitation would be exceeded, perhaps by a wide margin.

177. Id. The House Report also stated:
By defining the terms “emission limitation,” “emission standard,” and “stan-
dard of performance” [42 U.S.C. §§ 7602(k),(l)], the committee has made clear
that constant or continuous means of reducing emissions must be used to meet
these requirements. By the same token, intermittent or supplemental controls or
other temporary, periodic, or limited systems of control would not be permitted as a
final means of compliance. These definitions apply to all emissions limitations
under the Act . . .

Id. (emphasis supplied). When Congress sought to provide exceptions to the “continuous
means of reducing emissions” requirement it did so by specific statutory language. In 42
whereby sources otherwise subject to continuous emission limitations can be excused for a
period of up to 18 days from meeting applicable requirements during episodes of adverse
meteorology. No comparable provision appears in Clean Air Act § 119, 42 U.S.C. § 7419
(Supp. IV 1980), governing SO_2 emissions from smelters. See also legislative history, supra
notes 144 & 145.

Under MPR a smelter continually must employ control technology in meeting the MPR-
emission limitations. Accordingly, though the underlying MPR emission limitations may be
tions rather than requiring one continuous emission limitation, the Agency appears to be banking on the likelihood that upwardly-staggered emission levels will not coincide with atmospheric dispersion conditions more severe or, even, no more severe than those used to determine the smelter’s emission profile.

The Arizona MPR proposal suffers from a number of additional problems. First, although MPR was developed for use in those cases in which air quality and emissions data are available, Arizona’s SIP proposal was based on a dearth of data. In fact, a full year’s data was available only for 1976, and then only for the ASARCO and Kennecott, Hayden smelters. Second, SCS-prompted cutbacks in operations “possibly contaminated” the available data for 1976, a situation which presumably would not characterize later operations. Third, the emission data ultimately used for ASARCO and Kennecott, which had been extrapolated partially from an incomplete 1975 data base, were then used as a basis for shaping the emission profiles of the state’s five remaining smelters, none of whose emission characteristics necessarily bear any close relationship with the computed emission profiles for ASARCO and Kennecott, Hayden. Finally, rather than requiring continuous emission monitoring of the source’s SO$_2$ emissions to ensure an accurate count of the varied emission levels, the state’s emis-

“periodic” or “limited,” the control obligation, itself, arguably is not. Nevertheless, the underlying limitations themselves are based upon an averaging mechanism which Congress seems to have found objectionable. See supra notes 175 & 176 and accompanying text.

178. MPR Memo, supra note 172, at 5.

179. 46 Fed. Reg. 58,102 (1981). Where emission limitations are based on past experience, as is the case with the MPR approach, one would prefer to have as much data as possible to arrive at a representative emission profile. In other contexts involving the compilation of meteorological data to be used for modeling emission limitations, EPA has expressed a preference for as much as five years’ data. See, e.g., 45 Fed. Reg. 9996 (1980) (involving other probabilistic approaches to developing emission limitations). In the case of the Chino Mines MPR calculation, see supra note 161, the observed distribution of emission rates from the smelter was not used at all because emissions after the planned process change, see supra note 171, were expected to vary significantly from those previously observed. Instead, “a different distribution of emission rates was projected.” 46 Fed. Reg. 61,491-92 (1981).

180. 46 Fed. Reg. 58,102 (1981). SCS contamination was also present in the case of the ambient data used by New Mexico in developing MPR regulations for the Chino Mines Company smelter. See supra note 161 and 46 Fed. Reg. 61,492-93 (1981). In the Chino Mines case, the Agency determined that it could not assess the degree of bias created by the SCS contamination, but that efforts by the state to quantitatively adjust for such bias seemed “reasonable.” Id. at 61,493.

181. Id.

182. Id.

183. For example, Kennecott, Hayden has a double contact acid plant and uses a fluid bed roaster, ASARCO, Hayden has a single contact acid plant and uses multi-hearth roasters, Phelps Dodge, Douglas uses a multi-hearth roaster and no acid plant and Inspiration Copper—a very modern facility—uses double contact acid plants and an electric furnace. See generally Smelter Statistics, supra note 116.
sion monitoring requirements specify that monitoring need occur only ninety-five percent of the time, thereby raising the possibility of unmonitored violations and unenforceable standards.\footnote{\textit{Fed. Reg.} 58,104 (1981). EPA's notice does say that the state has agreed to provide incentives so that the "sources will strive for 100\% data recovery." \textit{Id.} at 58,107.}

3. \textit{Clean Air or Jobs: Alternative Programs to Reduce SO\textsubscript{2} Emissions}

EPA sources advise that, based on the current practices of two of the smelters and the requirements set out in judicial consent decrees for three others,\footnote{See \textit{United States v. ASARCO, Inc.}, No. CN 81-110, GLO-RAMB (D. Ariz. consent decree filed June 22, 1981); \textit{United States v. Phelps Dodge Corp.}, No. Civ. 81-099 (D. Ariz. consent decree filed Oct. 1981). See also \textit{EPA Environmental News}, Apr. 13, 1981 (describing consent decree for ASARCO, Hayden facility); \textit{EPA Environmental News}, Mar. 26, 1981 (describing consent decrees for the Phelps Dodge smelters at Ajo and Morenci).} five of Arizona's seven smelters probably would be in compliance with the state's proposed MPR standards. Only Phelps Dodge, Douglas and possibly the Magma smelter may have major problems meeting the emission limitations. This shortcoming is crucial, for Magma and Douglas together emitted sixty-three percent of all the SO\textsubscript{2} releases by Arizona's smelters during 1981,\footnote{Computation derived from data supplied to EPA's Region II (San Francisco) Office by State of Arizona Department of Health Services.} and one-half of all of the SO\textsubscript{2} pollution released within the state.\footnote{\textit{Part 3 Senate Hearings, supra} note 114, at 37 (testimony of Priscilla Robinson).} Emitting an average of 455 tons of SO\textsubscript{2} per day in 1981,\footnote{\textit{Id.} at 114, note 186.} Douglas thought to be the largest polluter of SO\textsubscript{2} in the nation. During its 1973 high of 721 tons per day, Douglas released more sulfur dioxide pollution than released in all of Southern California.\footnote{\textit{See supra} note 189.} It is one of the oldest smelters in the country and is frequently mentioned as a shut-down candidate.\footnote{\textit{Id.} at 43 (testimony of Matthew Scanlon, Phelps Dodge).} Douglas is, however, the primary source of employment for the community it serves, with about 500 persons dependent on its continued operation.\footnote{\textit{Id.} at 71 (statement of David Swan).} Closure of the smelter also would probably affect many of the 700 persons who work the nearby Cypress-Pima Copper Mine that provides Douglas with its concentrate.\footnote{\textit{Id.} at 37 (testimony of Priscilla Robinson).}

The political and bureaucratic battles in connection with the Douglas smelter typify those that have hampered implementation of smelter pollution controls since the passage of the Clean Air Act, and have led to the proposal of such a questionable measure as multipoint rollback. On the one hand, strict SIP enforcement may lead to closure
of marginal plants with attendant loss of jobs. On the other side, \( \text{SO}_2 \) emissions from Douglas, as well as other Arizona smelters that find it difficult to meet legitimate SIP requirements, pose an externality which potentially diminishes the enjoyment of millions of visitors who visit the Southwest's natural wonders annually.\(^{193}\) The smelters also pose potentially serious threats to the health of residents.\(^{194}\) The need to deal fairly under these circumstances affords Congress an opportunity to resolve conclusively the problem of visibility degradation from smelters.

Two options appear available to Congress. The first, resisted thus far and replaced with NSO's and other temporizing measures, is to force smelters such as Douglas either to install the needed but potentially unaffordable process changes, or to close.\(^{195}\) The second option would involve direct or indirect government subsidies to assist these plants in meeting mandated pollution reduction goals.

The first option, the compliance or closure policy, is severe but, perhaps, not as harsh as might first appear. Although admittedly draconian, it is equally as harsh as the environmental standard applicable to non-smelter sources.\(^{196}\) Furthermore, closure may not have the severe economic consequences that may have been true some years ago, at least in the case of the Douglas smelter. As with other Sunbelt areas, Douglas can be expected to grow both commercially and as a retirement community.\(^{197}\) The town at present serves as a commercial center for the substantial Mexican population just across the border which is now able to bring its business to Douglas as a result of a new highway system constructed on the Mexican side.\(^{198}\) From July 1, 1980 through June 30, 1981, Douglas' retail sales increased thirteen percent over the previous year despite the four-month copper strike in 1980.\(^{199}\) As these

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193. See supra text accompanying notes 121-129.
194. See infra text accompanying notes 203-205.
195. Such a philosophy might affect Phelps Dodge's Ajo facility which, although now operating pursuant to a consent decree, is also the subject of closure speculation. See, e.g., Part 3 Senate Hearings, supra note 114, at 71 (testimony of David Swan). Kennecott's McGill, Nevada smelter, which now employs no \( \text{SO}_2 \) controls, could also be affected. Id.
197. See Part 3 Senate Hearings, supra note 114, at 185-86 (testimony of Priscilla Robinson).
198. See COCHISE SMELTER STUDY GROUP, A BREATHER'S GUIDE TO DOUGLAS SMELTER POLLUTION 15 (1982) [hereinafter cited as BREATHER'S GUIDE]. A local study group composed of citizens residing in the zone of impact of the Douglas smelter published the BREATHER'S GUIDE to inform and to encourage efforts to alleviate the perceived threat to public health posed by the smelter. Id. at 18.
199. Id. at 15. See also Clean Air Act: Hearings Before the Subcommittee on Health and
commercial activities grow, a smaller percentage of Douglas' people will be affiliated with the smelter, thereby softening the blow of work displacements arising from closure. 200

Furthermore, the distinct benefits associated with closure, though perhaps not as poignant as the initial sting of lost jobs, may in the long run prove to be at least as weighty. Since emissions from the smelter degrade the local environment, it is likely that some industries with job-producing potential will eschew Douglas and places like it in favor of other Sunbelt locations. Were the smelter to cease operations, previously reluctant companies might well regard Douglas as a candidate site for new industry. 201

Closure of the smelter also will slow the degradation of the region's scenic areas, including the nearby Chiricahua National Monument and the Chiricahua Wilderness, both of which are protected areas under the Clean Air Act. 202 Enhanced by improved visibility, the areas' scenic vistas and potentially wondrous blue skies could attract greater numbers of visitors and tourists, further contributing to the commercial well-being of the Douglas community.

Finally, termination of the smelter's activities would halt emission of the deleterious and health-threatening pollutants now released virtually unchecked from the smelter. In addition to sulfur dioxide derivatives associated with a variety of adverse health effects, 203 smelter smoke contains arsenic and other suspected carcinogens as well as other harmful substances. 204 In fact, a 1977 study of one-to-five-year-old Douglas children living within 1.8 miles of the smelter revealed that the cells of their hair contained an average of 4.6 times more arsenic than normal. 205

Overall, persons living within the vicinity of smelters such as Douglas pay a substantial price for the economic benefits the smelter's activities provide. Nevertheless, the economic dislocations that likely would attend closure of the smelter ought not to be taken lightly. One would hope that, in the event of closure, either government sources or

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201. At present, land near the smelter often goes begging even though it is cheaper than real estate not as conveniently located to the city. Breathers' Guide, supra note 198, at 15.
203. With respect to the health effects of sulfur dioxide derivatives such as sulfates, see H.R. REP. NO. 294, supra note 144, at 122-23; Ostrov, supra note 59, at notes 68-82 and accompanying text.
204. See Breathers' Guide, supra note 198, at 6.
205. Id. at 7.
the smelter companies, some of whom have benefited from communities such as Douglas for nearly three-quarters of a century, would provide assistance.

Even if unwilling to apply the compliance or closure standard to Douglas and other similarly-situated smelters, Congress may recognize that the national parks and wilderness areas of the Southwest are aesthetic treasures which promote the public good, warranting protective action. If so, Congress could, as a second option, provide the southwestern smelters with sufficient tax incentives, trade incentives, or both, to encourage the installation of needed controls. Of course, a company such as Phelps Dodge might still choose to close the Douglas or any other smelter and, if permitted to do so, capitalize on the incentive in some other way. Such would be the decision of the company, however, and Congress and EPA would be removed from the horns of the equitable dilemma they have faced during the last decade.

Of the two options, the first appears a better balance of the competing considerations. Particularly in the interest of preserving this nation’s leadership role in the world copper industry, however, Congress may wish to opt for the tax incentive approach which might also ensure smelter-related jobs in communities such as Douglas.

Would Congress consider the tax incentive option? Only a fair
ventilation of the issue will tell. Of equal significance is whether the public would support such a measure, since it would probably lead to higher taxes or, in the case of tariffs or import limitations, higher prices. Although a matter of speculation, recent surveys have evidenced a willingness on the part of the public to shoulder the cost of some environmental controls, especially to prevent visibility degradation.

(C) Power Plants and Prevention of Significant Deterioration

I. Regulations Governing Existing Sources

Besides smelters, the Agency's focus in the Southwest during its early years centered on two power plants: the Four Corners Power Plant in Farmingdale, New Mexico, and the Navajo Power Plant in Page, Arizona. Both plants lacked significant SO$_2$ controls, although Navajo did have a high-efficiency particulate matter control system. Because of the size of the two plants—each exceeds 2,000 megawatts of power-generating capability, placing them among the largest in the nation—and their close proximity to a number of national parks and wilderness areas, visibility protection was a key concern, though not

208. For example, in a recent Harris Survey 40% of the people polled indicated that, in their view, air pollution standards were not strict enough—a vote which, although not directly addressing aesthetic air quality standards, suggests a willingness on the part of the population to bear the additional costs that are implied by additional pollution controls. "By an overwhelming 86-12 percent, a majority oppose[d] making the provisions of the Clean Air Act less strict." See Clean Air Act Oversight: Hearings Before the Senate Committee on Environment and Public Works, Part 5, 97th Cong., 1st Sess. 576 (1981). See also Editorial, Its a Depression at EPA, The Washington Post, Nov. 3, 1981, § A, at 22, col. 1 (referring to congressional testimony given by Lou Harris to the effect that the public's commitment to environmental issues is "clear cut" notwithstanding the attendant cost); The Washington Post, May 24, 1982, § A, at 1, col. 4. (White House polls reveal that "voters want to use tax dollars to protect air, land and water resources even as they call for less government.").

209. See studies collected in DRAFT FINAL PARTICULATE MATTER CRITERIA DOCUMENT, supra note 7, at 68-74. Though the studies identified by EPA tend to focus on local attitudes toward visibility protection, one recent study has attempted to extrapolate benefits to the national populace. See Mobile Source Provisions Hearings, infra note 230, at attachment 2 (on national basis, annualized value of protecting visibility in the Grand Canyon, Mesa Verde and Zion National Parks estimated to be $10 billion). But see Repetto, The Economics of Visibility Protection, 21 NAT. RESOURCES J. 360 (1981) (when arguing that an economically-based justification exists for stringent visibility controls in pristine areas, the author asserts that "[w]hile some efforts have been made to infer air pollution benefits from market behavior, the visibility components of those benefits have not yet been isolated").


211. By contrast, a typical new power plant would normally tend to be in the 500 megawatt range. See Sierra Club v. Costle, 657 F.2d 298, 312 n.6 (D.C. Cir. 1981) (upholding EPA's revised SO$_2$ NSPS for power plants).

212. The Four Corners Power Plant, located in Farmington, New Mexico, is in close proximity to Mesa Verde National Park, and the Navajo Power Plant, located in Page, Arizona, is within 50 miles of a number of national parks and recreation areas in northern Arizona and southern Utah, including the Grand Canyon. See Mobile Source Provisions Hearings, infra note 230, at attachment 2, p.2.
always the focus of EPA's regulatory efforts involving these facilities.\textsuperscript{213}

In devising regulations governing these facilities, EPA used diffu-
sion models due to the lack of sufficient air quality data.\textsuperscript{214} EPA's regu-
lations provide for seventy percent $SO_2$ control,\textsuperscript{215} even though such
was viewed as possibly not being sufficient to protect fully the secon-
dary ambient standards for $SO_2$ and particulate,\textsuperscript{216} because that level
represented the then-attainable control level for power plant
scrubbers.\textsuperscript{217}

Environmental groups challenged the regulations because of the
possibility that the seventy percent level might not protect secondary
standards.\textsuperscript{218} The utilities, by contrast, challenged the regulations on
the ground that the modeling substantially over-predicted pollution
from the power plants.\textsuperscript{219}

For the Navajo plant, the parties subsequently voluntarily with-
drew their petitions based on a test program designed to monitor $SO_2$
air concentrations in the vicinity of the plant and to determine whether
violations were occurring.\textsuperscript{220} Completed in September 1975, the moni-
toring program revealed that no $SO_2$ control would be needed to

\textsuperscript{213} Typifying the concern of the environmental community regarding both power
plants are the following excerpts from H.R. REP. No. 294, supra note 144, at 204:

The Four Corners Power Plant, located in New Mexico, emits several hundred
tons of particulate matter into the atmosphere every day. According to a study
prepared by the Native American Rights Fund . . . , nuclear physicists at the Los
Alamos Scientific Laboratory performed a direct aerial tracing of the Four Corners
plume and found smoke from the plant in the Grand Canyon, Bryce Canyon,
Monument Valley . . . .

Testimony . . . indicates "there is evidence that some areas that in the past
had 100 mile visibility, now have only an average of 30 miles visibility. Much of
this can probably be attributed to emissions from powerplants such as the Navajo
and Four Corners plants." Moreover, an article in the Environmental Journal . . .
indicates that stack emissions from the Four Corners Power Plant "caused a
fivefold decrease in visibility in the area."

See also Congressman Rogers' summary of the 1977 Conference Bill amending the Clean
Air Act:

For the first time, the Congress will write into law explicit protection for visi-
bility. This will mean that the Four Corners and Navajo powerplants can expect to
retrofit with additional pollution controls to limit the vast deterioration in visibility
which their plumes have caused.

\textsuperscript{123} CONG. REC. H27,069 (August 4, 1977).


\textsuperscript{216} 38 Fed. Reg. at 7555.

\textsuperscript{217} Id. See 40 C.F.R. § 50.5 (1973) for the secondary ambient air quality standards
applicable to $SO_2$, and 40 C.F.R. § 50.7 (1971) for the secondary ambient standards applicable
to particulate matter.

\textsuperscript{218} Committee to Save Black Mesa v. EPA, Nos. 73-1536 & 74-1705 (9th Cir. Oct. 29,
1974) (dismissed by stipulation); Goodman v. EPA, No. 73-1179 (10th Cir. Mar. 3, 1975)
(dismissed for lack of prosecution).

\textsuperscript{219} Utah Int'l v. EPA, Nos. 73-1239, 73-1178, 73-1242 & 73-1265 (10th Cir. Apr. 20,
1976) (dismissed as moot). See Ostrov, supra note 59, at 52-56, for a discussion of the role
played by modeling in estimating air pollution impacts.

\textsuperscript{220} Memorandum to EPA files from David M. Jones, Regional Counsel (Region IX),
achieve the SO₂ ambient standards.²²¹ Based upon these results, EPA proposed on June 29, 1978 to rescind its earlier regulations requiring seventy percent SO₂ control.²²² In this proposal, however, the Agency noted that if the power plant’s emission stacks proved to be higher than permitted by the recently-enacted section 123 of the Clean Air Act (concerning dispersion of pollution through tall stacks),²²³ the results might continue to fall within the Act’s prohibition against meeting ambient standards through dispersion techniques.²²⁴ Under these circumstances, the results would be regarded as invalid.²²⁵

Since there were no proposed regulations under section 123 at the time of the proposed rescission of the Navajo regulations,²²⁶ the Agency could not evaluate the appropriateness of the rescission. While its Federal Register notice cited the need to act in accordance with the stipulation earlier entered into with the power plant, the notice also left open the possibility of later changes in policy as the section 123 regulations were proposed.²²⁷

The Agency issued its section 123 regulations on February 8, 1982.²²⁸ At the time of writing, the application of these regulations to the Navajo facility has not yet been established and the Agency’s SO₂ regulation for the plant remains in limbo.

Recent studies conducted within the vicinity of the Navajo plant, which question whether secondary aerosols from the sulfur dioxide emissions released by the plant have a significant impact on nearby visibility, may influence the final emission standards for the plant.²²⁹

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²²¹ Environmental Protection Agency (March 13, 1979) (entitled “Recission of SO₂ Regulations for Navajo Generating Station”).
²²³ Id.
²²⁴ 42 U.S.C. § 7423 (Supp. IV 1980). This section—§ 123 of the original Act—generally sets out a limit on stack height above which emissions from the stack cannot be used to establish compliance with applicable Clean Air Act requirements. For a fuller discussion of the § 123 provisions, see Ostrov, supra note 59, at 56-59.
²²⁵ See supra text accompanying notes 142-145, regarding the Act’s prohibition against the use of dispersion techniques for meeting ambient air quality standards.
²²⁶ See supra note 223. With respect to the Act’s prohibition against meeting emission limitations through tall stack dispersion, Clean Air Act § 123 requires that:

[i]n the degree of emission limitation required for control of any air pollution under an applicable implementation plan under this subchapter shall not be affected in any manner by

(1) so much of the stack height of any source as exceeds good engineering practice (as determined under regulations promulgated by the Administrator)

²²⁹ See, e.g., Richards, Anderson, Blumenthal, Brandt, McDonald, Waters, Macias &
The studies do not, however, focus on possible long-range effects attributable to the Navajo plant's emissions.

As with Navajo, efforts to establish SO₂ controls for the Four Corners plant have been difficult. On August 26, 1980, however, more than seven years after EPA's first regulatory effort, the Four Corners Power Plant entered into a stipulation with the State of New Mexico and several environmental groups, agreeing to install sulfur dioxide controls sufficient to control seventy-two percent of its SO₂ emissions from its main generating units. The stipulation provides that the parties will use their best efforts to obtain a ruling from the New Mexico State Environmental Board that the SO₂ equipment contemplated by the stipulation will constitute Best Available Retrofit Technology (BART) for purposes of the Clean Air Act's section 169A visibility provision.

Bhardwaja, The Chemistry, Aerosol Physics, and Optical Properties of a Western Coal-Fired Power Plant Plume, 15 Atmospheric Env't 2111 (1981). [hereinafter cited as Richards, et. al.] This article describes studies made of the Navajo plume during EPA's 1979 Project VISTTA, supra note 70, and concludes that "[s]ulfur dioxide and its oxidation products had little or no effect on the optical properties of the plume at distances up to 100 km. . . . These findings demonstrate that a visibility model for the NOS plume need consider only nitrogen dioxide and the primary particulates." Id. at 2132. For a discussion of nitrogen dioxide, see supra text accompanying notes 75-80. See also Macias, Zwicker & White, Regional Haze Case Studies in the Southwestern U.S.—II Source Contribution, 15 Atmospheric Env't, 1987, 1994 (1981) [hereinafter cited as Regional Haze Case Studies] (though the 2325 MW Navajo Generating Station (NGS) is 70 km from the main sampling site, and therefore is an obvious potential source of pollution, available data fail to show any visibility effects from its plume aerosol).

230. On February 17, 1976, after several unsuccessful efforts to settle the company's lawsuits challenging the 70% SO₂ control requirement, EPA finally withdrew its regulation for control of SO₂ emissions in deference to a New Mexico regulation for a higher degree of control. 41 Fed. Reg. 8057 (1976) (to amend 40 C.F.R. § 52). Under Clean Air Act § 116, states such as New Mexico may impose air quality regulations more stringent than those required under the relatively minimal federal standards. See 42 U.S.C. § 7416 (Supp. IV 1980). See also Union Elec. Co. v. EPA, 427 U.S. 247 (1976). New Mexico's action was short-lived, however, as a state court invalidated the New Mexico regulation. Public Serv. Co. of New Mexico v. New Mexico Envtl. Improvement Bd., 89 N.M. 223, 549 P.2d 638 (1976). This opened a gap in the regulatory scheme applicable to the power plant. On June 9, 1978, the power plant, the State of New Mexico, and several citizen environmental groups reached agreement on a regulatory program calling for 72% SO₂ control. See Mobile Source Provisions: Hearings Before the Subcommittee on Health and the Environment, Committee on Energy and Commerce, House of Representatives, on H.R. 4400 & H.R. 2310, 97th Cong., 1st Sess. 1101, 1110, Attachment 1 (1981) [hereinafter cited as Mobile Source Provisions Hearings] (testimony of John R. Bartlit, State Chairman, New Mexico Citizens for Clean Air & Water) (attachment 1 is a press release entitled "Owners of Four Corners Power Plant, Citizens Environmental Organizations, and the State of New Mexico Reach Agreement on Air Quality Control Requirements").


232. Id. at ¶ 10. For discussion of BART, see infra text accompanying notes 273-290.
2. Regulations Applicable to New Sources

While questions still exist with respect to the Navajo plant, the Four Corners stipulation closes a long and arduous chapter in the control of one of the Southwest’s largest sources of pollution. Concern with the potential of power plant-induced visibility degradation in the Southwest does not end with Four Corners, however. In its evaluation of visibility impairment in the Southwest, the National Commission on Air Quality assumed that the area’s smelters would control sulfur dioxide emissions by ninety percent.\(^{233}\) Even so, the Commission concluded that “regional haze will not differ significantly from current levels in the Southwest through 1995,” and that “the declining emissions from southwestern copper smelters would [be] offset [by] anticipated increases in emissions from new sources.”\(^{234}\) While there could be a variety of new sources, the most likely ones are coal-burning power plants.\(^{235}\) The emergence of these new sources raises the question of how they are to be controlled.

In addition to the section 169A mandate to prevent any future impairment of visibility in Class I areas,\(^ {236}\) two other provisions of the 1977 Clean Air Act Amendments may affect new power plant construction in the Southwest. One provision is the new source performance standards for power plants (NSPS),\(^ {237}\) while the other is the Act’s Prevention of Significant Deterioration (PSD) requirements.\(^ {238}\)

\(^{233}\) To Breathe Clean Air, supra note 34, at 21-44 (finding 187).

\(^{234}\) Id. The Report also stated that “if, instead, emission controls on smelters are kept at their current levels of control . . . southwestern visibility impairment will be greater by 1995.” Id. For statements rebutting and surrebutting this last quoted passage, see Part 3 Senate Hearings, supra note 114, at 114 (comments on To Breathe Clean Air, supra note 34, at conclusion 187 [hereinafter cited as Comments on Conclusion 187]); D. Nochumson, Los Alamos National Laboratory, A Response to Comments on Conclusion 187 (1981) (attachment to Letter from John Bartlit, State Chairman, New Mexico Citizens for Clean Air and Water, to Rep. Henry Waxman, Chairman, Subcommittee on Health and Environment, U.S. House of Representatives, and Senator Robert Stafford, Chairman, Committee on Environment and Public Works, U.S. Senate (Dec. 29, 1981)).

\(^{235}\) See NCAQ REPORT 2, supra note 71, at 28: “The percent contribution from FPM [aerosols] is estimated to increase over time. . . . Coal-fired power plants are estimated to be the predominant anthropogenic source within the [Four Corners] study region contributing to light scattering within the region.”


\(^{238}\) For PSD provisions regarding Class I areas, see supra note 16. In general, the Act’s PSD provisions are intended to manage and protect those areas in which air quality is superior to that required by the Agency’s ambient air quality standards or cannot be classified as being in violation of such standards. Such areas are designated Class I, II or III depending on their proximity to protected areas as well as other considerations. Most are designated Class II. Associated with each classification is a table of increments for SO\(_2\) and particulate matter. Increments are measures of pollution determined as of a baseline date of August 7, 1977. Sources wishing to locate in areas governed by such increments must show that the increments will not be exceeded. Such sources must also demonstrate that they are employ-
a. New Source Performance Standards

Prior to the 1977 Clean Air Act Amendments, EPA’s SO₂ (NSPS) for power plants provided only an emission ceiling for sulfur dioxide. Some sources, including the Navajo power plant, could meet the requirements by burning low sulfur coal, thereby eliminating the need to install expensive pollution control devices known as scrubbers. Section 111(a)(1)(ii) of the Act changed this by requiring that EPA develop regulations designed to achieve a percentage reduction in SO₂ emissions from the amount which would occur if the fuel burned by new power plants was left untreated. While developing these regulations, EPA debated whether the required percentage reduction should be uniform for all coals (referred to as “full scrubbing”), or whether a sliding scale should be developed (referred to as “partial scrubbing”) under which facilities burning low sulfur coal would be allowed to capture a lesser percentage of sulfur than facilities burning higher sulfur coal. Under the full scrubbing standard, all facilities would be required to capture eighty-five percent of SO₂ emissions. Under partial scrubbing, those facilities burning low sulfur coal would be allowed to control as little as seventy percent of SO₂ emissions. Since scrubbers eventually would be required, only the capture efficiency and, therefore, the cost of the scrubbers would be influenced. To help analyze the impact of each option on visibility in the Southwest, EPA solicited the advice of several experts. Although cautioning that the reactions of the experts were preliminary, an EPA memorandum summarizing their conclusions states, inter alia, that:

Under partial scrubbing, regional visibility in the western U.S. would be perceptably lower in 2010 than it would be under full scrubbing. The median visual range reduction is likely to be between 2 and 8 percent. The difference in visibility reduction on worst-case days or in cer-

For an in-depth discussion of the Act’s PSD requirements, see Currie, Nondegradation and Visibility under the Clean Air Act, 68 CALIF. L. REV. 48 (1980).

239. See Sierra Club v. Costle, 657 F.2d at 315. See also Oljata Chapter of the Navajo Tribe v. Train, 515 F.2d 654 (D.C. Cir. 1975) (petition questioning likelihood that regulations could be met solely through use of low-sulfur coal).

240. Oljata, 515 F.2d at 656.

241. Clean Air Act § 111(a)(1)(A)(ii) requires in pertinent part: “[T]he achievement of a percentage reduction in the emissions from such category of sources [like coal burning power plants] from the emissions which would have resulted from the use of fuels which are not subject to treatment prior to combustion. . . .” 42 U.S.C. § 7411(a)(1)(A)(ii) (Supp. IV 1980).

242. See 43 Fed. Reg. 42,154 (1978) (to be codified at 40 C.F.R. pt. 60) (EPA’s proposed regulations). Although the proposal speaks in terms of 85% control, EPA’s explanation for its final regulations, which reject full scrubbing, note that the latter would result in 90% control. 44 Fed. Reg. 33,850, 33,583 (1979).

243. Id. at 33, 583-84.

244. Sierra Club v. Costle, 657 F.2d at 316.
tain complex terrain is likely to be greater than the median case.\textsuperscript{245}

Another memorandum on the issue states that “the effect of partial scrubbing for the worst-case conditions, i.e., cleanest air impacted by fully scrubbed plants and topographical channeling of pollution, is a contrast reduction of 0.08, an easily noticed haziness.”\textsuperscript{246} Whether influenced by the substantial caveats in these memoranda or the variety of other considerations which the Agency was obligated to assess under section 111,\textsuperscript{247} EPA eventually promulgated a sliding scale regulation permitting the capture of as little as seventy percent SO\textsubscript{2} under specified circumstances, normally those plants burning low-sulfur western coal.\textsuperscript{248}

The Sierra Club and several other groups challenged the new regulations.\textsuperscript{249} Sierra Club argued that the Act’s NSPS requirements contemplated full scrubbing.\textsuperscript{250} The Court of Appeals disagreed, however, arguing that

\textit{[t]he absence of any express mandate in . . . [section 111 of the Act] to adhere to a single percentage reduction standard critically undercuts Sierra Club’s arguments that EPA could not vary the standard below the level which is technologically feasible.}\textsuperscript{251}

In upholding the regulations, the court acknowledged that the variable control provisions would, by 1995, yield 200,00 tons more emissions in the West than would be experienced under full control.\textsuperscript{252} On balance, however, the court found that national emissions under each approach would be very close and that the Agency’s regulations were reasonable, particularly in views of the very high costs entailed in full scrubbing.\textsuperscript{253} Further, addressing the environmentalist claims that the sliding scale approach was inconsistent with the visibility objectives of the Act, the court countered that “[t]he NSPS, as EPA recognizes, is only a mini-

\textsuperscript{245} Memorandum from John Bachmann, Strategies and Air Standards Division, Environmental Protection Agency, to Walter C. Barber, Director, Office of Air Quality Planning and Standards, Environmental Protection Agency, 5 (March 7, 1979) (entitled “NSPS Visibility Impact”).

\textsuperscript{246} Memorandum from Walter C. Barber, Director, Office of Air Quality Planning and Standards, Environmental Protection Agency, to David G. Hawkins, Assistant Administrator for Air, Noise and Radiation, Environmental Protection Agency, 1-2 (April 12, 1979) (entitled “Supplemental Visibility Analysis of NSPS Options”).

\textsuperscript{247} Clean Air Act § 111(a)(1)(C) specifies that in arriving at an NSPS, EPA shall consider not only whether emission reduction systems have been adequately demonstrated to be reasonably available, but, in so doing, the Agency must take into account “cost” and the “nonair quality health and environmental impact” of the systems under consideration as well as their “energy requirements.” 42 U.S.C. § 7411(a)(1)(C) (Supp. IV 1980).


\textsuperscript{249} Sierra Club v. Costle, 657 F.2d 298.

\textsuperscript{250} See id. at 316.

\textsuperscript{251} Id. at 318.

\textsuperscript{252} Id. at 336.

\textsuperscript{253} See id. at 338. On a national scale, EPA notes, such incremental costs would be approximately $1.8 billion. Id.
mum national standard, and there are mechanisms provided in the Clean Air Act which should be activated in appropriate circumstances to protect troubled areas." 254

**b. Prevention of Significant Deterioration**

Among the other "mechanisms for reducing or preventing visibility impairment" are two PSD provisions—one requiring PSD sources to install "best available control technology" (BACT) 255 and the other imposing on affected federal land managers an affirmative duty to protect air quality-related values (including visibility) within Class I areas. 256 Under the BACT provision, all major sources located in PSD clean air areas must undergo a technology review to determine the degree of technology that is "best available" for such source. 257 The Act requires that the reviewing authority consider "energy, environmental, and economic impacts and other costs" in determining what constitutes BACT. 258 The statute also specifies that BACT shall never be less stringent than an applicable NSPS, 259 so that a reviewing authority, after considering the environmental consequences of a proposed power plant's impact on visibility, could require a level of SO2 control comparable to the ninety percent full scrubbing option rejected by EPA.

The second PSD provision requires federal land managers to assess the impact of proposed sources on the air quality-related values of Class I areas, including impact on visibility. 260 Even if a source complies with other features of the PSD program, if a federal land manager (FLM) believes the source may impair air quality-related values, section 165 261 requires that the manager present this view to the PSD reviewing authority. If the manager presents adequate proof as to his position, the reviewing manager may not issue a permit to the planned source. 262

Of these two provisions, the BACT review requirement appears to be more significant. Probably due to an absence of resources, DOI officials advise that the section 165 review procedure has never been invoked, 263 though one facility agreed to conduct visibility monitoring

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254. *Id.* at 339.
259. *Id.*
261. *Id.*
263. Confidential communication with Department of Interior officials. *But see Tundermann, Protecting Visibility: The Key to Preventing Significant Deterioration in Western Air Quality, 11 Nat. Resources Law. 373 (1978)* (setting forth the author's views on the importance of the FLM provisions).
after a PSD permit had been issued. By contrast, BACT reviews have produced control requirements significantly more demanding than NSPS in the case of several major western power plants.\textsuperscript{264} Additionally, each BACT-imposed requirement contributes to region-wide visibility conservation by reducing the amount of atmospheric loading attributable to the source. In its fourth report on the Four Corners area, the Los Alamos National Laboratory framed this phenomenon as follows:

Thus, from the standpoint of giving protection against regional visibility loss (and other potentially harmful effects related to total atmospheric emissions, such as acid deposition), minimizing total emissions is more important than meeting PSD increments \textit{per se}. A large, if not major, argument for establishing PSD in the first place was to add a degree of protection against regional visibility loss and acid deposition. This suggests that the criterion of meeting PSD increments \textit{per se} may not be as important as minimizing total emissions.\textsuperscript{265}

c. \textit{What Price BACT?}

The above notwithstanding, the question of whether BACT is worth its cost remains, particularly if costs are expected to rise disproportionately as one approaches higher levels of control.\textsuperscript{266} At least in New Mexico, utility ratepayers seemingly have answered in the affirmative. There, in a poll conducted by the Public Service Company of New Mexico, utility ratepayers by a margin of three to one approved of the $120 million the company has invested in pollution control equipment.\textsuperscript{267} The utility is on record as committed to ninety percent control of $\text{SO}_2.\textsuperscript{268} Whether the rest of the West's ratepayers share this view remains to be seen. A recent survey of 600 persons located in both the West and Midwest suggests that, again, the answer may be "yes," and that the populace may well be willing to pay higher utility rates in order to preserve visibility in the pristine portions of the West.\textsuperscript{269}

\textsuperscript{264} See Part I Senate Hearings, supra note 137 at 434-35 (testimony of John R. Bartlit, State Chairman, New Mexico Citizens for Clean Air & Water) (recitation of several power plants with BACT requirements ranging from 87\% to 94\% sulfur capture).

\textsuperscript{265} NCAQ REPORT 4, supra note 32, at 97. The Report went on to argue that in the absence of PSD increments, some criterion is needed to insure against very poor siting decisions, such as locating immediately against a canyon wall or in a very narrow canyon. This criterion could be as simple as a minimum distance from plant to high terrain, depending on plant limitations.

\textit{Id.}

\textsuperscript{266} See supra note 253 discussing predicted nationwide 1995 cost implications of full vs. partial scrubbing.

\textsuperscript{267} See Mobile Source Provisions Hearings, supra note 230, at Attachment 4.

\textsuperscript{268} Kneese & Williams, \textit{Air Quality Issues and Approaches in the Southwest}, 19 NAT. RESOURCES J. 537, 572 (1979).

\textsuperscript{269} See Mobile Source Provisions Hearings, supra note 230, at Attachment 2. This study, entitled "The Benefits of Preserving Visibility in the National Parklands of the South-
IV
VISIBILITY PROTECTION UNDER SECTION 169A

In the preceding sections, the discussion has focused on visibility-related problems addressed by the 1977 Clean Air Act sections other than section 169A. Aimed specifically at visibility protection, section 169A requires that each state containing a protected area amend its SIP to contain emission limitations and compliance schedules, as well as other measures necessary to make reasonable progress toward meeting the two-fold goal of remedying existing visibility degradation and preventing future impairment.

Section 169A and its accompanying regulations complement NSPS, PSD, BACT, and the FLM provisions in three major ways. First, under the Act’s BART requirements and EPA’s implementing regulations, all major existing sources of a given age—not just Navajo and Four Corners—must be evaluated for visibility impact. Second, while the Act’s PSD provisions govern the pollution and visibility effects of sources locating in PSD-governed areas, EPA’s section 169A regulations govern all major new source construction, whether the place of intended construction is designated as attainment or unclassified (and subject therefore to PSD scrutiny) or nonattainment. Finally, the survey participants were asked how much they would be willing to pay in higher electric utility bills to preserve current average visibility in the three parks and prevent deterioration to the below-average level. Most of the participants responded and individual bids ranged from an average of $3.72 per month in Denver to $9.00 per month in Chicago for preserving visibility at the Grand Canyon. Adjusting their results for a 1990 population, the authors arrived at a discounted annual worth of $7.6 billion dollars for power plant SO₂ controls removed and new power plants allowed to emit at uncontrolled rates.

Arguably, were the survey participants also asked e.g., how much they would bid for eradicating various diseases, making automobiles safer or preserving well-known historic landmarks, their bids for protecting visibility in the Southwest might have been considerably lower. The study does, however, point to the citizenry’s approval of visibility protection in the Southwest, and suggests a willingness to pay for such protection if necessary.

unlike the PSD provisions which extend visibility protection only to areas within mandatory Class I areas, EPA's regulations extend the reach of section 169A (as applied to both new and BART-affected sources) to vistas that, although geographically outside of such areas, are integral to the visual experience of persons within such areas ("integral vistas").

The remainder of this article will discuss these three major features of EPA's section 169A regulations, noting how they are affected by the various requests for reconsideration.

A. Best Available Retrofit Technology (BART)

As required by Section 169A(b)(2)(A), EPA's regulations prescribe rules for reviewing existing sources "which may reasonably be anticipated to cause or contribute to impairment of visibility in any mandatory Class I federal area where impairment in the mandatory Class I federal area is reasonably attributable to that existing stationary facility."271 The regulations apply the above-stated provisions to integral vistas designated by the federal land manager at least six months before plan submission.272 EPA's regulations require that the Best Available Retrofit Technology (BART) be established on a case-by-case basis and that the cost/benefit criteria enunciated in section 169A(g)(2) must be considered.273

The preamble to the regulations declares that the pollutants of primary concern are particulate matter and oxides of nitrogen (NOx). The preamble further notes that even existing controls for NOx, as specified by the applicable NSPS, "may not be sufficient to achieve any perceptible improvement in visibility."274 Under such circumstances, the state is not obligated to require controls immediately.275 Such sources may

272. Id. This phase of the BART program would take effect only if a Federal Land Manager has identified an integral vista prior to the December 31, 1985 deadline for such identification. For specifications of deadline, see 40 C.F.R. § 51.304(a) (1981).
273. See 40 C.F.R. § 51.301(c) (1981). The Act requires consideration of costs of compliance, the energy and nonair quality environmental impacts of compliance, any existing pollution control technology in use at the source, and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology.
275. Id.
be subject to BART reanalysis, however, in the event that EPA at a later time determines that controls for a pollutant which interferes with visibility, such as NO\(_x\), have become available.\(^{276}\)

The regulations define the term “visibility impairment” as “any humanly perceptible change in visibility (visual range, contrast, coloration) from that which existed under natural conditions,”\(^ {277}\) and specify that a source may seek exemption from BART on the ground that it does not “significantly impair” visibility.\(^ {278}\) The definition of “significant impairment” takes into account “the geographic extent, intensity, duration, frequency and time of visibility impairment, and how these factors correlate with (1) frequency of visitor use of the mandatory Class I Federal area, and (2) the frequency and timing of natural conditions that reduce visibility.”\(^ {279}\) To be exempted, fossil fuel power plants with a generating capacity exceeding 750 megawatts must show that, even in connection with other sources, their emissions will not cause or contribute to significant impairment.\(^ {280}\)

Unless exempted, BART for power plants with a generating capacity of 750 megawatts or more must comply with the Agency’s BART guidelines.\(^ {281}\) Otherwise, the BART guidelines are only advisory to the states. Among other things, the BART guidelines emphasize that “states need only identify impairment that can physically be traced to a source,”\(^ {282}\) and that “[s]tates can use visual observation (either ground-based or with an aircraft) or any other technique it [sic] deems appropriate to determine which source causes the visibility impairment.”\(^ {283}\) The BART guidelines also note that EPA visibility models are available for such purposes, but that use of the models is not required.\(^ {284}\)

The regulations apparently attempt to be extensive and, in the interest of facilitating state administration of the section 169A program,\(^ {285}\) flexible at the same time. Their generality regarding concepts

\(^{276}\) Id.

\(^{277}\) 40 C.F.R. § 51.301(s) (1981).

\(^{278}\) 40 C.F.R. § 51.303 (1981).


\(^{280}\) 40 C.F.R. § 51.303(b) (1981).

\(^{281}\) 40 C.F.R. §§ 51.302(c)(4)(iii), 51.303(b) (1981). See also BART Guidelines, supra note 273, at 6, for a general discussion of the Guidelines’ application.

\(^{282}\) BART Guidelines, supra note 273, at 6.

\(^{283}\) Id.

\(^{284}\) Id. at 13-14.

\(^{285}\) In the event a state fails to adopt provisions in compliance with EPA’s BART and other § 169A-related regulations within the requisite nine-month time period, 42 U.S.C. § 7410(a)(1) (Supp. IV 1980), the statute directs EPA to promulgate appropriate SIP provisions for the state in question. 42 U.S.C. § 7410(c)(1) (Supp. IV 1981). To date, EPA has not taken such action in the case of any defaulting state. Confidential communication with EPA officials. This circumstance has prompted at least one environmental group to advise the Agency of its intent to file suit. See Letter from Robert E. Yuhnke, Regional Counsel,
such as "visibility impairment" and what constitutes "significant impairment" raises the possibility of extensive source review and very individualistic case-by-case assessments. While raising such possibilities, however, the regulations also attempt to provide maximum flexibility to the state administrator, as in the guideline provisions allowing states considerable latitude when assessing visibility impacts,286 and the provisions noting that corrective technologies may not be available in all cases.

Depending on one's perspective, the vagueness of the regulations may be either an enlightened attempt to provide states with maximum decision-making responsibility in an area in which scientific knowledge is uncertain,287 or an open-ended and potentially burdensome delegation of responsibilities.288 In assessing their ultimate impact, one cannot help but be struck by the Agency's preambulatory statement in which it advises that "preliminary analyses have identified no existing source which will need to install additional controls under these regulations."289 If untrue, as is claimed by at least two petitioning industrial parties,290 one cannot help but question the quality of the Agency's analysis. If accurate, however, one must look at the regulations' intended goals in order to determine their significance.

The primary objective of the BART regulations may be to reserve judgment on those existing power plants for which adequate NO\textsubscript{x} controls are not now available but whose plumes raise concerns regarding visibility impairment. Such could be inferred from the various references in the regulations to the unavailability of NO\textsubscript{x} controls and the Agency's reanalysis clause reserving authority to take a second look at the sources where previously unavailable controls became available. If so, the regulations' source reanalysis aspects seem appropriate and may

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Environmental Defense Fund, to Anne Gorsuch, Administrator, Environmental Protection Agency (December 15, 1981).

286. These guidelines are incorporated by reference into the regulations. 40 C.F.R. § 51.302(c)(4)(iii) (1981).

287. In Protecting Visibility supra note 6, at 7-11, EPA acknowledges that a number of judgments will have to be made involving concepts such as "significant impairment," and notes that these judgments will require coordination of the efforts of the Federal Land Managers, state agencies, and EPA. See also NCAQ Report 2, supra note 71, at 31 (commenting on EPA's proposed definitional scheme for "visibility impairment" and "significant impairment," and noting that such terms are "critical and controversial").

288. See, e.g., Petition of Kerr-McGee, supra note 27, at 6 (asserting, among other things, that there exists no objective basis for determining baseline conditions for visibility impairment resulting from natural conditions); Petition of UARG, supra note 27, at 26-31 (challenging on a number of grounds the sufficiency of the Agency's BART Guidelines as adequate guidance to the states).


290. See, e.g., Petition of Kerr-McGee, supra note 27; Petition of API/NFPA, supra note 27, at 9 (asserting that as many as fifty paper industry facilities may be subject to BART).
prove meaningful in the long run. In the interest of Agency-state relations, however, one questions whether an approach more closely tailored to accomplishing this objective might have been available.

B. Provisions Primarily Affecting New Sources

Pursuant to the 1977 Amendments to the Clean Air Act, states were to determine which areas within their borders were achieving ambient standards for pollutants such as $\text{SO}_2$ and particulate matter and which areas were violating the standards. Those meeting the standards were denominated “attainment” areas; those failing to meet the standards were designated “nonattainment” areas. Areas for which an insufficient amount of information was available, so-called “unclassified” areas, were grouped with attainment areas and treated as if attaining the standards.

For areas classified as nonattainment, the Act established a series of requirements and sanctions aimed at achieving the ambient standards by a date certain, usually December 1982, but in some cases, December 1987. For areas denominated attainment or unclassified, the Act did not require the clean-up measures stipulated for nonattainment areas, but instead established steps aimed at preventing significant deterioration of air quality (PSD) in such areas.

Because pollution from sources seeking to locate in nonattainment areas could adversely affect air quality in nearby attainment areas, EPA’s 1978 regulations interpreting the Act’s PSD requirements extended such requirements to all eligible sources whose emissions might affect an attainment area, irrespective of whether the planned construction site was itself located in an area designated as attainment or nonattainment. Industry challenged this interpretation of the Act in

291. Indicative of the concern expressed by western states regarding implementation of the § 169A regulations is the following excerpt from the statement of Utah’s governor at EPA’s July 2, 1980 hearing at Salt Lake City:

[T] he visibility protection provisions of the Clean Air Act and the regulatory implementation of that law will have a greater effect on U.S. energy development than the enormous [synfuel] program just enacted by Congress. I feel there will be no greater conflict between these laws than here in the State of Utah.


295. 42 U.S.C. § 7471 (Supp. IV 1980) (requiring that SIP’s contain PSD provisions for both attainment and unclassified areas).


Arguing that its regulations continued a practice begun prior to the 1977 Clean Air Act Amendments and that "nowhere in the 1977 Amendments or legislative history is there a disavowal of EPA's policy respecting application of PSD review to sources locating in nonattainment areas," the agency asserted that a contrary construction would create a loophole enabling sources impairing PSD areas to escape PSD review by locating in nonattainment areas. The Court of Appeals disagreed with EPA's reading of the 1977 amendments, though it acknowledged that portions of the legislative history "indicate that the purpose of the Act would best be served by an extension of the PSD provisions to any source, the emissions from which adversely affect the non-degradation scheme." The court held that the language of section 165—the provision specifying the coverage of the Act's PSD provisions—was specific, and that the section plainly made the source's location determinative of whether PSD would or would not apply. The court argued that section 165's "[PSD review should apply to] any source constructed in any area to which this part applies" limits the application of section 165 to major emitting facilities to be constructed in certain locations.

The Alabama Power decision foreclosed reliance on section 165 as a source of authority to regulate emissions emanating from sources locating in non-PSD areas. EPA has attempted to bridge the consequent gap in source coverage by promulgating regulations under section 169A of the Act, which requires visibility protections even for non-PSD-governed sources. The Agency accomplished this through the use of three interacting provisions.

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299. 636 F.2d 323 (D.C. Cir. 1979).
301. Id. at 261-62.
303. Id.
304. Id.
305. The court in Alabama Power may have presaged this course of action by the following statement:

There are provisions in the Act, such as those of section 165(d)(2), which evidence a solicitude for the maintenance of air quality on federal lands but there are none which justify the application of the permit requirements of section 165 to sources not located in, but impacting upon such areas. Section 169A is available to protect visibility in Class I areas where visibility is an important characteristic, and the Administrator may choose to invoke the rulemaking authority granted to him by section 161 to address this problem.

Alabama Power, 636 F.2d at 368.
1. New Source Review

Section 169A306 is directed at preventing any "future" impairment of visibility in mandatory Class I areas. EPA has interpreted this section as governing construction of new sources that may have an impact on visibility in any Class I area.307 Although the issue is not free from dispute, the Agency’s construction seems appropriate.

Section 169A originated in House Bill H.R. 6161.308 Although the House bill was not explicit on the new source review implications of the section, the legislative history accompanying the House bill was to the point. Accordingly, in introducing the Conference bill to the House, Congressman Paul Rogers, who managed the House bill, noted that:

[A]s in the House bill, the section applies both to new and existing sources. As pointed out in the House Committee report, merely meeting Class I increments under prevention of significant deterioration will not be adequate to assure visibility protection. Clearly the conferees did not want to impose two separate pre-construction permit requirements for a new source for the purpose of assuring compliance with “significant deterioration” and “visibility protection” requirements. One permit should be issued.309

Also, in a statement accompanying later technical amendments, Congressman Rogers explained the intent of the Committee with respect to new source review as follows:

The conference committee, of course, did not want to subject new sources to two separate procedural steps under the PSD and visibility provisions. . . . But in the one-stop permit process for new and modified major sources, the substantive criteria and standards of both the PSD and visibility provisions would have been met.310

The legislative history is not without its contradictions, however. Hence, the following colloquy (cited by several of the parties petitioning for reconsideration of EPA’s regulations)311 appears to point against new source review under section 169A:

Mr. McClure: . . . I would like to ask the distinguished floor manager several questions. First are the provisions of this section limited to only existing major stationary sources which cause or contribute to visibility impairment in Class I areas?

Mr. Muskie: Yes . . . Visibility restrictions with regard to new

sources would result under the provisions . . . concerning prevention of significant deterioration.

Mr. McClure: Once a promise has been granted to a new source and the question of visibility has been considered as a part of air quality values under the significant deterioration provisions, could the source later be subject to [the visibility] requirements of section 128?

Mr. Muskie: It is my understanding that was not the intent of the conferees.

Mr. McClure: When a new source satisfies the requirements of significant deterioration increments but is determined by the Federal Land Manager to conflict with the air quality values of a Class I area would the Governor's decision to grant a permit be final for the purposes of visibility as well as for significant deterioration?

Mr. Muskie: Yes, it is my understanding that the conferees intended to provide no additional basis for any person to seek further regulation under [the visibility provisions of] section 128.312

Also arguably supportive of the view that section 169A has, as its primary purpose, the remedying of visibility degrading pollution from existing rather than new sources is the following language from the Conference report accompanying H.R. 6161:

A major concern which prompted the House to adopt the visibility protection provision was the need to remedy existing pollution in Federal mandatory Class I areas from existing sources. Issues with respect to visibility as an air quality value in application to new sources are to be resolved within the procedures of significant deterioration.313

In its analysis of the quoted Conference language, EPA construed the language not as proscribing new source review under section 169A but rather as meaning that the process of reviewing new sources for visibility impacts should not produce duplicative prevention of significant deterioration and visibility proceedings. Accordingly, reasoned that Agency, the Conference language constituted a directive that visibility issues affecting new sources would be handled under the procedure for PSD.314 Similarly, with respect to the Muskie-McClure dialogue, the Agency concluded that "like the conference report," the desire of the senators was to "dovetail new source visibility requirements with PSD procedures."315

Though not without question, the Agency's interpretation seems at least plausible, given the unequivocal statements of Congressman Rog-

ers, the manager of the originating bill. First, from a policy perspective, it seems unlikely that Congress would legislate provisions designed to remedy visibility degradation from existing sources while allowing new sources to perpetuate the problem. Congressman Rogers himself noted that it would make little sense to solve existing problems while allowing "the same situation to develop as a result of new sources."  

Second, the statutory language clearly refers to the "prevention of any future . . . impairment of visibility"—language which, absent any countervailing directive, would seem to provide a rational statutory basis for the Agency's position. As to the possibility that the Conference language cited above might provide such a countervailing directive, once again the words of Congressman Rogers would seem to dispel conclusively such a construction:

While the [Conference] Report recognizes that '[a] major concern which prompted the House to adopt the visibility protection [provision] was the need to remedy existing pollution,' it does not state nor does it imply that existing sources were the only concern. As the House Committee report makes clear, new sources were also of concern.  

Third, absent EPA's construction of section 169A, there could be circumstances in which visibility degradation might occur in a protected area even though a source has passed muster under the Act's PSD provisions. For example, as pointed out by the Agency, PSD review is limited to sources which choose to locate in certain areas designated as attainment or unclassified. Were a source to elect an area not so designated, it would not be subject to PSD no matter how immediate its impact on a Class I area and, absent section 169A, would not be subject to any review for its visibility impacts. Given the Congress' interest in protecting against future as well as existing visibility impairment, it appears unlikely that Congress intended such a statutory lacuna. If this view is accurate, it would also seem that EPA's construction of the McClure-Muskie dialogue—in which the Agency ascribed procedural but not substantive preemption to the Act's new source review provisions under PSD—is consistent with the statutory scheme. In short, though the matter is not free from doubt, it appears

317. 42 U.S.C. § 7491(a)(1) (Supp. III 1979). See also H.R. Rep. No. 294, supra note 141, at 206 ("The Committee recognizes that this [visibility] goal cannot be achieved overnight. But the very difficulty of curing existing problems after the fact argues strongly for a strong preventive approach for the future. Moreover, if the goal is ever to be achieved, progress in that direction must begin now.").
319. See Section 169A Summary, supra note 314, at 202-03.
320. See supra text accompanying notes 292-304.
that EPA acted reasonably in extending the provisions of section 169A to new as well as to existing sources.

2. Integral Vistas

In its second action, the Agency treated section 169A as covering those geographical zones within mandatory Class I areas as well as those vistas located in Class I areas and considered integral to the enjoyment of a person visiting the Class I area. In so doing, the Agency’s rationale for its integral vista provisions was that visibility “is a perceptual value and the perception occurs ‘in’ an area.”

Under EPA’s construction, any visibility impairment of a vista integral to a protected area and perceived from within it could adversely affect the visual experience of the visitor, and therefore should be protected. For example, the view from a Class I area mountain could encompass areas outside the park or clean air area. Integral vistas were to be identified by DOI pursuant to specific identification criteria preceded by reasonable notice and comment. Were a state to determine that a given vista identified by DOI did not meet DOI criteria, however, the state would not have to include the vista in its new source review (or BART) program, subject to the right of the federal land manager to consult with the state’s governor.

Though once again subject to argument, EPA’s integral vistas provisions seem supported by the legislative history underlying section 169A. The Agency noted that, in framing the visibility provisions,

321. See 40 C.F.R. § 51.307(b) (1981). The integral vista provisions also apply to BART sources. See also id. at § 51.302(c)(4) (BART analysis must include impact on integral vistas identified at least 6 months before the state’s § 169A Plan submission).
323. On January 15, 1981, the National Park Service (NPS) published notice of opportunity for comment on a proposed guideline for identifying integral vistas. 46 Fed. Reg. 3646 (1981). The proposal was accompanied by a “preliminary list of integral vistas associated with the 48 National Park Service mandatory Class I areas where visibility is an important value.” Id. The NPS listing included more than 170 vistas associated with 42 different national parks.

The criteria governing the selection of vistas by the NPS’s Federal Land Managers emphasize two overall considerations: (1) “the importance of the vista to the objectives for which the area was created,” and (2) “the contribution of the vista to the visitor enjoyment of the area.” 46 Fed. Reg. 3651 (1981). As to the importance of the vista, the FLM must consider, “in particular, vistas or landscape feature(s) identified in relevant legislation and legislative history.” Id. As to the contribution of the vista to visitor enjoyment, the FLM must consider a number of factors including, inter alia, “[v]istas which have received emphasis or attention in . . . books, magazines or newspaper articles . . . [o]r TV or radio references”, id.; “[v]istas that have developed observation points”, id.; “[v]istas which are viewed from prominent topographic points in predominantly flat terrain in undeveloped areas”, id.; and “[v]istas which have particular or unusual scenic quality or [a]re of cultural or historical value.” Id. See also the criteria proposed by DOI’s Fish and Wildlife Service (since integrated with the Park Service) containing identical criteria. 46 Fed. Reg. 8755 (1981). To date, none of the integral vistas proposed by DOI have been published in final.

Congress "clearly was aware that many of those areas were set aside because of their extensive vistas, expansive scenic views, unique natural formations or primitive value."\(^{325}\) The agency also noted that the legislative history is replete with references to the "grand, distant, and breathtaking vistas and panoramas of mandatory Class I Federal areas which merit visibility protection."\(^{326}\) Finally, the Agency stated that:

Even opponents of far ranging protection against deterioration of air quality recognized that "visibility" means the ability to see distant places and panoramic sweeps like the view from the top of a mountain. . . . Nowhere [in the legislative history] is there the suggestion that grand vistas integral to public enjoyment of mandatory Class I Federal area[s] were not entitled to protection if the place viewed lay outside the area.\(^{327}\)

While one may take pause at the notion that the absence of prohibitory legislative language is, by itself sufficient authority to support affirmative Agency action, it is submitted that, in the case of EPA's integral vista provisions, the measures undertaken appear to fit well within section 169A's scheme to protect the nation's grand vistas and panoramas. Admittedly, one may argue that the Agency would have been on safer ground had its integral vista provisions been predicated on a more express statutory grant. If EPA is correct in its judgment that visibility is a perceptual value, however, then it would seem to follow that scenery and vistas integral to one's perceptual enjoyment are worthy of protection whether they originate inside or outside of the protected area, itself. In this regard, it appears components of Congress find the Agency's construction acceptable. Indeed, though bills proposing to postpone\(^{328}\) or eliminate\(^{329}\) EPA's integral vista provisions were submitted during the 97th Congress, no major bill or committee action during the 1982 Clean Air Act reauthorization hearings proposed substantial change in or faulted EPA's integral vista construction.\(^{330}\)


\(^{326}\) Id.

\(^{327}\) Id.


The above notwithstanding, absent specific authorization legislation EPA may have to contend with law suits asserting that the section 169A(a)(1) reference to "in mandatory Class I Federal areas" means "in" rather than "integral to" such areas, and that in promulgating its integral vista provisions EPA has exceeded its legislative authority.\textsuperscript{331} Considering the \textit{Alabama Power} court's strict construction of section 165(a) PSD phraseology "to which this part applies," as limiting PSD review to construction "in" attainment and unclassifiable areas irrespective of the effects on PSD of sources locating "out" of such areas,\textsuperscript{332} such an argument may carry weight with the courts.

3. \textit{Sources Locating in Nonattainment Areas}

The Agency's third action extended the new source elements of section 169A, including the integral vistas component, to sources locating in both attainment (PSD governed) as well as nonattainment areas.\textsuperscript{333} The Agency was careful, however, to note that, unlike the stricter provisions applicable to PSD review, the visibility impact of sources locating in nonattainment areas could be balanced against "cost, energy and other factors."\textsuperscript{334}

Extension of the section 169A provisions to sources electing to locate in nonattainment areas ensures that all sources, irrespective of their planned situs, will be subject to visibility review where a Class I area may be affected. From a policy point of view this would seem to make good sense\textsuperscript{335} particularly since EPA claims that "in many cases the § 169(a)(2) areas lie close to nonattainment areas."\textsuperscript{336}

EPA's position also appears to be legally defensible. For unlike the statutory circumstances encountered by the Court of Appeals in \textit{Alabama Power},\textsuperscript{337} there is no language in section 169A which, by its terms, would restrict the reach of the section to sources locating in attainment or unclassified areas. The Agency position is not, however, without legal problems.

The difficulty stems from the fact that, to extend section 169A review to new sources in the first instance, EPA had to explain away


\textsuperscript{331} See, e.g., Petition of UARG, \textit{supra} note 27, at 13-20.

\textsuperscript{332} \textit{Alabama Power}, 636 F.2d at 365.


\textsuperscript{335} See \textit{supra} text accompanying notes 319 & 320.

\textsuperscript{336} \textit{SECTION 169A SUMMARY, supra} note 314 at 203.

\textsuperscript{337} \textit{See supra} text accompanying notes 298 through 304.
legislative history suggesting that new source visibility impacts fell within the province of the Act's PSD provisions. As noted earlier, the Agency explained that the Act's PSD mechanism was intended to serve as the procedural focus for both new source PSD and section 169A review. Given this emphasis on the Act's PSD procedural provisions—provisions which do not apply to sources locating in nonattainment areas—it may be argued that review of sources locating in nonattainment areas was not contemplated under section 169A. Such a construction seems unnecessarily cramped, however, because, while the legislative history dealing with new source review under section 169A does look to the Act's PSD procedural mechanisms for accomplishing such review, the history is equally clear in noting that such procedural preemption was intended only as a means of avoiding duplication in the review of sources subject to both PSD and section 169A review. By contrast, the history does not seem to suggest that such an integrated review was intended to limit the scope of section 169A to sources locating in PSD-governed areas. Accordingly, though the matter is not free from doubt, EPA appears to have acted properly in establishing section 169A regulations for sources locating in nonattainment areas.


Although EPA attests to the importance of being able to review the visibility impacts of new sources locating in nonattainment areas, the public response to EPA's regulations shows that extending visibility review to nonattainment areas is not the key objection to the Agency's regulations. Rather, EPA's extension of the regulations to include integral vista coverage of both attainment and nonattainment area sources has evoked the greatest public response.

Much of the objection to the integral vista provisions is based on the view that the provisions limit construction far beyond the limits

338. See supra text accompanying notes 306-318.
339. See supra text accompanying notes 306-318.
340. See statement of Congressman Rogers quoted supra text accompanying note 310.
341. See Section 169A Summary, supra note 314 at 203. ("As a factual matter, review of such sources locating in a nonattainment area is important and often critical to making reasonable progress toward the national visibility goal").
342. See, e.g., Salt Lake City Hearings, supra note 291, at 16-17 (testimony of Gov. Matheson):
otherwise established by the Act's mandatory Class I PSD provisions. Much of this concern may be misplaced, however. First, EPA's regulations allow a state to issue a permit to a source even if visibility impairment is predicted, provided that the action is consistent with making "reasonable progress" toward achievement of the national visibility goal. Accordingly, the Agency states that

[T]he State may permit a source which will impair visibility now while acknowledging there may be the opportunity in the future to remedy that impairment (as with emissions of NO\textsubscript{2}). . . . The national goal was not to be achieved immediately; energy, economic and other factors should be considered; therefore, some visibility impairment in these situations should be tolerated.

Additionally, in a recent study sponsored by the National Park Service, analysts using screening procedure typical of those used by EPA in evaluating sources for compliance with PSD provisions con-

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343. See Clean Air Act Oversight: Hearings Before the Senate Committee on Environment and Public Works, Part 7, 97th Cong., 1st Sess. 35 (1981) (testimony of John S. Larsen, Vice President for Regulatory and Environmental Affairs, Weyerhauser Co.) ("Nearly half of western Washington . . . is subject to review by the Federal Land Manager."); but see id. at 48 (testimony of Ruth Weiner, Chairman Air Quality Committee, Washington Environmental Council, Sierra Club) ("[source location] depends very heavily on where the wind is blowing and where the source is in connection with where the vista is. There are some vistas that are totally unaffected by heavily polluting industries . . . .").


345. 45 Fed. Reg. 80,095 (1980) (to be codified at 40 C.F.R. § 51, Subpart P). The Agency's reference to NO\textsubscript{2} appears questionable in light of the 10-15 year goal Congress established for achieving visibility protection. The 1977 amendment requires that each state implementation plan include a 10-15 year "strategy for making reasonable progress toward meeting the national [visibility] goal. . . ." 42 U.S.C. § 7491(b)(2)(B) (Supp IV 1980). In defining "reasonable further progress," states were expected to take into account costs and time required for compliance, as well as the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any existing source subject to section 169A's requirements. 42 U.S.C. § 7491(g)(1) (Supp IV 1980).

Given Congress' expectation that regulations would be promulgated by August 7, 1979, 42 U.S.C. § 7491(a)(4) (Supp IV 1980), the 10-15 year period would commence between 1989 and 1994. Yet the construction period for a power plant issued a potentially visibility-impairing permit in late 1981—the since-passed due date for state submission of the visibility SIP's under EPA's regulations—could take as long as five to seven years to build, causing the visibility-impairing plant to come on line just as the 10-15 year goal was about to commence, seemingly frustrating the congressional objective.

346. NATIONAL PARK SERVICE, FINAL REPORT: PERCEPTIBILITY OF PLUMES OF FACILITIES, SITED AT INCREMENT-LIMITED DISTANCES FROM CLASS I AREAS (1982) [hereinafter cited as INTEGRAL VISTA STUDY].

347. In evaluating the impact of new source construction on ambient standards or PSD increments, computer models are often employed to provide predictions of such impact. See Cleveland Electric Illuminating Co. v. EPA, supra note 163. Often, a company will use a screening model to approximate the proposed source's impact. The screening model is likely to be more convenient and more conservative than a model fine-tuned to the specific meteorological and siting circumstances confronting the source, and will normally predict higher pollution concentrations than a more finely-tuned model. If the screening model indicates a
cluded that "for a number of source types and sizes and for a range of background and meteorological conditions, plumes passing through an integral vista are likely to be imperceptible to observers in Class I areas," assuming the facility has been located far enough away from the Class I area to satisfy the PSD screening procedures.\(^3\)

This study notes that, even at distances dictated by the PSD screening measures, large power plants may "generate plumes that will occasionally be perceptible from a Class I area if the background visual range is 100 km or greater"\(^4\) and that, if the built-in conservatism of the screening measures is assumed to "over-predict ground measures by a factor of 4 or more,"\(^5\) smaller sources such as 500 megawatt power plants may also generate plumes perceptible within Class I areas under the above-stated conditions.\(^6\) Nevertheless, the study suggests that for many sources considering construction near mandatory Class I areas, the PSD provisions of the Act, rather than integral vista provisions, will be the limiting factor for siting purposes.

Finally, absent additional legislative mandate,\(^7\) EPA’s integral vista regulations will not apply until DOI publishes its final integral vista list.\(^8\) To date, DOI has indicated no plans to take such action, and sources indicate that such action is not likely in the near future.\(^9\)

Given the program’s uncertainties, a crucial question arises: should the integral vista program be abandoned? First at least as to large power plants capable of meeting PSD but having the potential to impair integral vistas,\(^10\) it would seem that congressional objectives are served by the integral vista provisions and that the answer, therefore, should be "no." Second, in any given case relatively small quantities of

\(348.\) INTEGRAL VISTA STUDY, supra note 346, at xii.
\(349.\) Id.
\(350.\) Id.

\(351.\) In the INTEGRAL VISTA STUDY, the primary model was the EPA Valley Model. Id. at 55. As to this model, the authors state:

"[I]n the absence of site-specific factors, such as terrain blocking or unique meteorological patterns, the extent of overprediction by Valley should not be expected to exceed a factor of 2 to 4."

Id. at 61. Accordingly, if the normal conservatism of the model used by the authors is taken into account, the conservatism conditions cited in the text will normally not pertain. This suggests that, for most smaller power plants, PSD rather than the integral vista provisions will be the limiting factor for companies interested in locating near Class I areas.

\(352.\) See, e.g., supra note 323 (regarding the Hart Amendment).

\(353.\) Under 40 C.F.R. § 51.307(b)(1) (1981), for an integral vista to apply to a proposed source, the FLM must have identified the vista at least six months prior to submission of the permit application. If the FLM has not provided notice and opportunity for public comment on the integral vista, the FLM must identify the integral vista 12 months before submission of the permit application for that integral vista to apply to the proposed source. Id.

\(354.\) See PROTECTING VISIBILITY, supra note 26, at 10,058.
\(355.\) See supra text accompanying note 349.
primary or secondary fine particles from a proposed source could significantly impair visibility.\textsuperscript{356} Absent the integral vista provisions, the otherwise applicable PSD provisions—which do not discriminate between gross and fine particles such as sulfates—could permit construction of such a source in a vulnerable scenic area.\textsuperscript{357} Finally, combined with the PSD provisions, the integral vista provisions convey to developers of proposed sources an element of visibility consciousness and the sense of responsibility clearly intended by Congress:

Let no industry misunderstand our intent: in planning new facilities, there must be no consideration of siting a huge powerplant so close to a national park that it threatens the area's integrity. Protecting the Grand Canyon simply must become a normal business practice of the American industry. Preservation of our critical parks deserves no less.\textsuperscript{358}

V.

CONCLUSION

The pristine grandeur of America's Southwest is a national treasure duplicated in few places on the face of the Earth. Studies have shown that small amounts of fine particle pollutants, of which sulfates are the major man-made component,\textsuperscript{359} can severely degrade visibility and thus mar enjoyment of the Southwest's scenic vistas.\textsuperscript{360}

Sulfates are formed from the combustion of sulfur-bearing fuels and the smelting of sulfur-bearing non-ferrous metals such as copper,\textsuperscript{361} and can travel long distances from their source of introduction

\textsuperscript{356}. See Protecting Visibility, \textit{supra} note 6. Whereas "[c]oarse particles are a less significant cause of visibility degradation," \textit{id.} at 2-23, "the addition of small amounts (1 to 5 \( \mu g/m^3 \)) of fine particles throughout the viewing distance tends to whiten the horizon sky. . . ." thus substantially impairing visibility in clean areas. \textit{Id.} at 2-27. \textit{See also} Air Quality Division, Office of Science and Technology, National Park Service, The Prevention of Significant Deterioration Increments Are Not Adequate to Protect Visibility in Class I Areas (1980).

In pristine Class I areas on clear days, when light scattering by air molecules dominates, an addition of about 4 \( \mu g/m^3 \) of fine particles (40\% of the 24-hour [42 U.S.C. \$ 7473(b)(1) (Supp. IV 1980)] particulate increment) would cause substantial 'whitening' of the natural blue sky and reduce visual range from 380 km to about 150 km . . . . \textit{Id.} at 14-16.

\textsuperscript{357}. \textit{See} Littlejohn, Shaver & Malm, \textit{The Inadequacy of PSD Increments to Protect Visibility in Class I Areas}, 31 J. Air Poll. Control Ass'n 879 (1981), (revised version of Park Service document cited \textit{supra} note 356, noting that: "the [PSD] increment is inadequate to protect visibility in areas of scenic beauty] because it is defined as the total particulate mass concentration rather than the \textit{fine} particle fraction of total suspended particulates." (emphasis in original)).

\textsuperscript{358}. 123 CONG. REC. H27,076 (August 4, 1977).

\textsuperscript{359}. \textit{Id.}

\textsuperscript{360}. \textit{See}, \textit{e.g.}, \textit{supra} text accompanying notes 125-129; \textit{supra} notes 356 & 357; \textit{infra} Appendix A.

\textsuperscript{361}. \textit{See} Richards, et. al., \textit{supra} note 229, at 1; Bartlit letter, \textit{supra} note 124, at exhibit 1.
into the atmosphere.\textsuperscript{362} Hence, the major sources of sulfate pollution in the Southwest are that area’s copper smelters and power plants, and automobile-produced smog from California’s South Coast Air Basin.\textsuperscript{363}

The fight to control pollution from such sources has resulted in some inroads, though there remains a need for further controls. The California legislature recently enacted a statute requiring inspection and maintenance of automotive pollution control devices, a program which may be the key to controlling automobile-aggravated sulfate pollution.\textsuperscript{364} On the other hand some measures considered by EPA for controlling sulfate emissions from smelters, such as multi-point rollback, seem questionable at best.\textsuperscript{365} Even with multi-point rollback, some smelters will be faced with the choice of high control costs or closure, and to avoid this consequence, Congress should consider enacting tax incentives to enable affected facilities to choose their futures in an environmentally-neutral setting.\textsuperscript{366} Though pollution from existing power plants may be well on the way to control,\textsuperscript{367} future regulatory programs should emphasize controlling pollution from new sources constructed as the Southwest’s energy potential develops. Of the various programs suggested by the 1977 Clean Air Act Amendments the best available control technology provisions appear the most promising.

Section 169A may complement significantly the Act’s other provisions affecting visibility preservation, though the regulations implementing this section have evoked concern over a claimed widespread impact on development.\textsuperscript{368} Though legislative history seems to support the regulations’ coverage,\textsuperscript{369} a close reading of the provisions themselves, as well as government-funded studies assessing their impact, suggests that they are as noteworthy for what they fail to do as for what their supporters claim they accomplish. In particular, the preambulatory statement indicating that no sources are likely to come under the best available retrofit technology provisions is difficult to reconcile with the comprehensiveness of the best available retrofit technology regulations themselves.\textsuperscript{370} There are also questions as to the coverage of the Agency’s integral vista regulations, though at present the issue is moot

\textsuperscript{362} See supra text accompanying notes 58 & 59.
\textsuperscript{363} See supra notes 87-112 and accompanying text (South Coast Air Basin); supra notes 113-209 and accompanying text (copper smelters); supra notes 210-269 and accompanying text (power plants).
\textsuperscript{364} See supra text accompanying notes 105-108.
\textsuperscript{365} See supra notes 154-184 and accompanying text.
\textsuperscript{366} See supra text accompanying note 206.
\textsuperscript{367} See supra text accompanying notes 210-232.
\textsuperscript{368} See supra text accompanying note 343.
\textsuperscript{369} See supra text accompanying notes 270-358.
\textsuperscript{370} See supra text accompanying notes 289-291.
because DOI has not yet completed its final integral vista listing.\textsuperscript{371} Good arguments exist for preserving the integral vista provisions, however, and one major bill submitted during the 1982 congressional session attempted to do so.\textsuperscript{372}

This article has attempted to identify the myriad of interacting factors likely to affect visibility in the Southwest, to trace the problems in regulating sources of pollution, and to offer some responses. The author hopes that, armed with such awareness, reader and regulator alike will approach the issue of Southwestern visibility degradation in a more informed and coordinated manner.

\textsuperscript{371} See supra text accompanying notes 353 & 354.
\textsuperscript{372} See supra note 330.
Appendix A

Effects of fine particle increments on calculated visual range

*Addition of 1 μg/m³ to a clean atmosphere reduces visual range by 30 percent. Addition of the same amount when background visual range is 35 km (20 Miles) produces a 3 percent reduction. (Source: Protecting Visibility, supra note 7 at Figure 2-22.)