Attachment 1 to Petition

N3615(475)

NOV 14 1985

Mr. Charles L. Elkins
Acting Assistant Administrator
for Air and Radiation
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Mr. Elkins:

For over seven years, the Department of the Interior and the Environmental Protection Agency (EPA) have cooperated on the development and implementation of a program designed to protect visibility in national parks and wilderness areas.

Accordingly, the Department of the Interior is pleased to respond to your April 1, 1985, letter requesting information on integral vistas and existing visibility impairment in those mandatory class I areas managed by the National Park Service (NPS) and Fish and Wildlife Service (FWS). The information you requested will be presented below and in the enclosures to this letter.

I. Integral Vistas

On October 25, 1985, Secretary Hodel issued his decision not to publish a final regulation identifying integral vistas associated with NPS class I areas. Enclosure A is a copy of the Department of Interior's press release package explaining the Secretary's integral vistas decision.

To date, the Department of the Interior has not identified integral vistas for any of the 21 FWS mandatory class I areas.

II. Existing Visibility Impairment

A. Visibility Monitoring Program

Visibility impairment generally tends to appear to observers as either a ground based or elevated haze layer, or as uniform haze. Both uniform and layered haze degrade the overall texture and color of landscape features. The NPS has been actively monitoring visibility in selected NPS areas since 1978. Generally, our visibility monitoring at any given NPS unit has been comprised of three components: view monitoring, optical monitoring, and aerosol monitoring.

The view monitoring documents the general appearance of a specific scene and if any layered or uniform haze is present. The NPS view monitoring is currently accomplished with 35 mm cameras equipped with 135 mm lenses and Kodachrome 25 color slide film. Photos of specific scenes are taken three times per day (9:00 a.m., 12:00 p.m. and 3:00 p.m.). In addition, the NPS has recently deployed several 8 mm time lapse movie cameras in selected park units in the Southwest United States.

Monitoring of a basic optical property of the atmosphere is performed by the NPS with two-point single wavelength (550 nm) teleradiometers. These instruments measure sky-target contrast which can be used to calculate the atmospheric extinction coefficient or visual range. More sophisticated optical instruments such as the transmissometer and the six-point multi-wavelength teleradiometer are being studied by the NPS and the scientific community.

The third component of the NPS visibility monitoring program involves measurements of the ambient aerosol. The NPS measures fine (0-2.5 um) and coarse (2.5-15 um) particulate mass concentrations using stacked filter dichotomous samplers. The particulate samples are collected continuously over 3-day periods and subjected to physical and chemical analyses which determine mass and selected elemental concentrations. Such data is relevant for determining the origin of the pollution that causes visibility degradation.

Enclosure B is a table summarizing those NPS areas that are currently, or have in the past, monitored visibility and the type of instruments used. A more detailed report containing the period of record of data collection for each instrument used at each park in the NPS visibility monitoring program is included in Enclosure C.

Currently, there is no visibility monitoring data collection at any of the FLS class I areas.

B. Summary of NPS Visibility and Particulate Measurements

Enclosure C also contains seasonal summaries of teleradiometer and particulate data prepared by the NPS Air Quality Division and its contractors. Specifically, Enclosure C contains tables of the 10, 50, and 90th percentile national park visual ranges for selected seasons; and information on the cumulative frequency distribution of coarse, fine, and fine sulfur particulate concentrations. (At the 10th percentile, for example, the visibility is equal to or less than the listed value 10 percent of the time or 1 day out of 10. Similarly, at the 90th percentile, the visibility is equal to or less than the listed value 90 percent of the time or 9 days out of 10. This definition of percentile also applies to the frequency distributions of coarse, fine, and fine sulfur concentrations.)

Fine sulfur concentrations are important because in most national parks sulfates are the single most important contributor to visibility impairment except in the northwestern United States, where fine carbon plays a more prominent role. For example, in Shenandoah National Park, sulfates appear to be responsible for over 70 percent of the visibility impairment. In the Colorado Plateau, an area containing Grand Canyon, Bryce Canyon, and Canyonlands National Parks as well as a number of other park units, sulfates are responsible for 40 to 60 percent of the visibility impairment.

Additional information on those elements besides sulfur present in the collected particulate matter is not presented here but is available from the Air Quality Division upon request. Furthermore, the most recent seasonal visual range percentiles for those NPS monitoring stations with automated teleradiometers will be available from the NPS contractor in the next several months

Lastly, we have enclosed two papers that summarize the NPS's visibility monitoring program: Enclosure D is a technical paper entitled "Visibility and Particulate Measurements in the Western United States" by Dr. William Malm, et al. Enclosure E is a summary of "Known Visibility Effects in National Park Units" prepared by the NPS for oversight hearings before the Subcommittee on National Parks and Recreation, House Committee on Interior and Insular Affairs, concerning the effects of air pollution on resources of the National Park System.

C. Identification of Existing Visibility Impairment

1. NPS Mandatory Class I Areas

The NPS monitoring program has found at least two instances where the suspected source of visibility impairment can be identified through photographic documentation (i.e., 35 mm color slides and 8 mm time lapse color movies). The two affected parks are Mesa Verde (Colorado) and Bryce Canyon (Utah) National Parks. The suspected sources of impairment at Mesa Verde National Park are the Four Corners Power Plant and San Juan Power Plant in New Mexico. The Navajo Power Plant in Arizona is the suspected source of impairment at Bryce Canyon National Park. The layered haze impairment occurs at least outside the parks' boundaries. On winter mornings, for example, portions of Navajo Mountain as seen from Bryce Canyon were completely or partially obscured as much as 80 percent of the time. Future data analyses or additional monitoring may well document that this impairment also occurs within these parks.

Much additional analysis of the Mesa Verde and Bryce Canyon impairment is required before the origin of the impairment is determined with great certainty as well as the impairment's intensity, duration and frequency of occurrence. These two parks would be excellent candidates for the EPA reasonably attributable monitoring program that is currently being designed under the recent July 12, 1985, EPA visibility rulemaking.

Questionnaires were sent to those NPS class I areas without visibility monitoring stations to qualitatively determine the presence of existing visibility impairment. The responses from the NPS staff suggest the possibility that existing visibility impairment at several additional park units can be traced, through visual observation, to a specific source(s).

The following table summarizes those NPS class I areas where the suspected sources of visibility impairment can or have been documented photographically or by visual observation. We would like to reemphasize that much additional analysis is required before the origin of this impairment is determined with great certainty.

State	NPS Class I Area	Impairment Inside Park?	Impairment Outside Park?	Suspected Source(s) of Impairment	Basis
Arizona	Petrified Forest NP	Yes	No	Power Plants	Questionnaire
Arizona	Saguaro NM	Yes	Yes	Smelters	Questionnaire

State	NPS Class I Area	Impairment Inside Park?	Impairment Outside Park?	Suspected Source(s) of Impairment	Basis
California	Pinnacles NM	?	Yes	Power plant	Questionnaire
Colorado	Mesa Verde NP	?	Yes	Four Corners Power Plant San Juan Power Plant	Monitoring Data
Michigan	Isle Royale NP	?	Yes	Pulp mills	Questionnaire
Minnesota	Voyageurs NP	Yes	No	Pulp and paper mills	Questionnaire
New Mexico	Carlsbad Caverns NP	?	Yes	Potash mills	Questionnaire
Utah	Bryce Canyon NP	?	Yes	Navajo Power Plant	Monitoring Data

With respect to uniform haze the NPS visibility monitoring has shown that in excess of 90 percent of the time scenic views are affected by anthropogenic pollution at all NPS monitoring locations within the lower 48 United States. As indicated earlier, sulfates are the single most important contributor to visibility impairment in most NPS units. The responses to the questionnaires sent to those NPS class I areas without visibility monitoring stations suggest that these areas as well are experiencing uniform haze. It is the position of the NPS that all NPS class I and class II areas in the lower 48 states are being affected by this visibility degrading uniform haze. As explained further below, the NPS has conducted or could conduct a variety of analyses to determine the origin and composition of visibility-degrading air masses.

2. FWS Mandatory Class I Areas

In 1978, questionnaires were sent to field staff at the 21 FWS mandatory class I areas requesting their qualitative judgements on the existence of visibility impairment within these areas. (There are no existing or proposed FWS integral vistas.) The questionnaire responses and recent follow-up telephone conversations with field staff found four FWS class I areas where the suspected source(s) of visibility impairment have been identified through visual observation:

State	FWS Class I Area	Suspected Sources(s) of Impairment
Alaska	Tuxedni Wilderness, Kenai National Wildlife Refuge (NWR)	Refineries near North Kenai, Alaska
Maine	Moosehorn Wilderness, Moosehorn NWR	Pulp and paper mill Asphalt plant
New Jersey	Brigantine Wilderness, Edwin B. Forsythe NWR	Coal fired power plant
South Carolina	Cape Romain Wilderness, Cape Romain NWR	Steel mill, pulp mills Fertilizer plant

These areas should also be considered as candidates for the EPA reasonably attributable monitoring program.

D. Suggested Additional Analyses of the NPS Data Base

The NPS has compiled a very large data base of 35 mm color slides, teleradiometer data and particulate matter measurements. Given the resources, the following analyses can be performed on the data to better document the frequency of occurrence, intensity, duration and origin of existing visibility impairment in the NPS class I areas:

1. Development of mass and extinction budgets at all NPS monitoring locations. [The mass and extinction budgets define a given constituent of the atmospheric aerosol's (e.g., sulfate) contribution to the total fine (or coarse) mass and visibility reduction, respectively.]

2. Create color prints from the NPS 35 mm slides of park scenic views representing the 10, 50 and 90th percentile visibilities.

3. Scan color slides with an optical densitometer to provide data that can be used for calculating the intensity and frequency of layered hazes, color difference, reduction of vista color, texture and form, or other more advanced visibility indices.

4. Perform back-trajectory residence time analyses that provide information on the origin of polluted air masses that are transported to class I areas and cause visibility impairment. Such analyses have been performed for NPS areas in the Colorado Plateau region (e.g., Grand Canyon, Bryce Canyon, Canyonlands, Capitol Reef, Zion and Arches National Parks), and for Theodore Roosevelt, Big Bend, and Glacier National Parks. These analyses have been used to identify major source areas that cause or contribute to visibility impairment in NPS units under different meteorological conditions.

5. Perform predictive dispersion modeling using a state-of-the-art sulfur dioxide long range transport model (RTM-II). The model has already been tested and found to perform well in applications to Shenandoah, Great Smoky Mountains, Acadia and Mammoth Cave National Parks and in the Northern Great Plains area.

6. Apply the mesoscale stagnation model being developed for the NPS to areas where nearby sources are suspected of causing or contributing to visibility impairment. The climatological part of the modeling study is complete, but chemistry has not yet been added to the model. The NPS expects to apply the wind flow module of the model to a basin area in southern Utah later this year.

E. New Monitoring Initiatives

The NPS is continuing its research into improved monitoring technology and other methods to characterize better the causes of visibility impairment. For example, a transmissometer is being developed for monitoring visibility. In addition, the NPS is planning to deploy monitors in selected class I areas that will characterize the nitrate component of the visibility degrading aerosol. In the past year, we also began monitoring, in cooperation with the utility industry, for carbonaceous materials at a few parks. Finally, a study

has been initiated to investigate the relative contribution of nitrates to visibility impairment in the Southwest. We will certainly make the results of these new initiatives available to your Agency.

In conclusion, we hope that this information is responsive to your regulatory needs. Your staff and involved States are welcome to contact the Air Quality Division for more information on the NPS data and its uses. Dr. William Malm is the main contact for the NPS concerning visibility monitoring data. Dr. Malm's phone number is (303) 221-5341.

Finally, I would be pleased to arrange a technical briefing for you, Mr. Thomas and your staffs by the NPS Air Quality Division concerning the effect that air pollution has on our national parks' visibility and other air quality related values.

Sincerely,

(Sgd) Susan Recce

Acting Deputy
Assistant Secretary for
Fish and Wildlife and Parks

Enclosures

bcc:
WASO: 475 (Ross)
AQD-DEN: Visibility Rules - EPA 40 CFR Part 52
AQD-DEN: Christiano, Malm, Mitchell, King, Rolofson, Scruggs, Shaver, Bennett (w/o attachments)
AQD-DEN: DJoseph:lk:7/31/85:x68761
FWS: Ty Berry (w/o attachments)