PROCEEDINGS

VIEW ON VISIBILITY –

REGULATORY AND SCIENTIFIC

ROCKY MOUNTAIN STATES SECTION

AIR POLLUTION CONTROL ASSOCIATION

NOVEMBER 1979

A SPECIALTY CONFERENCE ON:

VIEW ON VISIBILITY –
REGULATORY & SCIENTIFIC

EDITED BY

THE AIR POLLUTION CONTROL ASSOCIATION

SPONSORED BY

THE ROCKY MOUNTAIN STATES SECTION

and

THE TECHNICAL COUNCIL

of the

AIR POLLUTION CONTROL ASSOCIATION

November 26-27, 1979
Brown Palace Hotel
Denver, Colorado

APCA Specialty Conference Proceedings

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VIEW ON VISIBILITY -- REGULATORY & SCIENTIFIC

November 26-28, 1979, Denver, CO

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PROTECTION AGAINST VISIBILITY IMPAIR4ENT UNDER THE CLEAN AIR ACT

William H. Lewis, Jr.
National Commission on Air Quality
Washington, DC

I appreciate the opportunity to discuss with you what I think may be one of the least understood but potentially most significant aspects of the Clean Air Act. The issue, of course, is protection of visibility.

The history of environmental legislation in this country is full of examples of Congress enacting laws reflective of public concern with, but without complete understanding of, various problems. The Clean Air Act is a good example of Congress identifying a problem of general concern and, without fully understanding it or knowing how best to address it, directing federal, state and local officials – the country, really – to meet the challenge of remedying it. In the 1977 Amendments to the Clean Air Act, Congress recognized the importance the public attaches to aesthetics such as good visibility, as well as the fragile nature of our visibility heritage. Congressional intent clearly was to protect that heritage, and to ensure that we will be able to pass it on to future generations.

An example of the legislative history of the visibility provisions suggests four specific findings as the basis of Congressional concern: first, that while air quality has improved in many areas, visibility in national parks is decreasing: second, that there is a national value placed on areas of intrinsic beauty, both aesthetically and as one component of an economically healthy tourist industry; third, that the National Ambient Air Quality Standards are inadequate to ensure attainment and protection of good visibility; and fourth, that PSD requirements alone also are inadequate to protect visibility, since such requirements do not cover existing sources contributing to visibility impairment. Based on these findings, Congress provided a framework – albeit a very broad framework which possibly can be improved – within which we can begin to address visibility related issues.

We are fortunate in the United States – and again, particularly here in the West, with its unusual topography and spectacular vistas – to have natural assets unique in the world and of great value to the nation. Preserved in their natural state, relatively free of the handiwork of humans, they contribute to a quality of life which enhances our well-being.

For many, that quality in recent years has been compromised. Spectacular vistas are marred by increasing air pollution. For instance, in 1960 visibility across the Rio Grande Valley averaged about 200 miles. By 1968, visibility had been reduced to just 30 miles, a staggering loss of over 85 percent. Another example is the Grand Canyon. Visitors there often are disappointed to find that, when the wind is from the East, emissions from the Navajo power plant occasionally fill the canyon

canyon with haze. When the wind is from the West, pollution from Los Angeles also may contribute to haze in the canyon. The result is a reduction of visibility to less than 15 miles, effectively obscuring the view of the opposite canyon rim.

Pollution now is a problem for dozens of national parks, monuments and historical sites. Officials at more than 30 Western parks report specific sources of pollution – such as a paper mill, power plant, smelter or mining operation – to be affecting the quality of park air so much that they cannot guarantee good vistas, the prime attractions for visitors. Park Service Director Whalen has said that air pollution is the principal threat to the parks.

It is important to emphasize, of course, that visibility impairment is not confined to the West. In the Northeast, where visibility averages only about 10 miles from urban, suburban and rural areas, visibility generally has suffered. Recent studies indicate that suburban and rural areas have been hit the hardest, with 10 to 40 percent reductions in visibility between the early 1950's and the early 1970's. Summertime visibilities, once the best, are now the worst, having declined about 25 to 60 percent during this same period of time.

Certainly some of the reasons for regional variations in visibility are natural and not man-made. Such natural sources include moisture in its various forms, windblown dust, forest fires, volcanic activity, sea spray, vegetative emissions and decomposition processes. Although these sources usually cannot be controlled, they tend to contribute to the current visibility levels in Class I PSD areas. Accordingly, it should be an important objective to refine our methods of measuring visibility and air pollutants so that we can distinguish clearly between natural and man-made forms of visibility-impairing pollution.

It is important to note, however, that while natural sources of visibility degradation have been with us for eons, only recently has protection of visibility become a serious national problem.

There is no doubt, therefore, that man-made pollution is the major cause of visibility impairment in most areas. Fine particles, or aerosols, and NO_2 significantly reduce visibility. Sulfur oxide emissions also contribute to visibility impairment because, together with other precursor gases such as nitrogen oxides and volatile organic chemicals, they can be transformed into fine particulates, which give rise to regional haze. A number of studies have demonstrated a statistical relationship between nitrates, sulfates and visibility, providing evidence that man-made pollution accounts for substantial reductions in visibility.

One such study was conducted in the late 1960's on the copper smelters of Southern Arizona, at that time the single greatest source of SO_2 emissions in the Southwest. For nine months during 1967 and 1968, these smelters were shut down as a result of an industry-wide strike. SO_2 emissions in the regions consequently were reduced appreciably.

Sulfate levels measured during the strike dropped between about 40 and 80 percent at five monitored sites within 70 miles of the smelters, and there were corresponding improvements in visibility. Perhaps more significant, visibility improved up to 25 percent within 150 miles of the smelters.

Observers in the Mesa Verde and Grand Canyon National Parks, located two and three hundred miles away from the main group of smelters, noted discernible improvements in visibility. The study results suggest that control of sulfate precursors tends to protect visibility, while in the absence of such controls their transport over long distances can impair visibility in areas hundreds of miles away from their sources.

There have been a number of excellent studies in the area of visibility. But unfortunately, as is the case in many areas of inquiry in the environmental field in general, and the air quality field in particular, we know more than we understand or can express understandably. And yet to do nothing is to risk losing even more than we already have of the grandeur and splendor of our natural heritage.

Throughout this conference, you will hear a great deal about the fundamentals of atmospheric visibility impairment. You will hear a great deal about the technical information developed to date, and the technical information we do not have but need in order to enhance our understanding of the visibility problem. You will hear much about the relative merit of varying approaches for expressing, measuring and protecting visibility. Resolving questions in this area is crucial to the determination of how best to protect visibility.

Technical questions of the greatest concern to the Commission in the conduct of its studies can be categorized under two general headings. First, how can we trace visibility-reducing, man-made pollutants back to their sources? Second, how can we predict with greater certainty the effectiveness of alternative control strategies designed to protect visibility? The exchange of information at this conference on these two questions should contribute importantly to advancing the state of the art of protecting visibility.

Once we have a better idea of how to measure visibility, how to determine the sources of its impairment and how to evaluate the effectiveness of alternative controls, certain policy questions will remain. It is the debate over how to answer these questions which makes the visibility issue one of controversy. Let me talk briefly about just six of the key policy questions on which I expect both the Commission and the Congress will want to focus. Some are broad and some are narrow, but I believe it is worthwhile to consider each of them.

The first question which must be addressed is this: How should we define "baseline visibility" in order to determine whether there has been visibility impairment and thus a need for regulation? Visual air quality is an aesthetic value which in part is subjective and which can have many dimensions. As you know, the extent of visibility impairment is a function of source and specific pollutant characteristics, meteorology, and personal responses.

There are a variety of ways to account for these variables and to arrive at a definition of visibility impairment. There is a spectrum of views as how to interpret Congressional intent with respect to whether impairment must be, quote, "significant" prior to the application of regulatory mechanisms for controlling visibility – such as requiring old sources to install the best available retrofit technology, imposing tighter emissions limits on new sources or forcing the relocation of plant sites. The important objective in considering how to define visibility impairment for regulatory purposes, it seems to me, should be one of simplicity. If there is one criticism of the Act which the

Commission hears repeatedly, it is that there is insufficient certainty for those trying in good faith to comply with air pollution control requirements.

The second policy question is whether visibility standards should be set on a federal, regional, state or local level. It seems obvious that a national standard would make little sense, unless it would protect visibility to the extent desired in each part of the country; that, at this time, seems problematical. The challenge then becomes one of identifying the most appropriate level at which to set standards for different parts of the country, and – just as important – providing a clearly defined institutional framework within which decisions can be made in an uncomplicated manner.

Area specific and even vista specific standards have been proposed, although the level of monitoring, data collection and analyses which would be needed would be substantial in terms of both time and money. It may very well prove sensible to establish region specific standards for visibility. If this is the case, an important issue would be to determine what values people who live in, who travel to, and who would bear the costs of protecting visibility in a region assigned to varying degrees of visibility. This is one task the Commission hopes to perform in the examination of visibility issues in its comprehensive regional study of the energy development areas of eastern Utah and western Colorado.

The third policy question I would pose relative to visibility, like the question of how best to define visibility impairment, underscores the desirability of providing certainty to those trying to cooperate in working to achieve the goals of the Clean Air Act. The visibility provisions adopted by Congress include a requirement that certain existing sources install the best available retrofit technology, or BART, in order to protect visibility. As you know, the Act requires EPA to establish guidelines and procedures for the states to use in determine BART for specific sources. Such determinations necessarily will involve substantial effort and analysis. The third question is this: How should BART for specific sources be defined? Again, the objective in trying to develop a way of defining BART should be simplicity and ease of administration.

In the Western states, as I mentioned earlier, smelters can be a major source of visibility impairment. Yet, the legislative provisions in the Act effectively prevent EPA from imposing BART on certain major sources such as large smelters, since so many of these facilities have been in operation for over 15 years. States are permitted to set controls more stringent generally than those set as federal standards by EPA, but there is a question as to the extent to which states would exercise this option. The fourth question, then, is whether it is possible or appropriate to protect visibility in such areas without imposing BART on major older sources.

As I mentioned earlier, while pollution has its greatest impact near its source, it can affect visibility hundreds of miles away. In this respect, visibility impairment – like increased incidences of acid precipitation – can be characterized as part of a set of problems arising from the long range transport of pollutants. Long range transport issues – especially the institutional aspects of such issues – have not been addressed directly by Congress in the Clean Air Act. The fifth question is this: Is it possible – and, if so, what changes, if any, would be required in the Act – to design and implement control

strategies which would address simultaneously and adequately each of the transport issues, including visibility?

The sixth and final question, though related only in part to the issue of visibility, is perhaps the most important one to consider: To what extent need there be a tradeoff between good visibility and continued economic growth and development, between air quality and energy, between prosperity and a strong and health environment with clean air? Conventional wisdom assumes the necessity of such tradeoffs. Yet, I believe that we can provide for both economic growth and environmental quality.

Our use of energy is just one example of an area in which, with little capital and no sacrifice of amentities, we can make a significant contribution to our meeting both of these goals. The implication of many recent studies is that, by shifting our reliance to renewable, non-polluting, more efficient and increasingly less costly forms of energy, we can have continued growth and increased economic opportunities, while at the same time actually decreasing the total amount of energy we use. I am persuaded there are many ways, especially through a balanced, non-inflationary energy policy, to do more with less – through both prudence and innovation.

It seems to me that, especially in the West – where the potential for population growth and energy development is so great, and where the attendant potential for visibility impairment as a result also is tremendous – common sense dictates that we look hard for ways to decrease the demands on our air resources and conserve in our use of non-renewable energy, while still providing the goods and services our people need and want. I have a sense that the major barriers to accomplishing this objective are not scientific, technological, or economic; rather, they are social and institutional in nature.

The visibility provisions adopted by Congress in the Clean Air Act reflect the presumption that, as a result of the work in which many of you are engaged, we will be able reasonably to relate subjective aesthetic judgments to a readily understandable and scientifically, technically and logically defensible way of measuring changes in visibility, tracing such changes to specific sources, and ensuring that those sources do not contribute to visibility impairment in the future. I am sure each of you would agree with me that while this is no easy task, it is one well worth our best efforts.

I very much appreciate the opportunity to speak at this conference, which is both necessary and timely. It is necessary, because the issue is important and far from resolution; it is timely, because EPA's recent release of its report on visibility is only a preliminary step in meeting the visibility goals in the Clean Air Act. This conference provides a good forum in which to exchange information and ideas on how best to achieve these goals.

I look forward to speaking with a number of you, and would welcome and certainly could benefit from your specific thoughts with respect to how the Commission might approach its analysis of the visibility issue.

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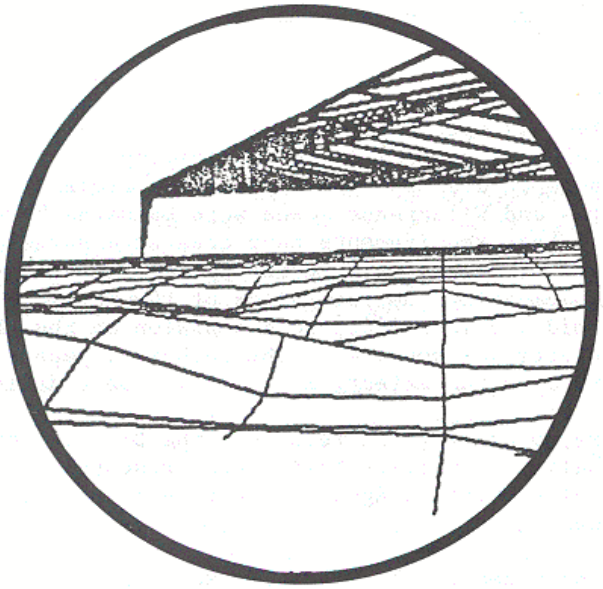


Chairman
Technical Program
Terry Thoem

Founder & Chairman
TE-5 Visibility Committee
Ben Linsky

CONFERENCE OVERVIEW

Technical Program Chairman

Terry L. Thoem
Director, Energy Policy Coordination Office
Region VIII, U.S. Environmental Protection Agency
Denver, Colorado

The purpose of the two day specialty meeting on visibility was to bring scientists, academicians, and technical experts in the visibility field together for detailed presentations and in-depth discussions. Visibility protection requirements for certain National Parks and Wilderness areas were mandated by the Clean Air Act Amendments of 1977. These-requirements have created a surge of interest and activities on the part of government, industry, academicians and the public. Since regulations implementing the provisions of the Act will not be proposed and finalized until mid and late 1981, no discussion on the shape or substance of the regulatory aspects was possible. The technical papers focused upon the topics of visibility cause and effect, monitoring, and modeling.

The conference was keynoted by an address from the Director of the National Commission on Air Quality. Overview talks were presented by representatives from the Environmental Protection Agency, the Friends of the Earth, and the National Park Service.

Questionnaires were provided to all Specialty Meeting attendees in order to provide feedback to APCA on the merits of the Conference. About forty percent of the Specialty Meeting attendees responded to the conference critique, in essentially equal number, from those involved with research and development, air pollution control and consulting. About 2/3 of those completing the critique came from industry, 1/4 from government (Federal and Local) and about 1/8 from non-profit organizations and universities. Overwhelmingly (99%), they agreed that the conference was of "help or of great benefit..." While 85% indicated that the sessions and papers were at least adequate, most (98%) were satisfied with the preparation of the conference. Some complaints (from 66% of the respondents), however, were registered and suggestions were also made concerning the topics (especially about certain few presentations). A few of the most pertinent comments and/or statements relating to specific suggestions, as taken directly from the critiques, are listed as follows:

- ... *more theory: less hand waving; more philosophy - both regulatory and scientific.*
- ... *measurement methods; setting-up (planning & implementing) a visibility monitoring program.*
- ... *cost benefit analysis of control to improve visibility vs. perceived benefit.*
- ... *relationship between scientific work and regulatory programs.*
- ... *legal interpretation of visibility by those who put it in the Clean Air Act. The federal land manager's dilemma.*
- ... *concrete results of field progrwns; model validations.*
- ... *industrial siting constraints imposed by visibility regulations of 1980; land manager experience with visibility evaluation.*
- ... *more discussion on regulatory impact.*
- ... *case histories.*
- ... *modeling.*
- ... *field data evaluation; methodology development.*

... *effect of visibility regulations on industry.*
... *connection between visibility and state of atmospheric chemistry.*
... *quality assurance and data reliability/confidence, relationships between visibility measurement or modeling and air quality measurement and modeling.*
... *something on urban visibility.*
... *future trends in visibility impairment given difference growth trends.*
... *resolve methodology vs. observe dilemma.*
... *would appreciate a panel-type discussion on policy issues surrounding visibility provisions.*

Fewer respondents (only 20%) commented on topics that they thought might be deleted from a follow-up conference, which was suggested by 99% to be set for one (66%) or two (30%) years hence. Among the subjects recommended for deletion were those related to:

... *sociological, philosophical and pschophysical aspects, mathematical derivations of modeling equations, "universities, lectures" and irrelevant historical data.*

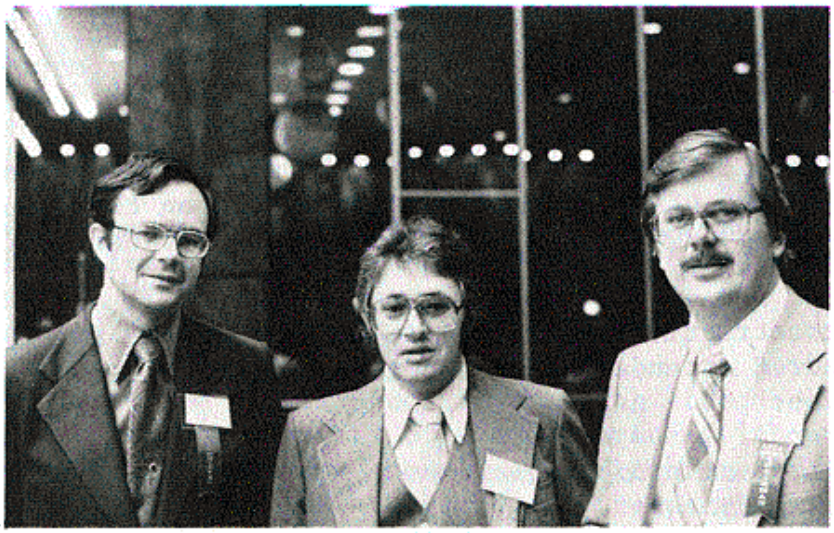
The overall quality of the conference was judged to be as good (by 36%) or better (by 48%) than other such meetings conducted on this topic. The facilities were also considered to be equal (35%) or better (46%) by the respondents.

A variety of constructive recommendations were offered by more than 45% of the one hundred attendees that submitted their critique. Some of these are given as follows:

... *need workshop on establishing monitoring standards and compliance with EPA regulations.*
... *begin to bring together the visibility and acid rain people.*
... *short papers would provide more topics and often short papers force speakers to be better organized for topics and presentations.*
... *this was the first conference on visibility that I've attended and I appreciated the overview.*
... *I have only attended a few APCA conferences, but I have been very impressed with this conference, the papers and the invited speakers. It has added much to my knowledge on visibility.*
... *either visual aids should be reviewed by session chairmen or strict guidelines should be spelled out - some were poorly done, detracting from the presentation.*
... *too many visuals with very small print that could not be read, suggest preview by APCA or standard format requirements; next time provide the speaker with a lighted pointer and possibly a portable microphone.*
... *it would have been of great benefit if we had copies of the papers prior to the conference in order to generate more questions and draw out points of classification. Also, a lavalier microphone would help the speakers presentation.*
... *preprinted proceedings, as done for the March '79 Quality Assurance conference would have been have been very useful. Six technical rating would have been eight otherwise.*
... *two things that would have helped me: 1) copies of papers (those available) at registration, and 2) a list of attendees.*
... *perhaps titles of papers and authors rejected might be listed also. The conference chairman indicated that time constraints limited the participation and not the quality of the papers submitted. This would continue to encourage the pursuit of effort rather than discourage it.*

APCA's Rocky Mountain States Section, the host of this successful conference, deserves commendation for its outstanding performance. Perhaps the best tribute was paid by one of the critique respondents when he wrote

... *"the hospitality of APCA and the people of Denver made my first stay in years truely enjoyable. Thank you for a fine conference, fine facilities and again for the hospitality shown."*



Bob Pearson Ron Brenton Art Hudson

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