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OA/ID Number: 45145
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Folder Title:
Environmental Protection Agency/Clean Air Act/Grand Canyon Visibility [5]

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G	12	8	5	2

Clean Air Act

Section 169A "Congress hereby declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from man-made air pollution."

Impairment in the Grand Canyon was a major reason for establishment of the national goal.

Section 169A requires best available retrofit technology (BART) for any source that "... may reasonably be anticipated to cause or contribute to any impairment of visibility..." in any Class I area

Clear Case of Impairment by NGS

NPS, NAS, SRP Studies All Show NGS is Significant Contributor

NPS

NGS contributes 60-70% of extinction during winter haze episodes

NGS contributes 40% of extinction during winter period based on mass balance analysis

Summer haze contribution not studied

Contribution based on WHITEX and additional in-Canyon data from 1988

NAS

NGS is significant contributor to haze

WHITEX data analysis does not supply enough data to quantify NGS contribution (lack of multiple monitors in GCNP and missing data points)

NGS could be the major contributor to extinction during episodes

Did not look at data outside of WHITEX

SRP

NGS contributes 50% of sulfate during winter haze episodes

NGS contributes to haze only 4 to 7% of the time based on plant plume tracking

No general winter component was calculated based on mass balance analysis

Analysis of 1990 Study is incomplete. Only one data point was analyzed

No in-canyon data was released

Tracer data inconclusive for WHITEX data point

EPA Must Determine What is Best Available Retrofit Technology (BART)

BART PROCESS

1. Impairment attributed to source
2. Requires use of BART Guideline required
 - NSPS controls are starting point
 - Adjust based on
 - source - impairment relationship
 - cost
 - benefits
3. Requires "best system of continuous emissions reductions"
4. Requires compliance in 5 years

Bart Requires Year-Round Controls

No Legal Basis For Seasonal Control

- BART is an "Emission Limitation" (Section 169A(c),(g)(2)).
- Statute (Section 302(k)) defines "emission limitation" to require CONTINUOUS emissions reductions.
- Requirement for continuous reductions prohibits seasonal controls as BART

Legislative history is explicit: "temporary, periodic, or limited systems of control would not be permitted."

Statute (Section 123) also prohibits dispersion techniques, including intermittent controls that vary with atmospheric conditions.
- EPA has NEVER allowed seasonal control on a coal-fired power plant, nor for any technology-based standard (NSPS, BACT); Grand Canyon is the last place to seek change in precedent.

Bart Requires Year-round Controls

No Factual Basis For Seasonal Controls

- Even if statute, precedents could be overcome, seasonal BART would require an unprecedented reading of the exemption provision and making of factual findings that have no support.
- General Counsel believes that reading Section 169A(c)(2) to allow any such exemption would likely lose in court.
- Section 169A(c) presents extremely high factual hurdle: NGS must demonstrate, to the satisfaction of EPA and Park Service, that NGS cannot --
 - "by itself or on combination with other sources...reasonably be anticipated to cause or contribute to significant impairment of visibility in any (Class I) area."

Bart Requires Year-round Controls

No Factual Basis For Seasonal Controls

- Fact of the matter is present record indicates NGS contributes to impairment in other seasons.

Second largest Western SO₂ emitter, 70,000 tons per year.
10% of all Western utility SO₂ emissions.

Equivalent to 5 new Western mega power plants.

NGS emits more SO₂ than the entire L.A. Basin.

Size, Location of NGS implicate NGS as summer haze contributor.

Air flow study in GCNP suggests NGS significantly contributes in spring and fall.

Numerous other National Parks nearby are likely to be affected when air flows away from Grand Canyon.

Bryce (53 mi.), Zion (77 mi.), Canyonlands (112 mi.).

- EPA cannot find that NSPS could not be met year-round, because many Western, low-sulfur plants have done so.

<u>20 New Plants</u>	<u>6 Retrofit Plants</u>
12 70% to 89%	4 70% to 89%
8 90% or greater	2 90% or greater
<u>0 Plants with Seasonal Control</u>	

Nearby Retrofits			
San Juan, NM		Four Corners, NM	
90%		70%	
Year-Round		Year-Round	
.8 Lbs S/MMBtu		.9 Lbs S/MMBtu	

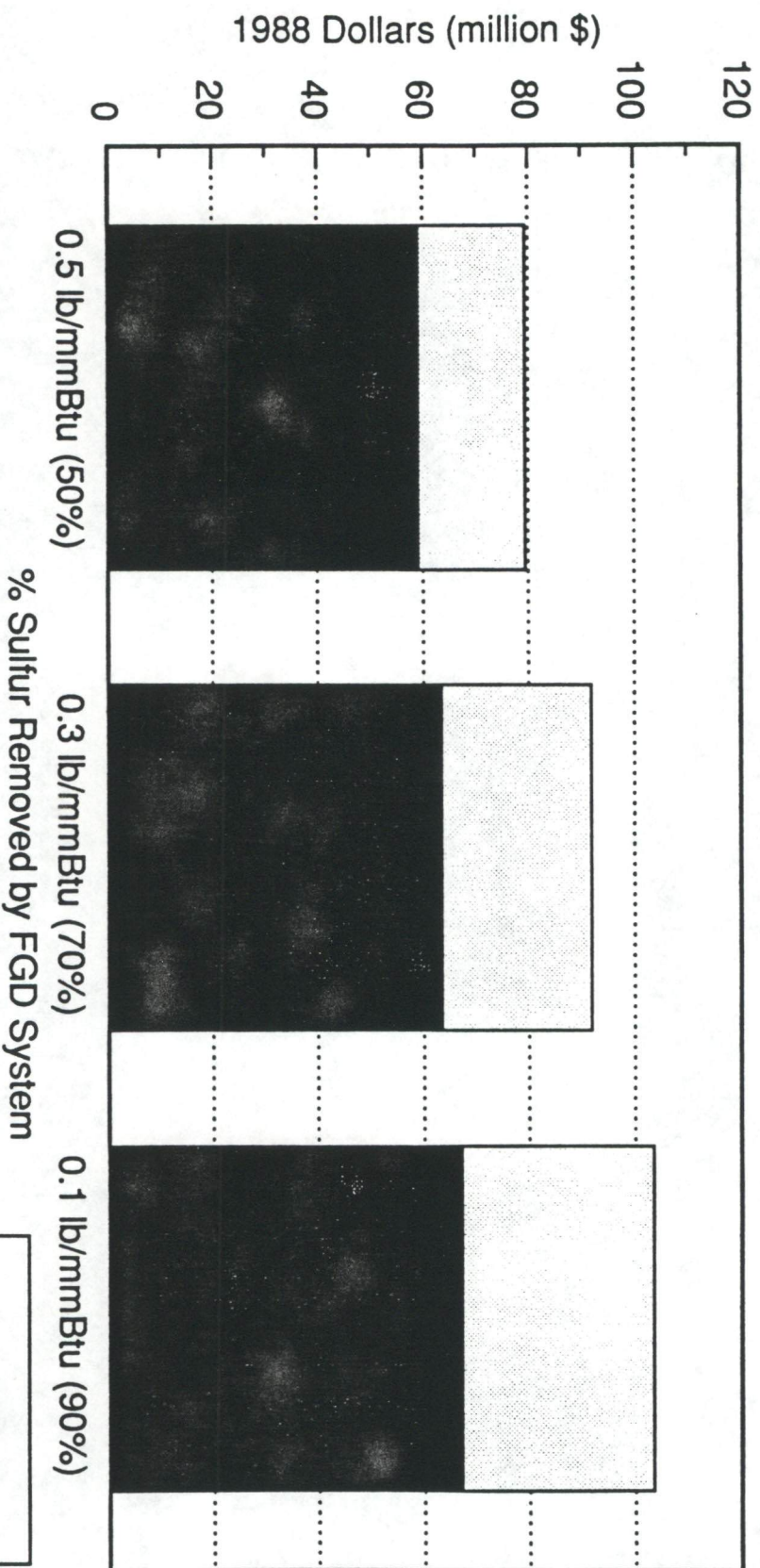
- NGS was designed for retrofit NSPS-type controls.

COSTS AND BENEFITS OF PROPOSED ACTION

- o EPA's BART proposal is: 30 day 0.10 lb/mmBtu SO₂ limit on a 30 day average basis (a 90% reduction).
- o No specific technology is prescribed -- EPA estimates that wet limestone scrubbing is lowest cost but the rule will not require it.
 - o Scrubbers have higher capital costs but lower sorbent and operating costs than the alternatives.
 - o The alternatives being discussed are sorbent injection technologies which have not been demonstrated for removal levels greater than 70%.
- o Plants subject to the current NSPS in the west emit at a rate no greater than 0.20 lb/mmBtu on an annual basis and are typically subject to enforceable limits that are more stringent, and that are set on a short term basis.
 - o The 1990 amendments to the CAA require revision to the NSPS to remove the percent reduction requirement but ensure the revised standard is at least as stringent as the current one.
- o The costs of control do not increase significantly between 70% percent removal (a 0.30 lb/mmBtu limit) and 90% percent removal (a 0.10 lb/mmBtu).
- o The benefits substantially exceed costs at every level of control but the benefit cost ratio is maximized at 90% removal.

Cost Difference Between BART Options is Negligible

Annualized Cost Difference



Net Cost*



Gross Cost

* Using Administration's Estimate of

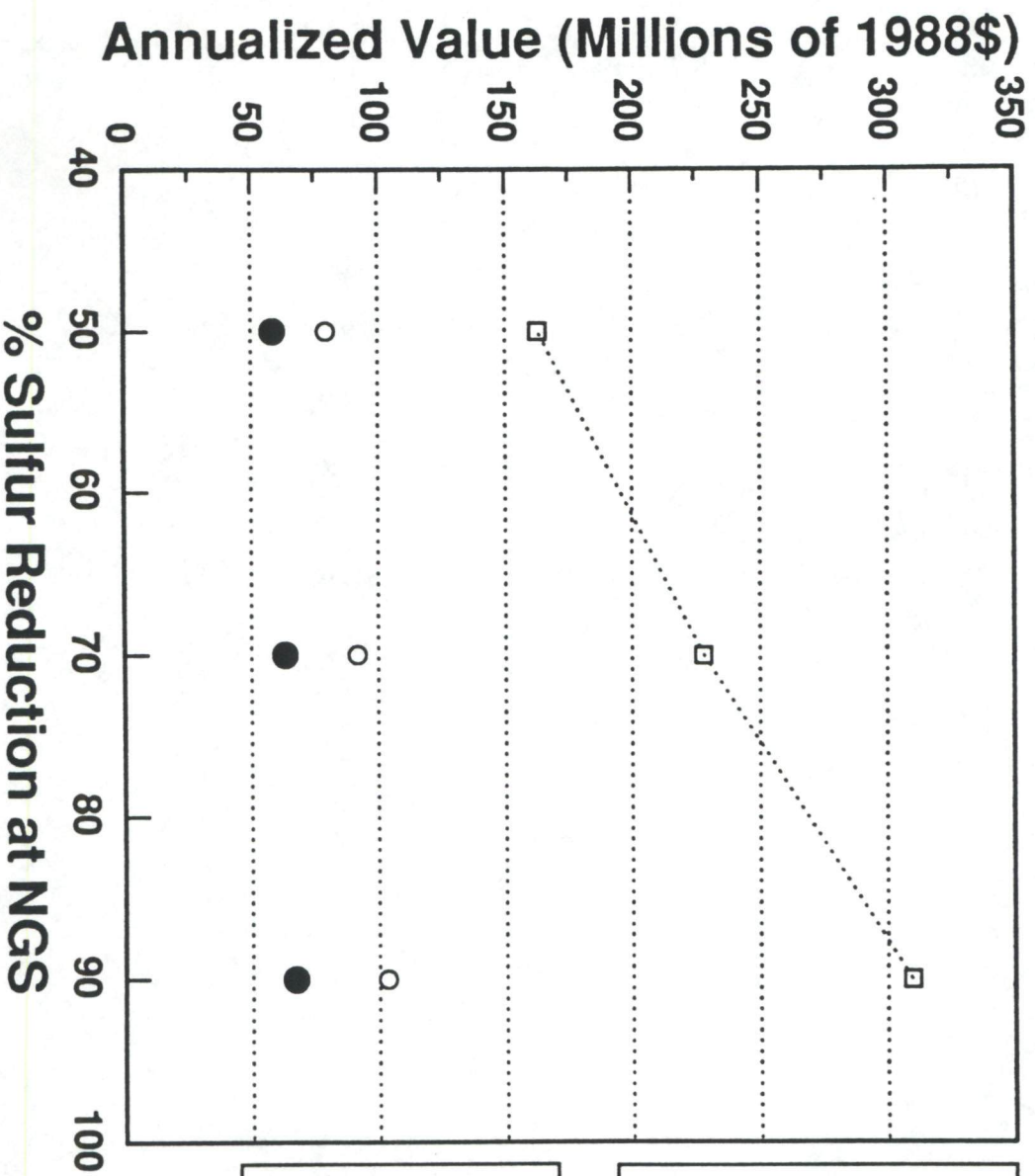
Acid Rain Allowance Value (\$570/Ton)

(ICF Report, 6/90)

0.1 = \$67.2 M
0.5 = \$59.1 M
Diff. = \$ 8.2 M

Benefits Substantially Exceed Costs

Year 2005, Acid Rain Credits of \$570 / ton



Benefits
.....□.....

Gross Annual Cost
(No Acid Rain Credits)
○

Net Annual Cost
(With Acid Rain Credits)
●

BENEFIT/COST RATIOS
(With Acid Rain Credits)

0.1 lb/mmBtu (90%) : 4.6
0.3 lb/mmBtu (70%) : 3.6
0.5 lb/mmBtu (50%) : 2.8

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USER ID NUMBER: _____
COMMENTS: Jeff -

more regarding NGS:
- 20 days averaging
- under the Breakley.
B.

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**THE EPA DRAFT BART PROPOSAL FOR NAVAJO
IMPERMISSIBLY INCLUDES A THREE-HOUR AVERAGING TIME**

The February 1990 draft of EPA's BART proposal for Navajo includes the requirement that the 90 % reduction in SO₂^{1/} emissions targeted for that plant be measured on a 3-hour basis. Adoption of such an averaging time would exceed EPA's authority:

1. The Agency's visibility regulations indicate that the most stringent controls required for BART is NSPS. If Navajo were built today, NSPS for that plant would be a 70 % reduction on a 30-day averaging time. Thus, the proposed 3-hour averaging time -- as well as the 90 % reduction requirement -- is more stringent than permitted by EPA's regulations.^{2/}
2. EPA has concluded in the NSPS proceedings that the shorter averaging time is inappropriate.
 - a. In 1978, EPA proposed a 24-hour averaging time for the current NSPS, but had to extend that time to 30 days. This revision was made because the shorter averaging time was stricter than the technology could achieve, the legal standard for NSPS.
 - b. Similarly, NSPS for combustion sources established in the 1980's were also grounded in the 30-day averaging convention.

Because EPA has never used the 3-hour average for NSPS for coal fired sources,^{3/} it represents an inappropriate basis for a BART requirement.

^{1/} That proposal's indication of the need for additional controls of NOx and particulate matter ignore the findings made by EPA in the record that Navajo's emissions of these two pollutants do not appear to affect class I area visibility. As a result, no BART proceeding can require reductions in their emissions.

^{2/} EPA has used a short-term averaging convention when setting ambient standards in order to protect the public from acute health effects. While such short averaging times may be appropriate for such settings, they say nothing about the needs of the technology-based standards like BART.

^{3/} In the context of establishing BACT requirements for new sources EPA may consider short averaging times. However, these requirements are designed to be no less stringent than NSPS and BART is to be no more stringent than NSPS.

3. As a policy matter, even the 30-day averaging time may be too short. When adopting the 1990 Amendments, Congress based its regional emission reductions for control of total loadings on annual averages. To the extent that controls are adopted for Navajo, an annual average should be used because it better reflects current environmental policy.

SENT BY: XEROX Telecopier 7017; 1-16-91 ; 11:28 ;

E KAMBER GROUP-

1202 824 5904;# 2

Text of Telegram
Sent to Dr. Allan Bromley
January 16, 1991

The Honorable D. Allan Bromley
Assistant To The President
For Science and Technology
Old Executive Office Building
Suite 358
17th St. and Pennsylvania Ave., NW
Washington, D.C. 20500

Dear Dr. Bromley:

In September of last year, we were encouraged to learn EPA Administrator William Reilly had stated in a National Press Club speech that:

"Sound science is our most reliable compass in a turbulent sea of siren songs. Science can lend much-needed coherence, order and integrity to the often costly and controversial decisions that must be made."

As a group of scientists who have followed a federal regulatory issue for well over a year, we are writing to call to your attention an egregious example where some at the EPA are not living up to Administrator Reilly's "sound science" proclamation.

In an effort to enforce the visibility provisions of the 1977 Clean Air Act, the agency has initiated a bewildering and gratuitous \$4.4 billion regulatory proposal to improve Grand Canyon visibility during a few days in the winter.

In the process, the EPA has (1) singled out one emission source as the "major contributor" to Grand Canyon haze while over a decade of prior research suggests the contrary; (2) manipulated the data of one brief scientific experiment in order to meet its own preconceived conclusions; (3) promoted an artificial crisis situation to justify its controversial regulatory initiative (4) and has ignored a thorough and professional review by an eminent National Academy of Sciences panel.

We are naturally quite troubled by EPA's actions in this case. Instead of making strides to improving Grand Canyon visibility, we are concerned this policy will damage the agency's own credibility and most importantly impede future efforts to improving visibility in all of our national parks.

Recognizing your desire to nurture and promote the use of proper science in the nation's public policy-making process, we ask that you intervene in this matter, so that you can assure that Administrator Reilly's call for "sound science" becomes

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1202 624 5804:# 3

reality and not just rhetoric.

As you may recall, in August of 1989, the EPA singled-out the Navajo Generating Station (NGS), a clean-coal fired power plant as the major contributor to winter-time Grand Canyon haze. In turn, the agency proposed that the owners of the plant install 90 percent sulfur-scrubbing equipment at a cost to its ratepayers of over \$4 billion over the life of the plant.

It has been well established that there are several regional contributors to visibility impairment. Over 10 years of government/industry research has shown that as much as two-thirds of the contribution is natural, having nothing to do with human causes. The remaining third is attributed to urban sources as far away as California, copper smelters in Arizona, Mexico and New Mexico and other power plants in the Southwest.

Nevertheless, EPA has chosen to focus on the results of one brief National Park Service experiment called WHITEX, conducted during a six-week period in the winter of 1986-87, which suggests the NGS plant is responsible for up to 70 percent of wintertime haze.

What is most troubling is that the WHITEX test was an experimental one, not originally designed to reach the conclusions for which it is now being used. After roughly a quarter of the study had been completed, the EPA requested that the study be changed from research (designed to determine whether any of three methods of analysis could be used for attribution purposes) to an attribution study to quantify the extent of NGS's contribution to Grand Canyon haze.

The scientists involved in the study had insufficient data, inadequate methods and not enough time to meet such an objective. Yet the scientists were put under pressure to do so. In our view, the WHITEX report represents extreme abuse of science and it is discouraging that the EPA would resort to such means to justify a regulatory decision.

Recognizing this controversy, Interior Secretary Manuel Lujan requested the National Academy of Sciences (NAS) to review the Park Service WHITEX experiment. The NAS critique, released in October, 1990, disputed the conclusions of the Park Service experiment and concluded WHITEX failed to show how much or how often NGS emissions affect winter-time haze in the Grand Canyon.

In addition, the Salt River Project and the other owners of the Navajo Generating Station last year sponsored the most detailed and comprehensive study ever conducted on visibility in the United States. The initial results from this \$12.5 million independent and peer-reviewed study are also vastly different from those of the WHITEX experiment. The basic finding was that NGS emittants only made a contribution to Grand Canyon visibility impairment in less than four to seven percent of the test reading

periods. In about half of these instances, it was either cloudy or at night.

Yet despite this NGS study and the National Academy of Sciences critique, the EPA remarkably appears to be advocating its original regulatory proposal. And it is likely that the agency will propose by February, 1991, that the NGS plant must install scrubbers to remove 90 percent of all sulfur dioxide emissions.

As a group of scientists who have studied this issue for several years, we believe such a policy would be wasteful and would do almost nothing to improve what can be seen at the Grand Canyon. And in the process, it could permanently tarnish the reputation of future government-sponsored science used for policy-making purposes.

We would like to meet with you at your earliest convenience to fully discuss this issue and what steps could be taken to prevent other instances of science abuse within the federal government.

Sincerely,

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Tracer Technologies
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Puget Sound Power & Light
411 108th Ave., NE
Bellevue, WA 98007

EPA'S DRAFT PROPOSAL TO IMPROVE VISIBILITY IN THE GRAND CANYON NATIONAL PARK

The Environmental Protection Agency (EPA) is under a Court order of the U.S. District Court for Northern California to propose best available retrofit technology (BART) for the Navajo Generating Station by February 1, 1991.

EPA has prepared a draft proposed rule that would require a 90 percent reduction in SO₂ emissions from the Navajo plant. EPA estimates that this requirement would impose additional control costs of roughly \$125 million per year (that is, a net present value cost of one billion dollars). EPA bases its decision on a finding (1) that SO₂ emissions from Navajo contribute to regional haze during the non-winter time and (2) that emissions from Navajo reduce wintertime visibility in the Grand Canyon by 10 to 15 percent (roughly 15 miles). EPA claims that its rule will yield benefits of \$270 million per year.

We have two major concerns with EPA's proposed rule. First, we believe it imposes costs that substantially outweigh the likely benefits. This position is supported by the recent findings of the National Academy of Science (NAS). The NAS findings completely undermine the credibility of EPA's estimate of the predicted improvement in visibility (and its associated benefits estimates).

Second, EPA's rulemaking represents the first time that EPA would exercise its regulatory authority under Section 169A to address visibility. As a result, this action will likely serve as a major precedent for EPA regulation of a number of major sources of SO₂ emissions. Such an initiative could result in a substantial additional control of SO₂ emissions beyond that required by the Title IV (acid rain) provisions in the 1990 Clean Air Act Amendments.

BACKGROUND

Haze is caused by suspended particulates that scatter and absorb light. Suspended particulates can dull colors, reduce contrast, and decrease visual range. Sulfates (SO₄), which account for one-third to one-half of the particulate concentration in the Grand Canyon, are largely the result of the transformation in the atmosphere of sulfur dioxide (SO₂) emissions from a variety of sources--including coal-fired electric powerplants, copper smelters, and other activities in the populated areas of Arizona and Southern California.

The Navajo Generating Station (NGS) is a 2250 megawatt (MW) coal-fired power plant located in Page, Arizona; about 15 miles northeast of the Park. NGS is owned jointly by the Bureau of

Reclamation (Department of Interior), the Salt River Project,¹ and several electric utilities. NGS meets Arizona's emission limit of 1.0 lbs SO₂/million Btu by firing very-low sulfur coal.² Even with this very stringent emission limit the NGS at full operation emits over 200 tons of SO₂ daily.

The WHITEX Study: Over the winter of 1987, NGS participated in the Winter Haze Intensive Tracer Experiment (WHITEX); a study by the National Park Service to evaluate empirical techniques for determining sources of haze. WHITEX focused on the area between the Grand Canyon and Canyonlands National Park because of the prevailing wind flow to the east -- as a result, only one monitoring site was located at the Grand Canyon, the remaining monitoring sites were located north and east of the Grand Canyon. (See attached map.) WHITEX injected deuterated methane into the smoke stacks of NGS to trace the flow of emissions. Deuterated methane was found at the Hopi Point monitoring station in the Grand Canyon.

The Park Service used a novel statistical analysis to conclude that NGS emissions contributed to wintertime visibility degradation in the Grand Canyon. On September 5, 1989, after reviewing the draft WHITEX report, EPA proposed to attribute a significant portion of wintertime visibility impairment in the Grand Canyon to the NGS.

The National Academy of Sciences Review of WHITEX: WHITEX is a controversial study. The Department of Interior requested that the National Academy of Sciences (NAS) review the WHITEX attribution methodology and conclusions in order to resolve a dispute between the Park Service and the Bureau of Reclamation. The NAS released its review on October 11, 1990. The NAS found:

WHITEX did not quantitatively determine the fraction of [haze] in the Grand Canyon attributable to NGS emissions. The conceptual framework for [the analysis] involved physically unrealistic simplifications ... especially damaging were the absence of measurements below the rim of the grand Canyon and the paucity of background measurements ... the WHITEX data also show that there are important sulfur sources in addition to NGS that appear to contribute to regional background [haze.]

¹ The Salt River Project is a special political subdivision of Arizona supplying area consumers with water and electricity.

² The federal new source performance standard for NGS is 1.2 lbs SO₂/million Btu; under State standards NGS meets a 1.0 lbs SO₂/million Btu limit.

Nevertheless, NAS concluded that NGS contributed significantly to haze in the Grand Canyon at some times during the study period. At the same time, the NAS also concluded that the WHITEX data analysis would not allow a quantitative determination of the fraction of the haze problem attributable to NGS.

BEST AVAILABLE RETROFIT TECHNOLOGY

Section 169A of the CAA requires EPA to establish BART level emission controls for major air pollution sources "which may reasonably be anticipated to cause or contribute to any impairment of visibility" in certain Federal lands. Since NAS concluded that, at times, NGS contributed significantly to haze in the Grand Canyon, it appears that BART controls are required.

Under the CAA, a BART determination is to include

the costs of compliance, the energy and non-air quality environmental impacts, any existing pollution control technology in use at the source, the remaining useful life of the source, and the degree of improvement in visibility.

EPA's Draft Proposed BART Standard: EPA's draft proposed BART determination for NGS would limit emissions to 0.1 lbs SO₂/million Btu; a 90 percent reduction from the current limit.

The Cost of Compliance: According to EPA estimates, the required 90 percent control will cost \$125 million per year.

Energy and Non-Air Quality Impacts: Based on available data, OIRA estimates that the technology required to meet the draft BART emissions level will produce 1.2 billion gallons of wastewater, and an additional 5 million tons of sludge each year. EPA estimates that this control requirement will reduce the energy output of the plant by 29 MW.

Existing Pollution Control Technology: NGS has no post-combustion controls on its SO₂ emissions. Rather, NGS limits emissions by firing very-low sulfur coal, typically 0.45-0.55 percent sulfur. NGS complies with Arizona's emission limit which is more stringent than the applicable Federal standard.

The Remaining Useful Life of the Source: Unknown.

The Visibility Improvement: According to EPA, a 90 percent reduction in emissions for NGS will increase average visual range in the Grand Canyon during the wintertime by 29 km, from 200 km

to 229 km.³ This estimate is based on the WHITEX study. However, NAS has stated that no quantitative estimate of visibility improvement could be made from the WHITEX data. This NAS conclusion completely undermines the credibility of EPA's predicted improvement in visibility.

ALTERNATIVES

Option 1: Allow EPA to Publish A Proposal Requiring Stringent Control of SO₂ Emissions

EPA's draft proposal would require Navajo to reduce its emissions by 90 percent. Yesterday, however, Bill Rosenberg, EPA's Assistant Administrator for Air, indicated that EPA would be willing to discuss an alternative approach based on a 70 percent control level (and some delay in the implementation date that would allow NGS to explore several experimental approaches to control SO₂ emissions).

We are not certain of the benefits or costs of this less stringent control alternative. EPA argues that its analysis indicates that a 90 percent control requirement would be no more costly (and far more cost-effective) than less stringent control levels. However, NGS takes issue with several critical assumptions of EPA's analysis and suggests that a less stringent control requirement would be more cost effective.

Option 2: No Further Control/Define Current Control Level at NGS as BART

Under Section 169A, EPA is to consider a variety of factors, including the cost of compliance, energy and non-air quality environmental effects, and the degree of improvement in visibility. While EPA claims that 90 percent control of NGS emissions would yield a 29 km increase (roughly 15 percent increase) in visual range, the NAS study completely undermines the credibility of a quantitative estimate of the likely improvement in visibility. Given the flexibility provided by Section 169A and the substantial costs and marginal visibility improvement of further control of NGS emissions, OIRA believes EPA could determine that the current emission controls represent BART and no further control is required.

Any such finding should be coupled to the establishment of the Grand Canyon Visibility Transport Commission, as provided by the

³EPA defines the wintertime visibility "season" as including the months from November through March. EPA believes that controlling NGS emissions may also improve visibility in other seasons but does not provide evidence to support this position.

1990 Clean Air Act Amendments. The 1990 CAA Amendments afford an opportunity to establish a well-conceived, comprehensive approach to the problem (rather than proceeding piecemeal with regulation of NGS).

Option 3: Study Regional Haze Under the Auspices of the Grand Canyon Visibility Transport Commission/NGS commits to Reduce Emissions by 70 Percent

Under this alternative, the owners of the NGS would agree to cooperate fully with the Grand Canyon Visibility Transport Commission in conducting regional haze studies and assist EPA in the collection of the data necessary to assess the nature and extent of the haze problem. NGS would also test the feasibility of several promising Clean Coal Technologies. If one of these approaches meets certain cost and effectiveness criteria, NGS would adopt the technology to reduce its SO₂ emission. If these innovative technologies prove to be in-effective or too costly to operate, NGS would install, by January 1, 2000, traditional pollution control equipment to reduce emissions by 70 percent.

Attachment

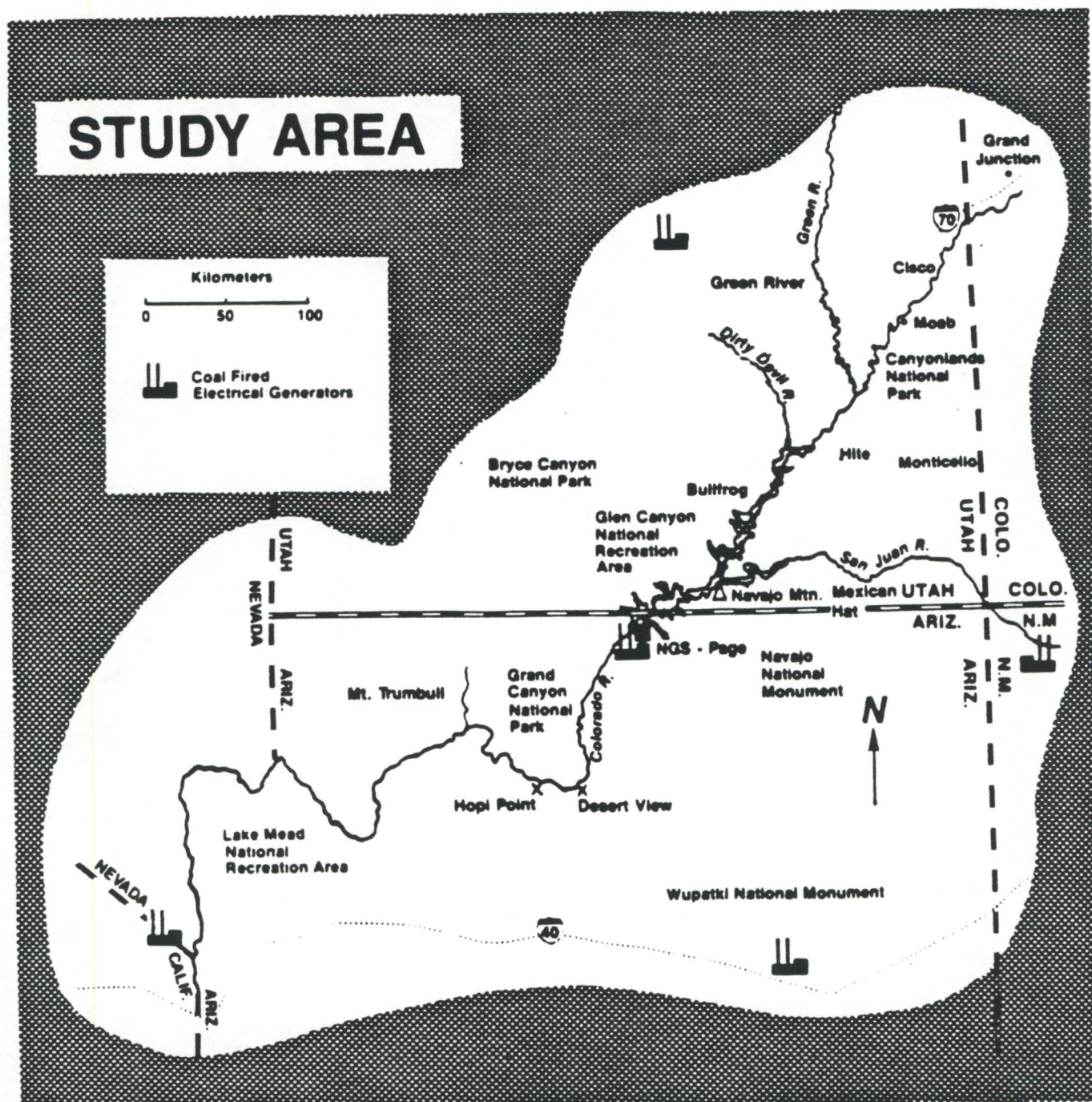


FIGURE 1 SCENES WHITEX study area. Source: Adapted from NPS, 1989.



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TELEPHONE: _____

DATE: 1/16 NO. OF PAGES 16

FROM: Tom Kienan
EPA-OAR

MESSAGE/INSTRUCTIONS: _____

Visibility Protection at the Grand Canyon

Why Action is Needed

- The Grand Canyon is a crown jewel of our National Parks; It is one of the world's greatest natural treasures
- Protecting visibility in our National Parks has been established as one of the goals of the Clean Air Act
- Apart from our statutory obligation, we jointly have the obligation of protecting a resource as valuable as the Grand Canyon from impairment which can be prevented
- EPA, NAS, SRP, studies all show NGS is a significant contributor to impairment and that pollution controls can help remedy the problem
- And, the benefits of applying the controls exceed the costs of applying those controls

Grand Canyon is A National Treasure

Because of its size, unique rock formations, and sheer beauty,
the Grand Canyon is one of our Nation's most prized national parks

It is located in the cleanest region of the Country

Millions of people visit the Grand Canyon every year

- Almost one million visitors every winter

Visual air quality is important to visitors and the Nation

President Bush has indicated his concern for protecting such
treasures as the Grand Canyon;

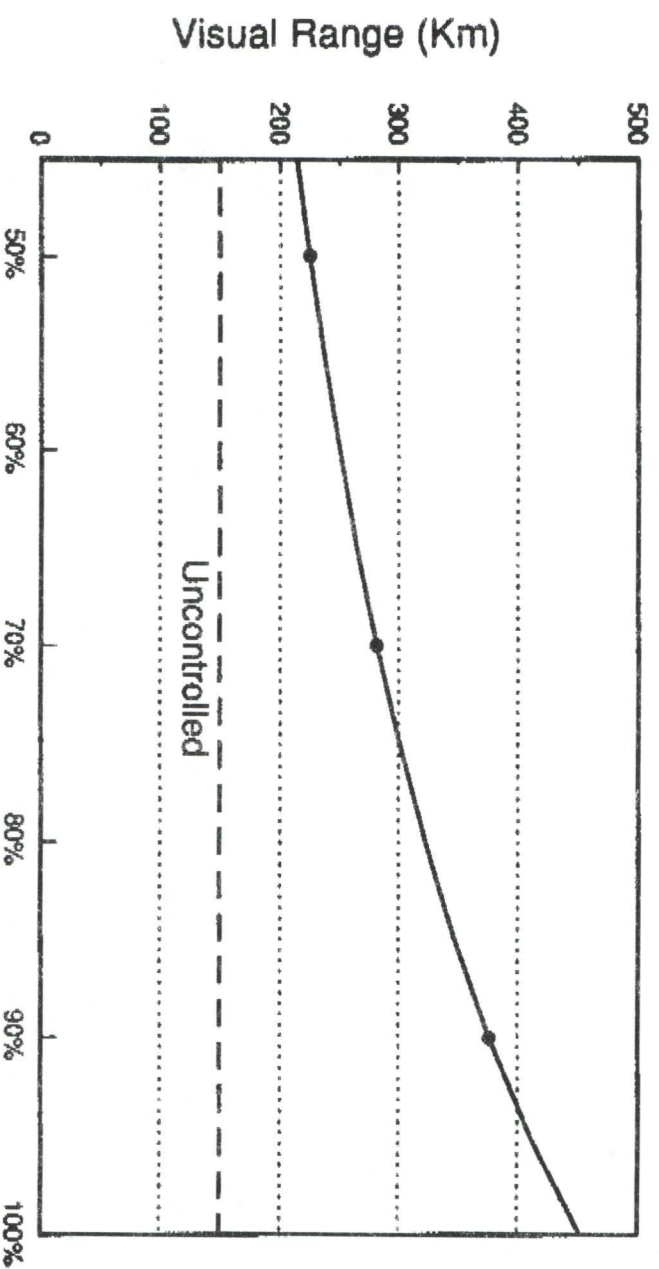
"Behind all the studies, the figures, and the debates, the
environment is a moral issue. . . For it is unjust to allow
the natural splendor bestowed to us to be compromised. . .
Recovery, Restoration, and Renewal -- that is our moral
imperative."

June 8, 1989

Relationship of Pollution Control at NGS to Visibility

GRAND CANYON VISIBILITY IMPROVEMENTS

Visual Range on Worst* Episode Days



* visibility improvements also increase exponentially on average and best days

EPA Must Determine What is Best Available Retrofit Technology (BART)

BART PROCESS

1. Impairment attributed to source
2. Requires use of BART Guideline required
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No general winter component was calculated based on mass balance analysis

Analysis of 1990 Study is incomplete. Only one data point was analyzed

No in-canyon data was released

Tracer data inconclusive for WHITEX data point

High Level of Attention Focused on Decision

Congress

New Hearings Likely

**Environmental Groups Aware of Data and Prepared
to Capitalize on Issue**

Public Aware of Issue

Broad-Based Support for Action

Congress

EPA Testimony, March 9, 1990, House Subcommittee:

"EPA has proposed to conclude that the Navajo Generating Station in Page,

Arizona was an identifiable source of visibility impairment in the Grand Canyon.

We are now proceeding with the rulemaking proposal to determine best available retrofit technology (BART) for this plant."

National Park Service

State of Arizona

Current Governor Supports Control

Department of Environmental Quality Supports WHITEX Conclusions

News Media

General Support in West

City of Los Angeles

Mayor's Office Directs Dept. of Water and Power to investigate control

Environmental Groups

Summary of Draft EPA Regulation

Emission Limitations

Limit SO₂ Emissions to 0.10 Lbs/MMBtu

Option A: 3-hour Average

Exception for Start-up, Shut-down, Malfunction

Exception for 7 hours per month

Option B: 24-hour Average

Exception for Start-up, Shut-down, Malfunction

Option C: 30-day average

Limit NO₂ Emissions to 0.50 Lbs/MMBtu

30 Day Average

Opacity Limit (Particulate Matter) 20 Percent

6 Minute Average

Exception: 6 Minutes per Hour, Max 27 Percent

Justification

Sulfates reduce Grand Canyon visibility

Based on WHITEX and other data.

Existing NO₂ emission rate of 0.40 Lbs/MMBtu.

Increased NO_x emissions could affect visibility in

Grand Canyon due to nitrate formation.

NSPS limits used.

Existing opacity is 12-13 percent. (Limit is 40 percent)
NSPS limits used.

Other Requirements

CEMS Required

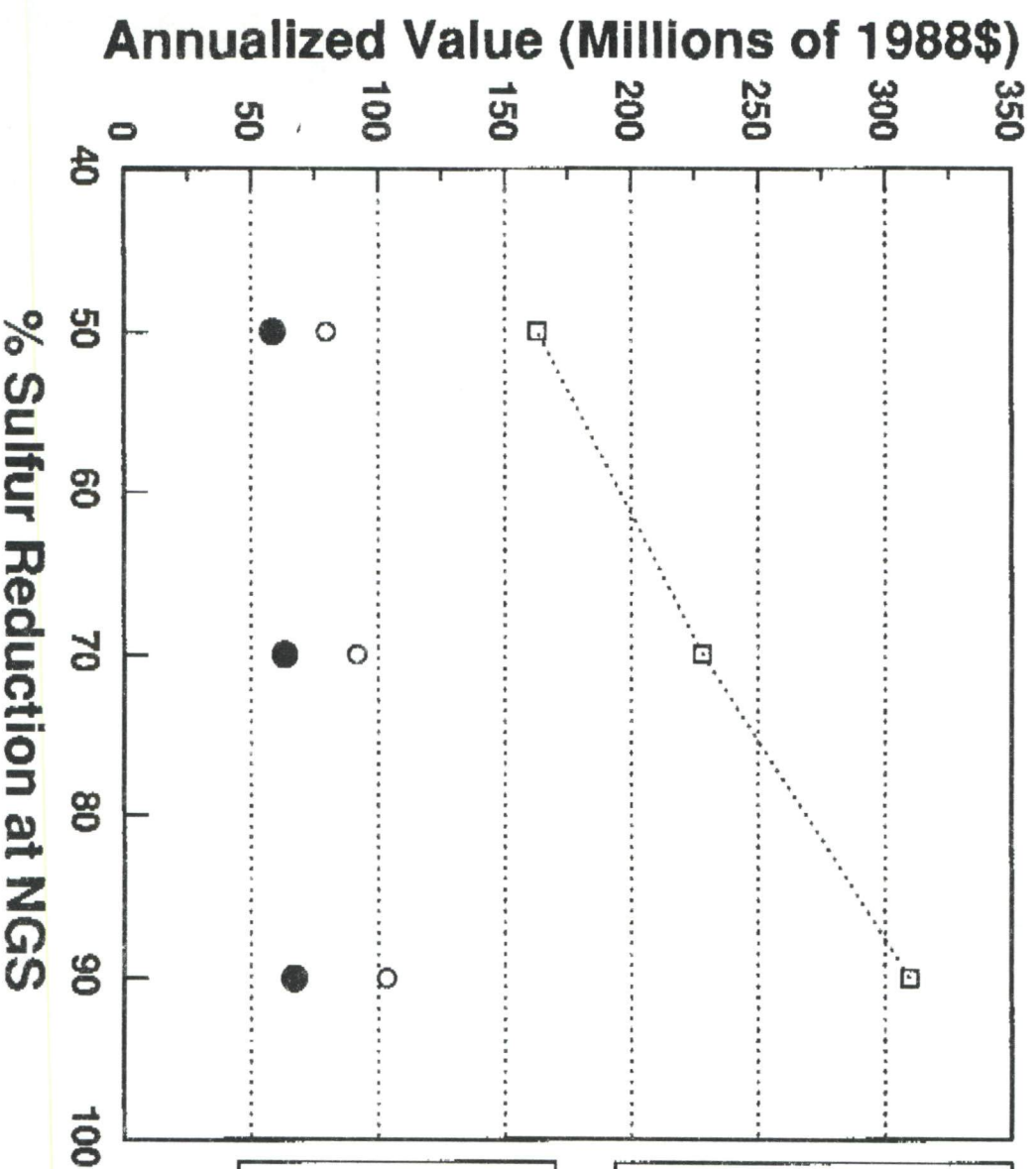
Compliance Date January 1, 1995

Enforcement consistent with State Requirements

3 Years for Construction

Benefits Substantially Exceed Costs

Year 2005, Acid Rain Credits of \$570 / ton



Benefits
.....□.....

Gross Annual Cost
(No Acid Rain Credits)
○

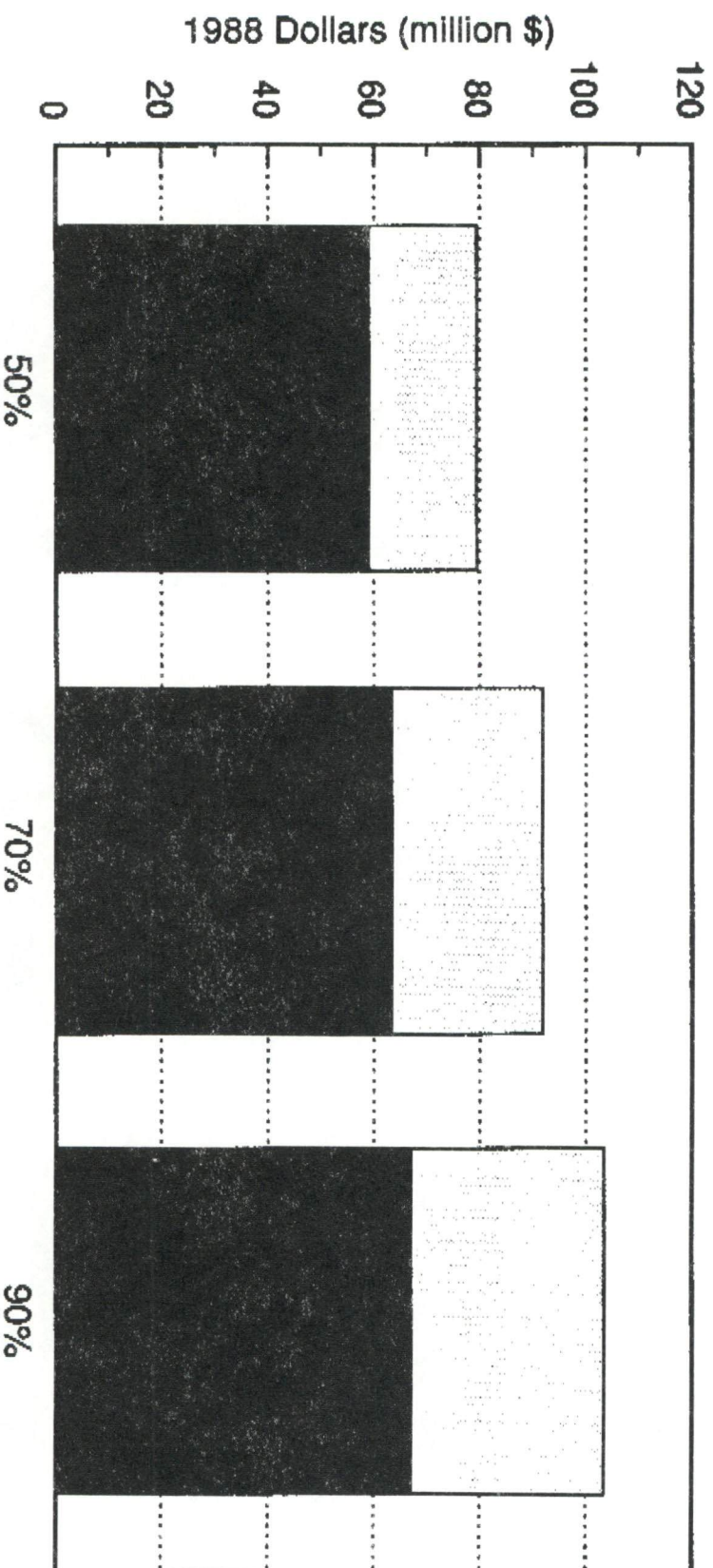
Net Annual Cost
(With Acid Rain Credits)
●

BENEFIT/COST RATIOS
(With Acid Rain Credits)

0.1 lb/mmBtu (90%) : 4.6
0.3 lb/mmBtu (70%) : 3.6
0.5 lb/mmBtu (50%) : 2.8

Cost Difference Between BART Options is Negligible

Annualized Cost Difference



■ Net Cost* □ Gross Cost

* Using Administration's Estimate of

Acid Rain Allowance Value (\$570/Ton)

(ICF Report, 6/90)

90% = \$67.2 M
50% = \$59.1 M
Diff. = \$ 8.2 M

History of NGS Plans For Controlling SO₂ Emissions

Planned to Incorporate Scrubbers

In 1971, NGS, stated, "the plant will be designed so that additional control equipment, including devices for removal of oxides of sulfur, can be added when developed."

Final environmental statement, Feb., 1972:

"the participants have committed themselves to installing sulfur dioxide removal systems on all three units at NGS. . . It is planned that an SO₂ removal system will be installed and operative before. . . May, 1975."

Navajo Generating Station

Three 750,000 KW Units = 2,250,000 KW Total

Uses 2.4 Million Lbs of Coal Each Hour

0.9 Lbs/MMBtu Sulfur

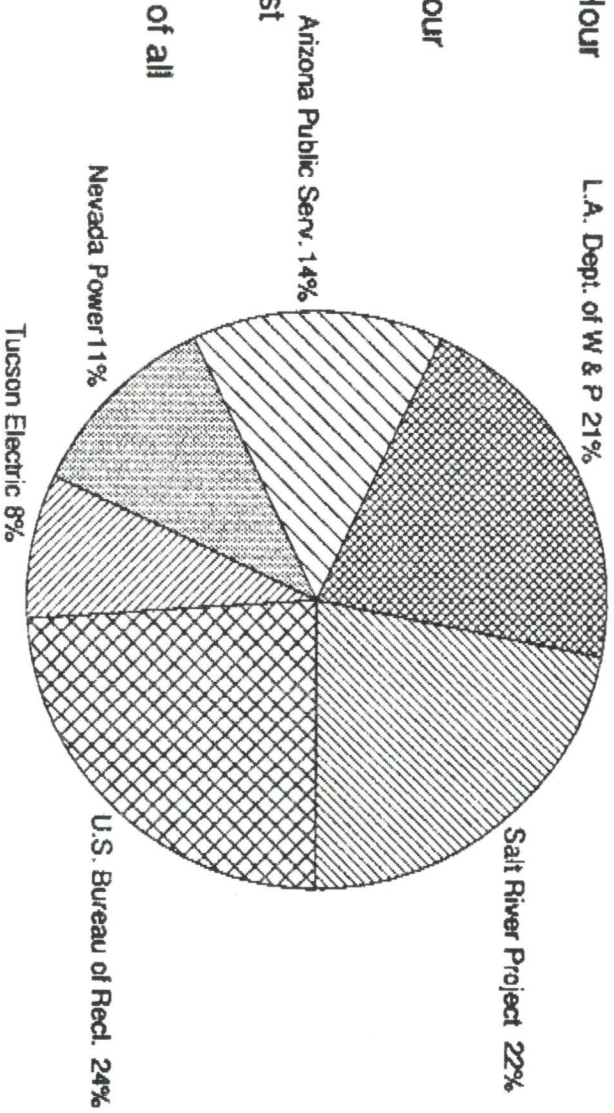
0.5% Ash

Produces 12-13 Tons of SO₂ per Hour

Second Largest SO₂ Source in West

Navajo is approximately 10 percent of all western utility SO₂ emissions

Ownership



Located in the heart of area with highest natural visibility,
15 miles from the Grand Canyon National Park

Clean Air Act

Section 169A "Congress hereby declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from man-made air pollution."

Impairment in the Grand Canyon was a major reason for establishment of the national goal.

Section 169A requires best available retrofit technology (BART) for any source that "...may reasonably be anticipated to cause or contribute to any impairment of visibility..." in any Class I area

Summary of EPA's Position

- Grand Canyon region requires protection as a National Treasure
- NGS contributes to visibility impairment at Grand Canyon
- 90% SO₂ reduction is the most defensible position based on technical, cost, benefit, and legal analyses

SRP-UE&C NGS Emissions

Control and Cost Study

Flue Gas Desulfurization (FGD) System Costs per Compliance Averaging Time*

Annual Cost									
Compliance Average Time	% SO ₂ Removal Required	FGD Type and Number of Absorbers	Capital Cost \$ Millions	1st Year O&M \$ Millions	Present Worth \$ Millions	\$/Year \$ Millions	\$/Ton SO ₂	90% vs. 70% vs. 50% Incremental \$/Ton SO ₂	Total*** Escalated Capital and O&M \$ Millions
3 Hour	95	LSFO, 3+1	406 - 586	47.3	950 - 1,138	110 - 131	1,280 - 1,533	11,690 - 1,723	3,085 - 3,409
	75	LSFO, 3+1	316 - 491	32.0	686 - 869	79 - 100	1,171 - 1,483		2,161 - 2,477
30 Day	90	LSFO, 3+1	357 - 513	43.2	818 - 956	95 - 112	1,164 - 1,374	11,009 - 846	2,658 - 2,881
	70	LSFO, 3+1	300 - 466	31.2	661 - 834	76 - 96	1,208 - 1,526		2,095 - 2,394
	50	LSFO, 2+1	248 - 384	27.4	564 - 706	65 - 82	1,443 - 1,807		1,810 - 2,055
	50	SI	95 - 109	48.3	632 - 646	73 - 75	1,618 - 1,654		2,569 - 2,594
	90	Trimex **	33	44.0	522	60	742		2,245
	70	Trimex **	30	35.6	426	49	778		1,824
Annual (no reheat)	90	LSFO, 2+0	263 - 378	32.4	635 - 755	73 - 87	903 - 1,074	649 - 562	2,086 - 2,293
	70	LSFO, 2+0	233 - 361	26.1	533 - 667	62 - 77	976 - 1,220		1,718 - 1,949
	50	LSFO, 2+0	201 - 313	23.9	456 - 562	53 - 65	1,168 - 1,440		1,476 - 1,636
	90	LSFO, 1+0	218 - 313	30.3	543 - 633	63 - 73	773 - 901		1,818 - 1,954
	70	LSFO, 1+0	197 - 306	25.0	484 - 598	56 - 69	885 - 1,093		1,504 - 1,795
Seasonal (4 Months/Year Operation and Compliance)	70	LSFO, 2+1	233 - 361	22.2	490 - 624	57 - 72	896 - 1,141	381 - 229	1,524 - 1,755
	50	SI/Add ESP	95 - 109	20.6	325 - 339	38 - 39	831 - 867		1,195 - 1,220
	90	Trimex **	33	18.8	242	28	345		994

* All Costs are presented in 1990 dollars, based on 80% station capacity factor and 20 year FGD System Operation, starting last quarter of 1996

** Trimex is an experimental process

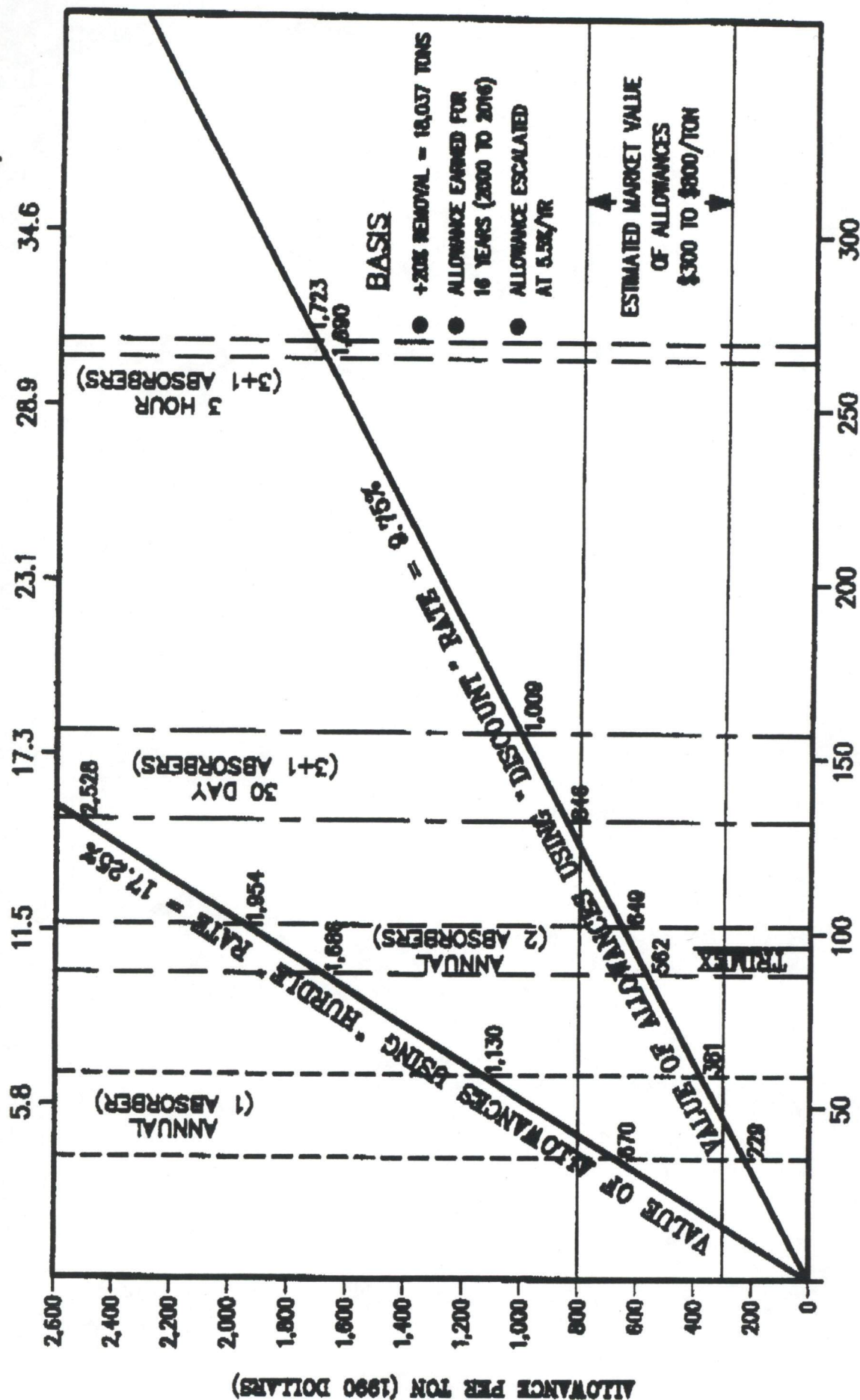
*** "As spent" dollars

⇒ LSFO - Limestone Forced Oxidation

⇒ SI - Sodium Injection, sodium injection SO₂ removal efficiency is unproven with NGS coal

"ANNUAL DOLLARS" (\$MILLIONS)

(BASED ON 20 YEARS AND 9.75% INTEREST, ANNUAL DOLLARS = .11546 X TOTAL DOLLARS)



NGS - INCREMENTAL DOLLARS TO INCREASE SO₂ REMOVAL FROM 70% TO 90%
1990 DOLLARS (\$ MILLIONS)

Analysis of Allowances for NGS
Based On
Clean Air Act Amendment

P.W.		Credit (\$/Ton)	
		17.25%	9.75%
\$264,000,000	3 Hour	5,057	1,690
\$269,000,000		5,152	1,723
\$157,000,000	30 Day	3,007	1,009
\$132,000,000	3 + 1	2,528	846
\$102,000,000	Annual	1,954	649
\$ 88,000,000	2 + 0	1,686	562
\$ 59,000,000	Annual	1,130	381
\$ 35,000,000	1 + 0	670	229

70% Removal

P.W.		Credit (\$/Ton)	
		17.25%	9.75%
\$686 Million	3 Hour	4,285	1,458
\$869 Million		5,428	1,847
\$661 Million	30 Day	4,128	1,405
\$834 Million	3 + 1	5,209	1,772
\$533 Million	Annual	3,329	1,133
\$667 Million	2 + 0	4,166	1,417
\$484 Million	Annual	3,023	1,028
\$598 Million	1 + 0	3,735	1,271

CRITICAL ISSUES

Visibility Benefits Assessments

Of 42 key issues identified with respect to contingent valuation studies relating to values of National Parks, the Grand Canyon Visibility Benefits (GCVB) study provides a technically superior and therefore more credible and defensible approach than the NPS study on 40 of those issues. A few of examples of why the GCVB study is a more accurate representation of actual values are:

Valuing visibility in the Grand Canyon rather than preservation of the Grand Canyon itself from irreversible effects in perpetuity

Valued photos of actual winter visibility episodes rather than extrapolating their value from hazy summer photos

Valued both large and relatively small visibility changes in specific seasons rather than extrapolating values for small changes from large visibility changes that last forever

Used large easily understandable photos of winter and summer scenes rather than small misrepresentative photos of hazy summer days compared to clear winter days

Did not adjust the results by including escalation factors for the unsupportable contention that people would value visibility in the Grand Canyon more each year

Adhered to standard, accepted survey techniques applied by experienced experts in person versus through the mail which excludes a large portion of the sample population from potential inclusion, assumes a high degree of literacy and accepts a high degree of self selection bias

Accounted for natural visibility impairment

Contingent Valuation studies measure value by assessing a person's willingness to pay (WTP) for a specific proposed change. That dollar amount is then translated into a household WTP figure and national benefits are estimated based on the number of households in the country. Comparisons between the results of the NPS study and the GCVB study follow below.

<u>Result Parameter</u>	<u>NPS Study</u>	<u>GCVB Study</u>
<u>Annual National Benefits in Millions of Dollars</u>		
Based on Raw or Unadjusted Mean	Not Provided	25-50
Raw Mean w/o Natural Impairment	?	3-25
Adjusted Mean	230-400	-
5% Trimmed Mean	-	7-12
<u>WTP \$/Household</u>		
Winter Season		
Median	0.43-0.83	0
Raw Mean	Not Provided	6.34
Adjusted Mean	1.30-2.50	-
5% Trimmed Mean	-	1.24-5.23
BART Reg Action		
Median	0.11-0.32 (est)	0
Raw Mean	Not Provided	2.28
Adjusted Mean	0.33-0.67 (est)	-
5% Trimmed Mean	-	0.07-0.12
BART w/o Natural Impairment		
Median	?	0
Adjusted Mean	?	-
5% Trimmed Mean	-	0.01-0.08

Standard, accepted statistical methods require some type of adjustment or trimming of raw means in most research projects. Certainly, no contingent value researcher has ever recommended using the mean; it is known to be biased upward, often by an order of magnitude or more. This type of research typically demands a treatment of the results to more closely represent the true mean, the midrange of public opinion. In that way a single inordinately high reported WTP will not skew the results.

Three additional independent approaches to estimating the true mean of the GCVB study sample were employed; one very similar the adjustment applied in the NPS study. All three methods estimate the true mean at less than \$1 per household and most the true mean at less than \$0.50 per household.

The three approaches are: 1.) inspection of responses dropping those inconsistent with economic theory (similar to the technique applied in the NPS study) 2.) univariate robust estimation using five techniques and 3.) a multivariate approach.

Potential user benefits by people who actually visit the park (as opposed to the vicarious non-use benefits above) are estimated by the NPS to be less than \$1 million per year. The estimate ranges from a few hundred thousand dollars up to a million.

~~CONFIDENTIAL WORK PRODUCT AND~~
~~PRIVATE INFORMATION COMMUNICATION~~

To: Mike Teague, Bob Bedell, Dan Hawkins, Greg Witherspoon

From: Bill Balson

The attached three pages are revisions of earlier draft summaries sent to you. The two tables show visibility values in millions/year rather than \$/household/year.

Many of the clarifying notes from the previous tables were removed to streamline the tables.

The results from Carson and Ruud's reanalysis of the GCVB data using multiple adjustment techniques are incorporated. The range of household values from that reanalysis is \$0.10 - \$1.00/household/year.

Let me know if any questions arise.



Critical issues between GCVB and C&R:

1. In an effort to ascertain the value of changes in summertime visual range, C&R has its respondents compare a picture of a hazy summer day with a clear winter day. Because the change in sun angle associated with the change in season has such a large and more dramatic effect on the viewer's perception of the picture than does the haze, this practice would improperly inflate, and significantly so, the value assigned to the air pollution effect.

GCVB study carefully evaluates only changes in visibility in the winter, the season of interest, reducing the need to extrapolate from the data.

2. C&R present respondent with large visibility changes that last a substantial portion of the year. This practice requires extensive extrapolation and inflates apparent WTP values because it suppresses zero bids.

GCVB study showed visibility changes of a magnitude and duration reflecting the WHITEEX description of the NGS effect so as to minimize the need to extrapolate (and hence the influence of the analyst's assumptions) from large changes to realistic changes and in the process removes the bias which leads people to associate a relatively larger incremental value with greater changes in visibility. The best evidence of the contribution of the GCVB study is that it reported 80-90% non-protest zero bids, whereas C&R only obtained 7% zero bids.

3. C&R survey encourages respondents to believe that the visibility impact attributable to NGS is an irreversible impact. This biases respondent to state higher WTP because most people will pay more to avoid damages that would last forever.

GCVB study looked at a 20 year period of visibility impairments based on the remaining useful life of NGS.

4. C&R used photographs of clear days, ignoring the need for the high-humidity days that WHITEEX and other studies indicate before NGS can contribute significantly to visibility impairment.

GCVB study included in its study pictures of typical meteorology.

5. C&R use a mail survey. This biases the sample mean to show a higher WTP for three reasons: a large fraction of the population is excluded, the respondents have higher than average degree of literacy, and respondents can choose not to participate after reading the survey.

GCVB study used an in-person survey method to maximize the population sampled and minimize self-selection problems.

**Comparison of Estimates of the Annual Value of
Visibility Improvements at the GCNP Due to Controls at
NGS Based on WHITEX and Based on
Median Household Willingness to Pay**

		Annual value (million\$/ year)
EPA's "Annual Average"		\$100-200
EPA's annual value in 1995		\$43-125
Annual value corrected for:	C&R's unrealistic estimate of visibility improvements	\$11-34
	GCVB estimate of annual visibility values	\$0
¹ The GCVB estimate is preferable because it corrects the problems described above. ² The median is a better estimate of public value than the mean because it is a more stable statistic that is resistant to outliers in the data set. The median also reflects what would happen in a referendum-like contest for deciding whether to augment the controls at NGS. ³ 89% of the GCVB respondents reported that they would associate no value with the visibility benefit on 20 winter episode days.		

**Comparison of Estimates of the Annual Value of Visibility
Improvements at the GCNP Due to Controls at NGS Based on
WHITEX and Based on
Adjusted Mean Household Willingness to Pay**

		Annual value (million\$/ year)
EPA's "Annual Average"		\$300-400
EPA's annual value in 1995		\$180-250
Annual value corrected for:	C&R's unrealistic estimate of visibility improvements	\$33-67
	GCVB estimate of annual visibility values	\$2-24 ¹
	the days on which natural conditions prevent controls at NGS from having a perceptible effect	\$1-16 ²

¹ These figures reflect a change in our method of adjustment of the raw data in response to a comment from EPA staff. The upper end of the range reported is the most conservative result from the five alternative adjustment schemes tried.

² To view this last range in perspective, it indicates that the U.S. population would be willing to pay as much as \$160 per visitor to the Grand Canyon on the days on which they could see visual range improve from 85 miles to 105 miles. On-site studies of the visitors' values for significant visibility improvements estimate \$1 to 8 per visitor day, which is significantly less than the cost of achieving the improvement.



**A Comparison of C&R and GCVB Study Estimates
of Adjusted Mean Household Visibility Values
(\$/household/year)**

note: There are about 100,000,000 households in the United States	C&R	GCVB Study ³
Household value reported in RIA for a 14% winter average VR improvement ¹ (average VR improves from 186km to 213km) ²	\$1.30-2.50	-
Household value that results from combining C&R with the RIA estimate of episode improvement (25 days improve from 186 km to 169 km) ²	\$0.33-0.67	-
Household value that results from combining GCVB Study with the RIA estimate of episode improvement (25 days improve from 136km to 169km) ²	-	\$0.07-0.12
Household value that results from linearly reducing estimate to account for natural visibility impairments (assumes 33-80% of episode days are affected by a BART action)	-	\$0.01-0.08 ⁴
¹ RIA, Appendix C, Table 4-4 ² RIA, Appendix C, Table 1-1 ³ These are rounded to the nearest cent. Alternative methods for adjusting the raw data could increase this number by a factor of 2 or reduce the estimate to zero. ⁴ To place this number in perspective, it indicates that the U.S. population would be willing to pay as much as \$4-80 per visitor to the Grand Canyon on winter- episode days during which perceived visual range improves.		

CONCERNS WITH EPA'S BENEFITS ESTIMATE

Estimating the benefits of any visibility improvements that would result from controls at NGS depends on two separate components of analysis: (1) the effect of emissions on visibility impairment must be quantified; and (2) any given quantified level of visibility improvements must be valued. We have serious concerns about EPA's analysis in both areas.

Quantification of Visibility Improvements

In order to estimate the benefits of its draft proposed rule, the Environmental Protection Agency (EPA) used the WHITEX study to estimate the fraction of haze attributable to Navajo emissions and the likely improvement associated with its proposed controls.

However, the recent NAS review of the WHITEX study completely undermines the credibility of EPA's estimate.

- NAS concluded that WHITEX is not an adequate basis for developing a quantitative estimate of the visibility impairment attributable to Navajo emissions. Critical shortcomings in the WHITEX study include:
- o the failure to account properly for other sources of SO₂. NAS reported that there are other important sulfur sources near the Grand Canyon, and these sources account for a significant fraction of the haze in the Grand Canyon National Park;¹
 - o the paucity of data on background SO₂ levels;
 - o the absence of data from below the rim of the Grand Canyon; and,
 - o the absence of meteorological data (e.g., relative humidity) that would allow estimates of the conversion of SO₂ emissions from Navajo to SO₄ aerosols at various locations in the Park and the failure to examine adequately the sensitivity of its calculations of the conversion rate under alternative assumptions.

¹As one aspect of this concern, NAS reported that there are important uncertainties with the tracer data used in WHITEX. The ratio of the tracer used at NGS (CD₄) to SO₂ varied by a factor of 2.5 but was not measured in the smokestack. Furthermore, the WHITEX report provided little documentation of procedures and quality assurance for sampling and analysis of CD₄. In addition, variations in CD₄ were not shown to correlate with any of the SO₂ variability measured at the GCNP that cannot be explained by tracers from other (non-NGS) sources.

- NAS also makes it clear that Navajo would contribute to wintertime visibility only on some days. Navajo's contribution to visibility impairment depends on certain meteorological conditions, in particular:²
- o air stagnation conditions that result in an atypical wind pattern (from the Northeast to the Southwest);
 - o higher levels of relative humidity; and,
 - o cloudy or foggy conditions.

²NAS reports that conversion of SO₂ to SO₄ aerosols is extremely sensitive to meteorological conditions and the availability of oxidants; the extent of SO₄ conversion could range from a very small percentage to nearly 100 percent. Conversion rates would be high during cloudy and foggy conditions, such as those observed during WHITEX haze episodes.

Valuation of Visibility Improvements

The Environmental Protection Agency (EPA) valuation estimates of the visibility benefits rely exclusively on the National Parks Visibility Values contingent valuation (CV) study conducted by Chestnut and Rowe (CR). The CR study used a survey questionnaire to estimate willingness-to-pay (WTP) for a general improvement in visibility. However, the study was not designed to address the potential visibility improvements associated with the reduction in emissions from Navajo. While EPA's analysis attempted to adjust for some of these differences, we have several key concerns with EPA's use of CR to derive a value of visibility improvement.

- The CR study used by EPA developed estimates of WTP based on:
 - o photographs representing extreme conditions -- four scenes ranging from a poor visibility day in the summer (visual range of roughly 60 miles) to a clear winter day (visual range of 150 miles);
 - o average (year-round) visibility changes rather than episodic events involving fewer than 10 percent of the days each year; and
 - o visibility improvements that avoid permanent and irreversible adverse effects.
- the CR study also failed to ensure that respondents only valued improvements in visibility (some respondents may have believed, for example, that improvement in visibility would also protect health or the ecology of the Canyon).
- the CR study used by EPA represents only one of several CV studies that have attempted to value visibility improvements in the Grand Canyon.
 - o two studies have estimated WTP values for improved visibility by actual visitors to the Grand Canyon; these studies yield estimates that are only a fraction (less than one-tenth to less than one-one hundredth) of the estimates in the CV study used by EPA.
- EPA's RIA argues that the survey designs used to estimate the WTP of actual visitors may have caused them to be understated;
- we believe that the WTP values estimated by CR based on non-visitors may overstate the value of small visibility improvements because non-visitors are more likely to include the value of the overall GCNP experience in their stated visibility values. Visitors may be better able to place in context and value visibility effects.

In any event, valuation of the effects of Navajo emissions using contingent valuation studies will be very sensitive to the photographs presented to respondents. Effects of Navajo emissions on visual range and the valuation of those effects depend on the context of the event--lighting conditions, direction of sun, clouds or fog, all affect the visual experience. Visibility impairment would clearly be valued differently on a clear day, than on a cloudy or foggy day. Visibility impairments from Navajo emissions would be less likely to occur, however, on a clear (low humidity) day.

EPA RESPONSE TO OMB COMMENTS ON NGS ATTRIBUTION

General Response

Comment: The National Academy of Sciences (NAS) review of the Winter Haze Intensive Tracer Experiment (WHITEX) study completely undermines the credibility of EPA's estimate of improvements likely from control of Navajo Generating Station (NGS) emissions.

Response: This is a misreading by OMB of the NAS conclusions. While the NAS review underscores the uncertainties in providing a precise point estimate of the impairment caused by NGS in the Grand Canyon, NAS estimates a range of impacts consistent with or greater than those used in EPA's analysis. The higher end of this range is supported by preliminary analysis of the recent study by Salt River Project (SRP) as well as further analysis of the WHITEX data not examined by NAS. All of these studies point to significant impacts by NGS within the range originally found based on the WHITEX report. More importantly, neither the NAS report nor the initial results of the SRP study provide any basis for OMB's assertion that this range includes zero impact across the majority of the study period. Moreover, if the NGS pollution does not travel toward the Grand Canyon it is likely to affect other national parks where visibility is an important value. These additional impacts were not considered in the EPA analysis. If anything this would result in an underestimate, rather than an overstatement.

Technical Response

Comment: The failure to account properly for other sources of sulfur dioxide (SO₂) is a critical shortcoming of WHITEX analyses.

Response: This problem with WHITEX does not critically affect our ability to provide a reasonable range of effects. The contributions of other sulfur sources, such as smelters, were accounted for in analyses not commented on by NAS. The National Park Service (NPS) addressed the collinearity question in supplemental statistical analyses, again finding NGS responsible for identified periods of sulfur-based impairment at Grand Canyon during the WHITEX study. Some large smelters operating during WHITEX have controlled or shut down since the WHITEX measurement period. Yet large sulfate episodes of impairment continue at the Grand Canyon National Park. NGS is the second largest SO₂ source in the west, emitting more SO₂ than the entire Los Angeles basin. Given its location next to the Grand Canyon, NAS calculated that NGS could account for episodes of impairment even greater than those measured in WHITEX. New in canyon visibility and particle monitoring (1989) documented an impairment episode where sulfate concentrations reached 8 µg/m³, which is higher than NAS's estimated highest conversion of NGS emissions based on WHITEX data. No other source in the region could be responsible for such high levels.

Comment: The paucity of data on background SO₄ (sulfate) levels is a critical shortcoming of WHITEX analyses.

Response: While more background measurement of sulfate would be beneficial, this is not a critical shortcoming preventing a reasonable estimate of NGS's contribution to sulfates. In response to this NAS criticism, NPS conducted a supplemental analysis. Measurements of pre-NGS atmospheric sulfate concentrations in air flows towards the Grand Canyon can be estimated from measurements at Bryce Canyon. Using that site in the attribution analysis sets a upper limit on the NGS contribution to Grand Canyon haze at 50% to 60% of the sulfate concentrations for the February 11, 12 episode. This is a conservative assessment because it is likely that Bryce Canyon was somewhat affected by NGS emissions at that time.

Comment: The absence of data from below the rim of the Grand Canyon is a critical shortcoming of WHITEX analyses.

Response: OMB erroneously supports that this factor would lead to less impact from NGS than calculated in WHITEX. In fact, NAS indicated that this limitation may have resulted in NPS underestimating sulfur concentrations. Subsequent analysis and data indicate that in canyon effects are even greater than those found in WHITEX. Time-lapse photography showed that the haze layer within the Canyon did reach the rim of the Canyon and the sampling site during that episode shows substantial NGS contribution. Moreover, monitoring of particles and extinction within the canyon in 1989 shows episodes where concentrations of sulfate reach 8 $\mu\text{g}/\text{m}^3$, significantly higher than any WHITEX measurement. This is near the annual average sulfate concentration found in eastern Class I areas and reduces visibility from an average 200 km to less than 40 km. This measurement of sulfate in 1989 are consistent with NAS's estimates of maximum conversion of NGS SO_2 to sulfate based on the WHITEX data. It is insupportable to state that other sources could have accounted for this level of sulfates in the Grand Canyon. For times other than episodes, preliminary analysis of the SRP 1990 tracer data from within the canyon (Indian Gardens) identifies NGS as a significant contributor to sulfate throughout the monitoring season.

Comment: The absence of meteorological data (e.g., relative humidity) that would allow estimates of the conversion rate of SO_2 emissions to SO_4 (sulfate) is a critical shortcoming of WHITEX analyses.

Response: This is not a critical shortcoming because a full range of literature values for deposition and conversion were used in evaluating the sensitivity of the models used in attributing the sulfur-based impairment to NGS. While exact measurements would provide more exact estimates for the WHITEX period, using literature values to define a range of impacts is reasonable to estimate a range of benefits as was done in the EPA Regulatory Impact Analysis (RIA).

Comment: According to NAS, NGS only contributes to impairment on some days.

Response: This is a misrepresentation of the NAS conclusion. NAS stated that NGS was a significant contributor to impairment on some days. This does not mean that NGS does not contribute to impairment on other days. In fact tracer data from WHITEX and the 1990 SRP study indicates that NGS pollution is present in the canyon a majority of the time during the tracer study period. Any initial conclusion that presence of tracer can be attributed to noise is not supported by analysis of particle data.

Comment: NGS's contribution is dependent on air stagnation conditions, higher humidity, and cloudy or foggy conditions.

Response: Once again OMB makes a comment that is on its face correct, but does not alter the conclusion of EPA's attribution as used in the RIA. It is correct that the confluence of low air speed and RH higher than 70% (which is equivalent to presence of clouds) is needed for major episodes. However, these conditions occur together frequently enough to produce the attribution calculated used WHITEX. SRP claims that this occurs only 4-7 percent of the time. EPA benefits calculations used 10 episodes per winter season which is approximately 15-20 percent of the time. In addition, EPA calculated that NGS contributes 30% to 40% of the sulfate throughout the winter season as compared to 70% during episodes. Preliminary analysis of SRP 1990 tracer data indicates a similar portion of the sulfates (20% to 30%) can be associated with NGS.

EPA RESPONSE TO OMB COMMENTS ON ECONOMIC VALUATION**Technical Response**

Comment: Photographs used in CV study represent extreme conditions.

Response: The photographs are not extreme conditions: they accurately depict the actual distribution of visibility conditions at the Grand Canyon. A very conservative adjustment was made to adjust to the Navajo situation. The original study found an average value of \$19 (per household per year) for a 27 mile improvement in year round average visual range. EPA estimates a value of only \$1.10 to \$2.20 for a 16 mile improvement in average visual range during the 5 month winter period. These small values result from adjustments for 1) smaller visibility change, 2) winter-only improvements, and 3) the limited life of the Navajo Generating Station. Salt River Projects recent pilot CV study (which used substantially different photographs) found a mean response of \$2.25 for improvements on only 10 winter days, equivalent to a 7 mile improvement in average winter conditions.

Comment: Values are based on average (year-round) visibility changes rather than episodic events involving fewer than 10 percent of the days each year.

Response: EPA's benefits are based on improvements on 100 winter days, including 21 days with dramatic improvement. That is actually smaller than those found in the recent attribution findings by SRP and NAS. All psychological and economic evidence indicates people are more concerned about substantial degradation on some days than about the equivalent average change. This implies EPA's benefit estimates are understated.

Comment: Values are based on visibility improvements that avoid permanent and irreversible adverse effects.

Response: This is not correct. EPA adjusted values to reflect difference between a perpetual improvement and an improvement that lasts 20 to 40 years.

Comment: The Chestnut and Rowe (C&R) study failed to ensure that respondents only valued improvements in visibility.

Response: EPA took great care to avoid counting non-visibility benefits. This issue was a central design feature of the C&R study. The questionnaire used two approaches to ensure people understood the issue was visibility. After other discussion and questions about only visibility, and before the valuation question was asked, the questionnaire had the following text:

These questions concern only visibility at national parks in the Southwest and assume there will be no change in visibility at national parks in other regions. Other households are being asked about visibility, human health and vegetation protection in urban areas and at national parks.

After the visibility valuation question was asked, respondents were asked if their responses were really about visibility, or included values for other things as well. A question asked "About what percent of your dollar answers is for visibility [only]". The values used in the original study and in EPA's benefit study use only the reported portion of the original value response. If anything, the final benefits result are understated by excluding both implicit and explicit valuation of potential non-visibility effects.

Comment: C&R represents only one of several CV studies that have attempted to value visibility improvements in the Grand Canyon.

Response: EPA carefully examined the relevant literature (beyond that cited by OMB) on Grand Canyon visibility. The benefit estimates are based on the lowest of all available valuation studies. The National Park Visibility Value study is the best available because it is the most recent complete study, explicitly examined values for visibility improvement at the Grand Canyon, was designed to utilize state-of-the-art contingent valuation techniques. Moreover, all other valuation studies, including the subsequent CV pilot study by the Salt River Project, result in benefits greater than the EPA's analysis.

Comment: Two studies have estimated willingness to pay values for improved visibility by actual visitors to the Grand Canyon that are only a fraction of EPA's estimates.

Response: We are surprised that OMB would so constrain the scope of benefits. Clearly, the issue is not merely the value to visitors: most people in the United States genuinely want to protect Grand Canyon. The benefit analysis attempts to quantify that desire in dollar terms. On-site value was excluded to avoid double counting.

Comment: Non-visitors may overstate the value of small visibility improvements because non-visitors are more likely to include the value of the overall Grand Canyon experience in their stated visibility values.

Response: This assertion is totally without foundation in the literature. Half the respondents in the C&R study had visited the Grand Canyon, and over 70% say they are likely to visit a Southwest National Park in the next 5 years. The survey took great care to ensure people understood were only being asked about visibility.

Comment: Valuation of Navajo emissions using contingent valuation will be sensitive to the photographs presented to respondents. Responses depend on the context of the event--lighting conditions, direction of sun, clouds or fog. Visibility impairment from Navajo emissions would be less likely to occur on a clear, low humidity day.

Response: Obviously valuation responses are affected by the photographs used. C&R selected clear sky photos in order to avoid well-known problems with non-identical scenes, peoples' preference for nice, fluffy white clouds to add visual interest, etc. Visibility perception studies conducted by cognitive psychologists show that ratings of visual air quality are affected by the presence of factors such as clouds and snow; people actually prefer clouds in pictures. However, these studies show that changes in visual air quality ratings with respect to a change in pollution are the same whether clouds are present or not. Moreover, SRP's pilot CV study using cloudy day photographs found mean values greater than EPA's benefit analysis for a smaller improvement.

Comment: The Integral Vista RIA valued visibility at only \$.025/household.

Response: It is absurd to claim that the Integral Vista RIA is relevant to the Navajo issue. Neither RIA values generic visibility protection: each develop estimates for the specific regulatory issue. The Integral Vista RIA valued a thin plume visible from Bryce Canyon at \$.025/household/day. The Navajo RIA implicitly values 25 days of haze obscuring features of the Grand Canyon at \$.08/household/day. This ignores all benefits from visibility improvements in the summer time and at other National Parks and Monuments in the region.

1) Five Options (30-day average)

2) Soft preference:

Under its BART guidelines, ^{however,} EPA ~~currently~~ uses NSPS levels of control as a starting point in its BART. Adoption of an alternative control level must reflect a balance of the various BART factors (including cost and visibility improvement). Accordingly, EPA is proposing a level of control consistent with current NSPS.

- 3) Clear and fair (a la Art Fraas) discussion of the National Academy of Science critique of the WHITEX study. Outline of the kind of additional information EPA will seek to bring to bear on a decision in the final rule. *Because of the uncertainty in the information now available to EPA, EPA is proposing 5 alternative options*
- 4) Balanced discussion and request for comments on seasonal controls.
- 5) Discussion of Navajo as a unique circumstance; no precedent for implementing Section 169A.
- 6) Drop control requirements for nitrogen oxide (NO_x) particulate matter (PM).

- a) 90% control
- b) 70% control
- c) 50% control
- d) Salt River
- e) no further control

Jeff,
Art wants you
to call him regarding
the attached. He will
be giving you a fax
number for me to
send it after you &
Art have talked. K

FIVE PRINCIPAL REASONS FOR PROCEEDING WITH EPA'S PROPOSED RULE

1 President Bush:

"Behind all the studies, the figures, and the debates, the environment is a moral issue...For it is unjust to allow the natural splendor bestowed to us to be compromised...Recovery, Restoration, and Renewal--that is our moral imperative." (President Bush, June 8, 1989)

Protection of the Grand Canyon, one of the Seven Wonders of the World, must certainly be part of the President's moral imperative.

2 The threshold question of whether Navajo can reasonably be anticipated to cause or contribute to visibility impairment in the Grand Canyon or any Class I area has been met.

The Park Service, National Academy and even Salt River Project all agree that Navajo is a "significant contributor".

3 It is ludicrous to argue that the visibility benefits from controlling Navajo would not be significant, even though the exact magnitude of those benefits are uncertain.

The Administration is debating the quantification of the extent of impairment and the techniques used to monetize the benefits. Despite uncertainties inherent in both exercises, there is no factual or theoretical support for OMB's assumption that the benefits could be zero.

EPA has prepared a point by point response to OMB's critique of the attribution and benefits studies that refute OMB's conclusions.

EPA's BART proposal is supportable without a numerical benefit cost comparison; nonetheless, any benefits greater than or equal to \$70 million per year would exceed the estimated costs of full control at the Navajo plant, and would thus support the rule. In fact, EPA's benefits are estimated to fall in the \$200-400 million per year range with maximum net benefits realized at the highest levels of controls.

4 Controls less stringent than the NSPS are not supportable. The statute makes clear that the Best available retrofit technology is required for any source that "... may reasonably be anticipated to cause or contribute to any impairment of visibility in any ... Class I area".

BART regulations require us to start with the NSPS, and allow us to adjust from there based on a number of

statutory factors such as cost and the degree of improvement in visibility which may reasonably be anticipated.

The costs of NSPS-type controls at Navajo are reasonable and consistent with what other plants in the West have undertaken: Twenty-six low sulfur coal-fired power plants in the West, six of them retrofits, have controls that achieve 70 - 90% or greater control, NSPS units in the West typically emit at a rate no greater than 0.20 lb/mmBtu.

Navajo was designed for retrofit NSPS-type controls, the environmental impact statement for the plant promised NSPS-type controls, the owners committed to NSPS-type controls over 20 years ago.

- 5 Seasonal controls are unprecedented under technology-based rules. The Grand Canyon is the last place to try to break precedent.

The statute requires continuous controls and prohibits dispersion techniques, including controls that vary with atmospheric conditions. The legislative history makes clear that temporary, periodic or limited systems of control would not be permitted.

Even if you could overcome the statute and precedent, a seasonal BART determination would require the making of a factual finding that has no support:

Navajo is the second highest emitter in the West and accounts for 10% of all western utility emissions.

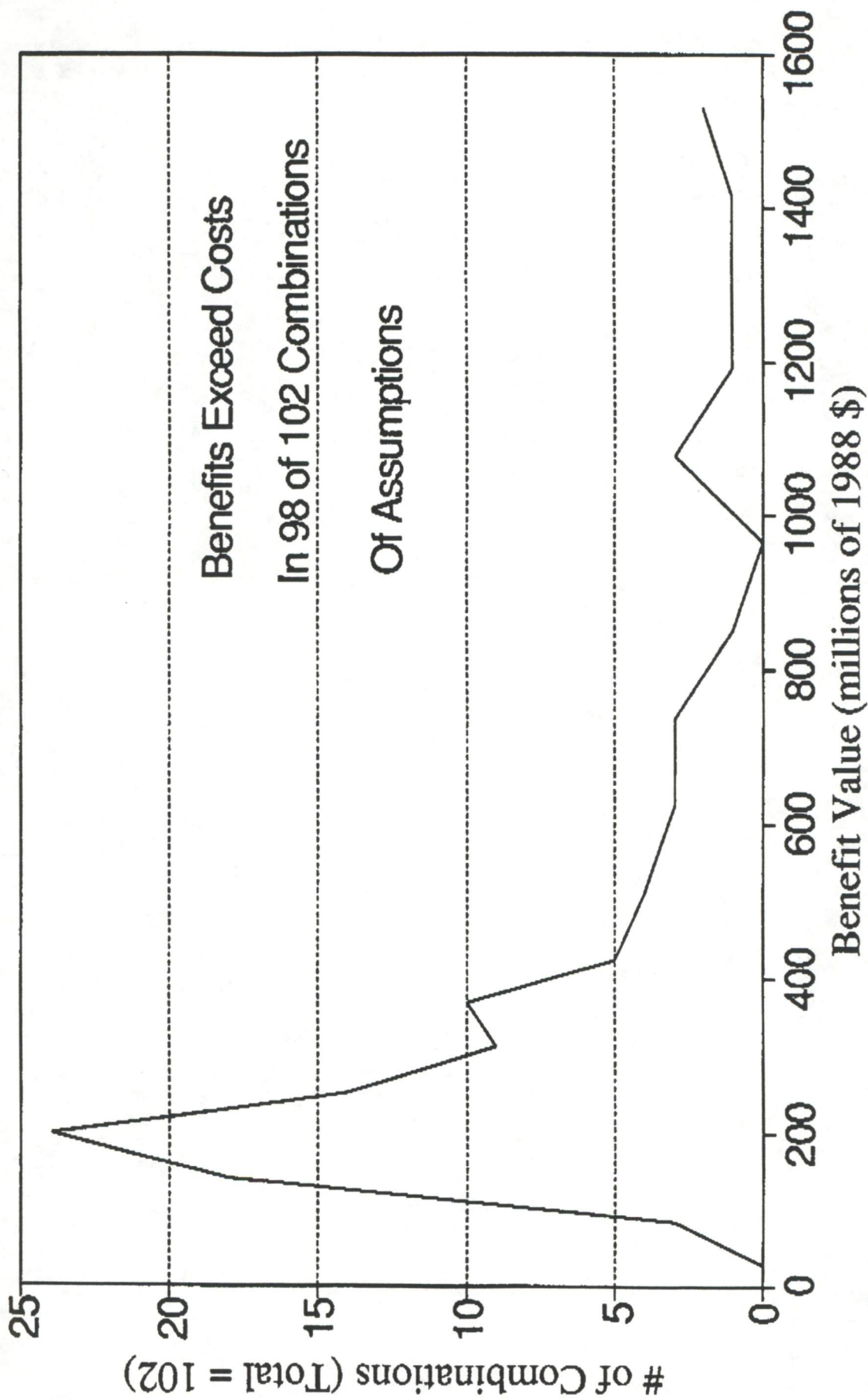
Navajo's emissions are equivalent to at least 5 new Western mega power plants and exceed all the SO₂ from the LA basin.

Navajo's size and location implicate its role in summer haze; air flow studies in the Canyon suggest it contributes significantly in the spring and fall.

Numerous nearby National Parks are likely to be impaired by Navajo emissions when the wind flows away from the Grand Canyon.

Distribution of Benefit Estimates

Year 2005



information on the visibility improvements that could be expected in times other than winter, and in areas other than the Grand Canyon. Additional information on control alternatives and their costs as well as appropriate use of data on social benefit for improving visibility is also solicited. The proposed emission limitation is based on year-round control. However, EPA solicits comments on legal and policy issues relating to the use of seasonal controls instead. For a discussion of seasonal control, please refer to the section "Discussion of Seasonal Controls as a BART Emission Limitation" elsewhere in this notice. Consistent with the similar emission limitations implemented at other facilities over the past 10 years, ^{In addition,} EPA is proposing that compliance be determined on a 30-day rolling average. Nevertheless, EPA invites comments on other options for averaging times that could be used to determine compliance. ~~The current State of Arizona emission limit is 1.0 lbs/MMBtu, 3-hour average.~~ Compliance with this limitation would be determined using continuous emission monitoring systems (CEMS).

Two other pollutants emitted by NGS, NO_x and PM, are known to contribute to visibility impairment in some circumstances.³⁵ The current emissions of NO_x and PM from NGS have not been identified as significantly contributing to the visibility impairment in the Grand Canyon. However,

³⁵ See eg. BART Guidelines at 12-13.

EPA is concerned based upon its ~~engineering~~ ^{technical} judgment regarding the behavior of the pollutants as potential contributions to visibility impairment as a general matter, upon the amount of the pollutants emitted by NGS, upon the proximity of NGS to the Grand Canyon and upon the characteristics of the NGS plume shown by ^{WHITEX} ~~whitex~~ and other studies, that increased emissions of these pollutants could result in impairment in the Grand Canyon. Although the NGS is not subject to any NO_x emission limitations, SRP has stated that NGS currently emits NO_x at a rate of 0.4 to 0.5 lbs/MMBtu. Therefore, EPA is proposing an NO_x emission limit consistent with NGS's existing emission rate, as well as the rate at other similar plants, of 0.5 lbs/MMBtu. As with the SO₂ emission limit, compliance would be determined using CEMS.

Particulate matter emissions for the NGS are currently limited in two ways. The Arizona SIP has both an emission rate limitation of 0.06 lbs/MMBtu and an opacity limit of 40 percent for NGS. The SRP has stated that NGS currently emits PM at a rate of 0.03 lbs/MMBtu with an opacity of between 10 and 15 percent. Thus, the opacity limit of 40 percent is well above the NGS existing emissions. Therefore, EPA is proposing a 20 percent opacity limitation consistent with current NGS emissions opacity in order to preclude any visibility deterioration that would be caused by an increase in PM emissions. Compliance would also be



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

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NAVAJO FINAL INSERTS

INSERT RE NSPS IN BART GUIDELINES --P. 20

In light of ~~EPA's extensive experience since 1980 in promulgating~~
~~and approving emission limitations for coal-fired power plants, and~~
~~considering the effects of the Clean Air Act Amendments of 1990,~~
EPA believes that the BART Guidelines are outdated in certain
respects, and should be revised.

~~Specifically, EPA notes that numerous power plants, including~~
~~several Western power plants using low-sulfur coal have retrofitted~~
~~or installed in new units control equipment achieving emissions~~
~~reductions equivalent to or better than the reductions that would~~
~~be achieved by the ^{0.03} lb/MMBtu limit being proposed today, which~~
~~is the limit that would be applicable if NSG were subject to the~~
~~NSPS at 40 CFR Part 60, Subpart Da. (which Section 18(b)(1) based~~
~~on this experience, the EPA believes it is no longer clear that~~
~~NSPS controls represent the best these sources could install as~~
~~BART, and that the increased use of these controls since 1980~~
~~should be considered in conducting BART analyses. In addition, the~~
1990 Amendments embody certain statutory changes that represent a
Congressional policy judgment to move away from rigid control
technology requirements and towards an emphasis on air pollution
control strategies that reflect flexibility and market-based
incentives. In particular, section 403 of the Amendments revised
section 111(a)(1) of the Act to repeal the percent reduction
requirement under the NSPS program. Also, Title IV of the

2 ENERGY EFFECTS
OF COST, ~~NON-AT-SP~~
AND VISIBILITY IMPROVEMENT

Amendments added an acid deposition control program, the essence of which is the use of market-based incentives (through freely tradable allowances under section 403 of the revised Act) to achieve the greatest reductions in SO₂ emissions at the least cost. In light of ^{the} ~~these~~ development^s, and considering the statutory mandate in section 155A to consider the various BART factors, EPA believes it would be both arbitrary and inconsistent with the statute to allow BART analyses to simply default to NSPS-level controls without consideration of the statutory BART factors. EPA has conducted a thorough analysis of the statutory BART factors in this case that is consistent with the existing Guidelines and hence, does not need to rely on any specific presumption regarding the advisability of using NSPS-level controls as BART. The Agency deems it appropriate to ensure that all future BART analyses consider the statutory BART factors as well. Accordingly, by this notice EPA solicits comment on whether the BART Guidelines should be amended concurrently with this BART rulemaking to reflect the above concerns. Based on those comments, EPA will decide at the time of final action on today's BART proposal for NGS whether to amend the Guidelines, ~~and may do so without further notice.~~

and on
whether to
BART Guidelines



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FROM: Tom Kieran
EPA-OAR

MESSAGE/INSTRUCTIONS: _____

U.S. ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

Assistant Administrator
For Air And Radiation*al, art + Jeff*

*Attached is the
seasonal discussion. My
apologies for the formatting
mistakes, I wanted you to
see a draft now.*

*The
To*



Printed on Recycled Paper

E. Discussion of Seasonal Controls as a BART Emission Limitation

In a letter dated January 14, 1990, SRP submitted a position paper to EPA Raising the issue of whether EPA could lawfully provide for the seasonal application of pollution control technology in establishing BART SRP's letter takes the position that the law allows seasonal controls in this case. For the reasons summarized below, EPA believes that at this time seasonal controls are not appropriate under the circumstances of this rulemaking. However, EPA solicits comments on (1) the appropriate use of seasonal controls as BART; and (2) whether, if seasonal controls may be allowed, the record of this rulemaking would support imposition of only seasonal controls at NGS.

EPA; traditional interpretation of the relevant provisions of the Clean Air Act has been that the language, structure and legislative history of the Act appear to preclude EPA from allowing seasonal controls under a technology-based emission limitations¹. However a possible exception in the case of BART emission limitations, discussed below, would be an instance where a partial exemption might be appropriate under section 169A(c). BART is designated by the Act as "emission limitations" which "reflect" the best available retrofit "technology." See sections 169A(b) and (g)(2), 42 U.S.C. 7491(b) and (g)(2). The regulations likewise refer to BART as "emission limitations" and as an

"emission standard." 40 CFR 51.302(c)(2)(iii) and 51.302(c)(4)(ii). The Act defines "emission limitation" and "emission standard" to require "continuous" emission reduction. Section 302(k), 42 U.S.C. 7602(k). The EPA regulations explicitly require "continuous emission reduction" in any BART emission limitation. 40 CFR 51.301(c). Thus, it is clear that BART requires "continuous" emissions reductions. In addition, section 123(a) provides that "[t]he degree of emission limitation required for control of any air pollutant under this title shall not be affected in any manner by . . . any . . . dispersion technique," while section 123(b) defines dispersion technique to include "any intermittent or supplemental control of air pollutants varying with atmospheric conditions." 42 U.S.C. 7423.

The legislative history of the 1977 Clean Air Act Amendments has also strongly suggested that seasonal controls would be inconsistent with any requirement under the Act calling for a "continuous" emission limitation or standard. The language eventually enacted as section 123 originated in the House version of the 1977 Amendments. The House committee report defines dispersion techniques as "techniques which seek to reduce concentrations of pollutants not by reducing the amounts of pollutants emitted

into the air, but rather by relying on the dispersion of pollution throughout the atmosphere."³⁸ (emphasis added).

Although the central focus of the congressional deliberations was on tall stacks and short-term adjustments in the amount of emissions from a source in order to meet SIP limits designed to achieve the national ambient air quality standards, those concerns also apply to seasonal controls and BART emission limitations. The House committee report lists several "fundamental policy objections" to intermittent controls or dispersion techniques that are relevant to this rulemaking, including dubious reliability, concern over effects of secondary pollutants, transport of pollutants to other areas, acid rain effects, and simple prudence. See H.R. Rep. No. 294 at 82-88. Language nearly identical in pertinent part to the language eventually enacted in section 302(k) appears in both the House and Senate bills. In explaining the purpose of this language, the House committee report states:

By defining the terms "emission limitation," "emission standard," and "standard of performance," 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

³⁸H.R. Rep. No. 294, 95th Cong., 1st Sess. At 81 (1977).

other temporary, periodic or limited systems of control would not be permitted as a final means of compliance.³⁹ (Emphasis added.)

The Senate committee report elucidates its reason for defining "emission limitation" as follows: "This bill includes a definition of the phrase 'emission limitation' to clarify the committee's view that the only acceptable basic strategy is one based on continuous emission control. Intermittent controls or dispersion techniques are unacceptable as a substitute for continuous control of pollutants under this act."⁴⁰

The Senate committee report parallels the House committee report in its statement of reasons for disfavoring intermittent control strategies. The Senate committee report adds that "continuous emission reduction measures are available, they are reliable, and they are economically justified."⁴¹

SRP's letter focuses exclusively on section 123 in asserting that seasonal controls are permissible as BART, and does not address section 302(k) or the legislative history which seemingly bars emission limitations that are not continuous, i.e., "constant." In addition, SRP characterizes BART as exclusively directed toward "ambient

³⁹Id. at 92.

⁴⁰S. Rep. No. 127, 95th Cong., 1st Sess. 94 (1977).

⁴¹Id. at 95.

objectives," citing instances in which EPA has allowed seasonal relaxations in SIP rules intended to achieve national ambient air quality standards.⁴² In so doing, SRP has not addressed the point that BART is ultimately a technology-based standard subject to a different set of statutory requirements than the SIP rules at issue in the instances cited by SRP. While Congress certainly intended BART as a tool to achieve reasonable progress toward the national visibility goal, the statute and regulations appear to refute SRP's contention that BART is strictly an ambient-based limit. First, as discussed above, the language and structure of the BART requirement delineates it as a technology-based standard linked to standards issued under the NSPS program. Second, the overall legislative scheme embodied in the visibility planning requirements of section 169A draw a clear distinction between the general requirement in section 169A(b)(2) to adopt SIPs that include "such emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress," and the specific and explicit requirement in section 169A(b)(2)(A) to employ BART as one such visibility measure.

Thus, while Congress certainly was addressing an ambient-based problem in adopting the visibility protection

⁴²EPA notes that none of the examples cited by SRP involve technology-based standards under the Act. In addition, it is not clear that these cases involved "emission Limitations" under Section 110(a)(2)(B) as that term of art is defined in Section 302(k), as opposed to other measures under Section 110(a)(2)(b).

provisions of section 169A, among the tools it prescribed was BART as a technology-based standard to assist in achieving the legislative objective. In the same fashion, Congress adopted the PSD program to protect against actual or potential adverse effects from pollutants emitted to the ambient air by requiring states to adopt SIPs containing a host of emission limitations and other measures to achieve the goal of preventing significant deterioration of air quality. See sections 160(1) and 161, 42 U.S.C. 7470(1) and 7471. However, as one such specific PSD measure, Congress required major new or stationary sources to employ a technology-based emission limit -- the best achievable control technology. See sections 165(a)(4), 169(3), 42 U.S.C. 7475(a)(4), 7479(3). Similarly, under the NSPS program, EPA must publish a list of categories of stationary sources that cause or contribute to air pollution which may endanger public welfare, but Congress required EPA to address these source categories contributing to ambient pollution problems through the technology-based new source performance standards. Compare section 111(b)(1)(A), 42 U.S.C. 7411(b)(1)(A), with section 111(a)(1), 42 U.S.C. 7411(a)(1). In sum, in light of the language, structure, and history of the legislation, EPA has never allowed the technology-based NSPS and BACT emission limitations to be applied on a seasonal basis, and there is no indication that Congress intended the technology-based BART limit to be

treated in any different fashion. The EPA solicits comment on its traditional interpretation of the statutory requirements regarding seasonal controls under other technology-based standards, and on whether that interpretation should be applied to BART rulemaking in this case.

Should EPA decide that year-round controls are not required for BART emission limits, a possible statutory basis for a seasonal variance would be the procedures contained in the BART exemption provisions of section 169A(c)(2) and (3), and 40 CFR 51.303. The statute explicitly addresses the possibility of BART exemptions for large power plants such as NGS and establishes a very high hurdle for granting any such exemption. It requires the source owner or operator to demonstrate to the satisfaction of the Administrator "that such powerplant is located at such distance from all [Class I areas] that such powerplant does not or will not, by itself or in combination with other sources, emit any air pollutant which may reasonably be anticipated to cause or contribute to a significant impairment of visibility in any such area." It further requires the concurrence of the appropriate FLM's. Thus, if such a variance or exemption could be allowed, the burden would be upon SRP and/or its co-owners to make the necessary demonstration. Because there would be no need for a BART exemption until such time as final BART emission limits are established, any such

request for exemption should be submitted after completion of the BART rulemaking in the form of a request for partial (i.e., seasonal) relief from any final BART limits that might be established as a result of this rulemaking. See 40 CFR 51.303. Under the exemption regulations, in order to demonstrate no "significant impairment," i.e., the absence of "a level of impairment that interferes with the visitor's visual experience of the area," the owner or operator "should address the frequency, extent, time, intensity and duration of the impairment." See 45 FR 80084, 80087. Thus, the factual basis for such a demonstration with respect to this case would be a showing that NGS does not contribute to any significant impairment in any Class I area in seasons other than winter. In this regard, SRP contends that the record demonstrates that summer impairment at Grand Canyon is not attributable to NGS (SRP has not to date addressed potential impacts of NGS at other Class I areas in the vicinity, such as Bryce Canyon National Park, Zion National Park, and Canyonlands National Park). The limited information in the record at this time, however, suggests the contrary.⁴³ As stated earlier, EPA and NPS suspect that emissions from NGS may contribute to regional visibility impairment during the entire year and that a decrease in SO₂ emissions from NGS may improve regional visibility in many Class I areas in the Colorado Plateau.

⁴³Summary Statement by Brand Niemann, March 21, 1990.

The EPA solicits comment on whether a seasonal variance could be allowed under section 169A(c) in the manner discussed above or under some other statutory authority, on whether such a variance could be considered only after completion of this rulemaking, and (in the event that EPA concludes it would be appropriate to consider a seasonal variance in conjunction with the present proceeding) on the factual question of whether NGS contributes to any significant impairment in any Class I area.

F. The Adequacy of the September 5, 1989 Notice

The SRP asserts that the September 5, 1989 notice was inadequate to meet the requirements set forth in section 307(d)(3) of the Act for a statement of basis and purpose to accompany a notice of proposed rulemaking. The EPA agrees. However, as explained above, comments regarding the adequacy of the September 5, 1989 notice and the draft WHITEX report have been rendered moot by the fact that the NPS has now issued a final NPS report on WHITEX and by today's notice. This notice contains the complete statement of basis and purpose for a regulatory proposal required under section 307(d)(3) of the Act, and reopens the comment period on the issue of reasonably attributable impairment, as well as providing an opportunity to comment on all other issues relevant to this rulemaking. Moreover, EPA believes that insofar as the September 5, 1989 notice addresses the Grand Canyon, the preliminary attribution finding therein

In order to evaluate its BART analysis approach, EPA considered the cost-benefit analysis conducted as a part of the preliminary Regulatory Impact Analysis (RIA) (as required by Executive Order 12291) for this rule. This analysis also satisfies the requirements of section 317 of the Act regarding economic impact assessments. A more detailed discussion of the benefits associated with improving visibility in the Grand Canyon is found in the "Benefit Analysis" section of this notice.

The BART Guidelines published in 1980 stated that the level of control necessary to meet the new source performance standard (NSPS) for power plants¹⁵ is generally available to large power plants.¹⁶ However, the guidelines do allow the State (or EPA in this case) to propose an emission limit other than NSPS if the limit proposed reflects a "reasonable balance of the various BART factors."¹⁷ The BART Guidelines further state that, because EPA believed that NSPS controls generally represented the best these sources could install as BART, if the State (or EPA) set a BART limit equivalent to the NSPS level of control, no detailed analysis of the BART factors would be required.¹⁸ In light of EPA's extensive

¹⁵See 40 CFR 60 subpart Da.

¹⁶BART Guidelines at 1.

¹⁷Id. pg. 20.

¹⁸Id. at 20-21.

experience since 1980 in promulgating and approving emission limitations for coal-fired power plants, and considering the effects of the Clean Air Act Amendments of 1990, EPA believes that the BART Guidelines are outdated in certain respects, and should be revised.

Specifically, EPA notes that ^{some} ~~numerous~~ power plants, including ^{some} ~~several~~ Western power plants using low-sulfur coal have retrofitted or installed in new units control equipment achieving emissions reductions ^{in excess of those} ~~equivalent to or better than~~ the reductions that would be ^{required} ~~achieved~~ by the ^{NSPS. 19} ~~0.03 lb/MMBtu~~ limit being proposed today, which is the limit that would be applicable if NGS were subject to the NSPS at 40 CFR Part

60, Subpart D. ^{relevant to a BART analysis} ~~Based on this experience, the EPA~~ believes ^{that the experience since 1980 should be considered, and} ~~it is no longer clear that NSPS controls represent~~ the best these sources could install as BART, and that the ^{requests to comment on whether} ~~increased use of these controls since 1980 should be~~ considered in conducting BART analyses. ^{requests to comment on whether} ~~In addition, the~~ 1990 Amendments embody certain statutory changes that represent a Congressional policy judgment to move away from rigid control technology requirements and towards an emphasis on air pollution control strategies that reflect flexibility and market-based incentives. In particular, section 403 of the Amendments revised section 111(a)(1) of the Act to repeal the percent reduction requirement under

¹⁹ Memorandum from Gwen Jacobs to David Stonefield dated January 29, 1991.

the NSPS program. Also, Title IV of the Amendments added an acid deposition control program, the essence of which is the use of market-based incentives (through freely tradable allowances under section 403 of the revised Act) to achieve the greatest reductions in SO₂ emissions at the least cost.

of all available information bearing on
 In light of these developments, and considering the statutory mandate in section 169A to consider the various BART factors, EPA believes it would be ~~both arbitrary and inappropriate~~ ^{base} with the statute to ~~allow~~ ^{base} BART analyses to simply default to ~~NSPS-level controls~~ ^{full} without consideration of the statutory BART factors. EPA has conducted a thorough analysis of the statutory BART factors in this case that is consistent with the existing Guidelines, ^{rather than base its analysis on NSPS controls.} and hence, ~~does not need to rely on any specific presumption regarding the advisability of using NSPS-level controls as BART.~~ The Agency deems it appropriate to insure that all future BART analyses consider the statutory BART factors as well. Accordingly, by this notice EPA solicits comment on whether the BART Guidelines should be amended concurrently with this BART rulemaking ^{to} ~~reflect the above concerns.~~ Based on those comments, EPA will decide at the time of final action on today's BART proposal for NGS whether to amend the Guidelines, ~~and may do so without further notice.~~

The EPA does not, however, interpret the current guidelines as precluding the Agency from establishing emission

limitations that are more stringent than NSPS if EPA concludes that controls to meet such limits are readily available to the source and these controls would, at a reasonable additional cost, result in a marked improvement in visibility over the improvement that would result from controls designed to meet the NSPS. The EPA requests comments on this interpretation of the guidance and the underlying statutory and regulatory BART provisions and the advisability of specifically amending the BART Guidelines to clarify this intent. Conversely, the current BART Guidelines clearly also allow EPA to set BART limits that are less stringent than NSPS if, based upon the record before the Agency, the cost of controls, the degree of expected improvement in visibility, and the other BART factors, EPA concludes that a lesser degree of control is appropriate. Regardless of whether EPA revises the BART guidelines in this proceeding the EPA requests comment on whether it should adopt BART limits in this case that are less stringent than NSPS.

²⁰ In addition, EPA notes that the value of marketable allowances under section 403 of the Clean Air Act as amended by the Clean Air Act Amendments of 1990 will be made available to SRP should BART be installed. The EPA has factored the value of these allowances into its calculations

²⁰Increased use is documented in a memorandum from Gwen Jacobs to David Stonefield dated January 29, 1991.

p. 73-on 2:30 pm 1/31

E. Discussion of Seasonal Controls as a BART Emission Limitation

In a letter dated January 14, 1990, SRP submitted a position paper to EPA Raising the issue of whether EPA could lawfully provide for the seasonal application of pollution control technology in establishing BART. SRP's letter takes the position that the law allows seasonal controls in this case. For the reasons summarized below, EPA believes that at this time seasonal controls are not appropriate under the circumstances of this rulemaking. However, EPA solicits comments on (1) the appropriate use of seasonal controls as BART; and (2) whether, if seasonal controls may be allowed, the record of this rulemaking would

support imposition of only seasonal controls at NGS.

In considering whether EPA's ~~regarding emission limitations~~ traditional interpretation of the relevant provisions of the Clean Air Act ~~has been that the language, structure, and legislative history of the Act appear to preclude EPA from allowing seasonal controls under a technology-based emission limitations.~~ ^{regarding use of seasonal controls applies with equal force to BART} However a possible

exception in the case of BART emission limitations, discussed below, would be an instance where a partial exemption might be appropriate under section 169A(c). BART is designated by the Act as "emission limitations" which "reflect" the best available retrofit "technology." See sections 169A(b) and (g)(2), 42 U.S.C. 7491(b) and (g)(2). The regulations likewise refer to BART as "emission limitations" and as an

* / Insert bottom of 73⁷⁴ 75, 3/4 of 76

under the Act, BART is referred to as Fn.

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~~"emission standard."~~ 40 CFR 51.302(c)(2)(iii) and 51.302(c)(4)(ii). The Act defines "emission limitation" and ~~"emission standard"~~ to require "continuous" emission reduction. Section 302(k), 42 U.S.C. 7602(k). ~~The EPA regulations explicitly require "continuous emission reduction" in any BART emission limitation.~~ 40 CFR 51.301(c). Thus, it is clear that BART requires "continuous" emissions reductions.

In addition, section 123(a) provides that "[t]he degree of emission limitation required for control of any air pollutant under this title shall not be affected in any manner by . . . any . . . dispersion technique," while section 123(b) defines dispersion technique to include "any intermittent or supplemental control of air pollutants varying with atmospheric conditions." 42 U.S.C. 7423.

The legislative history of the 1977 Clean Air Act Amendments has also strongly suggested that seasonal controls would be inconsistent with any requirement under the Act calling for a "continuous" emission limitation or standard. The language eventually enacted as section 123 originated in the House version of the 1977 Amendments. The House committee report defines dispersion techniques as "techniques which seek to reduce concentrations of pollutants not by reducing the amounts of pollutants emitted

into the air, but rather by relying on the dispersion of pollution throughout the atmosphere."³⁸ (emphasis added).

Although the central focus of the congressional deliberations was on tall stacks and short-term adjustments in the amount of emissions from a source in order to meet SIP limits designed to achieve the national ambient air quality standards, ^{EPA requests comment on the extent to which} those concerns also apply to seasonal controls and BART emission limitations ^{which were not explicitly considered in this legislative history.} The House committee report lists several "fundamental policy objections" to intermittent controls or dispersion techniques that ^{are} ^{may be} relevant to this rulemaking, including ~~dubious reliability~~, concern over effects of secondary pollutants, transport of pollutants to other areas, acid rain effects, and simple prudence. See H.R. Rep. No. 294 at 82-88. Language nearly identical in pertinent part to the language eventually enacted in section 302(k) appears in both the House and Senate bills. In explaining the purpose of this language, the House committee report states:

By defining the terms "emission limitation," "emission standard," and "standard of performance," 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

³⁸H.R. Rep. No. 294, 95th Cong., 1st Sess. At 81 (1977).

other temporary, periodic or limited systems of control would not be permitted as a final means of compliance.³⁹ ~~(Emphasis added.)~~

The Senate committee report elucidates its reason for defining "emission limitation" as follows: "This bill includes a definition of the phrase 'emission limitation' to clarify the committee's view that the only acceptable basic strategy is one based on continuous emission control. Intermittent controls or dispersion techniques are unacceptable as a substitute for continuous control of pollutants under this act."⁴⁰

The Senate committee report parallels the House committee report in its statement of reasons for disfavoring intermittent control strategies. The Senate committee report adds that "continuous emission reduction measures are available, they are reliable, and they are economically justified."⁴¹

SRP's letter focuses exclusively on section 123 in asserting that seasonal controls are permissible as BART, and does not address section 302(k) or the legislative history, ^{noted above.} ~~which seemingly bars emission limitations that are not continuous, i.e., "constant."~~ In addition, SRP characterizes BART as exclusively directed toward "ambient

³⁹Id. at 92.

⁴⁰S. Rep. No. 127, 95th Cong., 1st Sess. 94 (1977).

⁴¹Id. at 95.

objectives," citing instances in which EPA has allowed seasonal relaxations in SIP rules intended to achieve national ambient air quality standards.⁴² In so doing, SRP

has not addressed the point that BART is ultimately a technology-based standard subject to a different set of statutory requirements than the SIP rules at issue in the instances cited by SRP. While Congress certainly intended BART as a tool to achieve reasonable progress toward the national visibility goal, the statute and regulations appear to refute SRP's contention that BART is strictly an ambient-based limit. First, as discussed above, the

language and structure of the BART requirement ^{appear to} delineate it as a technology-based standard, linked to standards issued under the NSPS program. Second, the overall legislative scheme embodied in the visibility planning requirements of section 169A draw a ~~clear~~ distinction between the general requirement in section 169A(b)(2) to adopt SIPs that include "such emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress," and the ~~specific~~ and explicit requirement in section

169A(b)(2)(A) to employ BART as one such visibility measure.

Handwritten: Congress appeared to follow a similar pattern regarding the PSD and NSPS programs. Thus, while Congress certainly was addressing an

~~ambient-based problem in adopting the visibility protection~~

⁴²EPA notes that none of the examples cited by SRP involve technology-based standards under the Act. In addition, it is not clear that these cases involved "emission Limitations" under Section 110(a)(2)(B) as that term of art is defined in Section 302(k), as opposed to other measures under Section 110(a)(2)(b).

provisions of section 169A, among the tools it prescribed was BART as a technology-based standard ~~to assist in~~ achieving the legislative objective. ^{For example,} ~~In the same fashion,~~

Congress adopted the PSD program to protect against actual or potential adverse effects from pollutants emitted to the ambient air by requiring states to adopt SIPs containing a host of emission limitations and other measures to achieve the goal of preventing significant deterioration of air quality. See sections 160(1) and 161, 42 U.S.C. 7470(1) and 7471. However, as one such specific PSD measure, Congress required major new or stationary sources to employ a technology-based emission limit -- the best achievable control technology. See sections 165(a)(4), 169(3), 42 U.S.C. 7475(a)(4), 7479(3). Similarly, under the NSPS program, EPA must publish a list of categories of stationary sources that cause or contribute to air pollution which may endanger public welfare, but Congress required EPA to address these source categories contributing to ambient pollution problems through the technology-based new source performance standards. Compare section 111(b)(1)(A), 42 U.S.C. 7411(b)(1)(A), with section 111(a)(1), 42 U.S.C. 7411(a)(1). In sum, in light of the language, structure, and history of the legislation, EPA has never allowed the technology-based NSPS and BACT emission limitations to be applied on a seasonal basis, and there is no indication that Congress intended the technology-based BART limit to be

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treated in any different fashion. The EPA solicits comment

on its ~~traditional interpretation of the statutory~~

~~requirements regarding~~ ^{The use of} seasonal controls under other

~~technology-based standards, and on whether that~~

~~interpretation should be applied to BART rulemaking in this~~

case.

Should EPA decide that ^{in this} year-round controls are not required for BART emission limits a possible statutory basis for a seasonal variance would be the procedures contained in the BART exemption provisions of section 169A(c)(2) and (3), and 40 CFR 51.303. The statute explicitly addresses the possibility of BART exemptions for large power plants such as NGS and establishes a very high hurdle for granting any such exemption. It requires the source owner or operator to demonstrate to the satisfaction of the Administrator "that such powerplant is located at such distance from all [Class I areas] that such powerplant does not or will not, by itself or in combination with other sources, emit any air pollutant which may reasonably be anticipated to cause or contribute to a significant impairment of visibility in any such area." It further requires the concurrence of the appropriate FLM's. Thus, if such a variance or exemption could be allowed, the burden would be upon SRP and/or its co-owners to make the necessary demonstration. Because there would be no need for a BART exemption until such time as final BART emission limits are established, any such

request for exemption should be submitted after completion of the BART rulemaking in the form of a request for partial (i.e., seasonal) relief from any final BART limits that might be established as a result of this rulemaking. See 40 CFR 51.303. Under the exemption regulations, in order to demonstrate no "significant impairment," i.e., the absence of "a level of impairment that interferes with the visitor's visual experience of the area," the owner or operator "should address the frequency, extent, time, intensity and duration of the impairment." See 45 FR 80084, 80087. Thus, the factual basis for such a demonstration with respect to this case would be a showing that NGS does not contribute to any significant impairment in any Class I area in seasons other than winter. ~~X~~ In this regard, SRP contends that the record demonstrates that summer impairment at Grand Canyon is not attributable to NGS (SRP has not to date addressed potential impacts of NGS at other Class I areas in the vicinity, such as Bryce Canyon National Park, Zion National Park, and Canyonlands National Park). The limited information in the record at this time, however, suggests the contrary.⁴³ As stated earlier, EPA and NPS suspect that emissions from NGS may contribute to regional visibility impairment during the entire year and that a decrease in SO₂ emissions from NGS may improve regional visibility in many Class I areas in the Colorado Plateau.

⁴³Summary Statement by Brand Niemann, March 21, 1990.

The EPA solicits comment on whether a seasonal variance could be allowed under section 169A(c) in the manner discussed above or under some other statutory authority, on whether such a variance could be considered only after completion of this rulemaking, and (in the event that EPA concludes it would be appropriate to consider a seasonal variance in conjunction with the present proceeding) on the factual question of whether NGS contributes to any significant impairment in any Class I area.

F. The Adequacy of the September 5, 1989 Notice

The SRP asserts that the September 5, 1989 notice was inadequate to meet the requirements set forth in section 307(d)(3) of the Act for a statement of basis and purpose to accompany a notice of proposed rulemaking. The EPA agrees. However, as explained above, comments regarding the adequacy of the September 5, 1989 notice and the draft WHITEX report have been rendered moot by the fact that the NPS has now issued a final NPS report on WHITEX and by today's notice. This notice contains the complete statement of basis and purpose for a regulatory proposal required under section 307(d)(3) of the Act, and reopens the comment period on the issue of reasonably attributable impairment, as well as providing an opportunity to comment on all other issues relevant to this rulemaking. Moreover, EPA believes that insofar as the September 5, 1989 notice addresses the Grand Canyon, the preliminary attribution finding therein

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[AD-FRL-]

Approval and Promulgation of Implementation Plans:
Revision of the Visibility FIP for Arizona

AGENCY: U.S. Environmental Protection Agency (EPA).

ACTION: Proposed rule and announcement of public hearing.

SUMMARY: This proposal addresses the need for revising the Federal implementation plan (FIP) for the State of Arizona to include emission limits representing best available retrofit technology (BART) for the Navajo Generating Station (NGS) to remedy wintertime visibility impairment in the Grand Canyon National Park. This action is taken pursuant to sections 169A and 110(c) of the Clean Air Act (Act), which requires EPA, upon default by a State, to take appropriate measures to remedy certified visibility impairments in mandatory Class I areas where the impairment is reasonably attributed to a specific source. On September 5, 1989, EPA preliminarily attributed a significant portion of wintertime impairment to the NGS (54 FR 36948). The timing of today's action is in accordance with a revised settlement agreement between EPA and the Environmental Defense Fund (EDF) in EDF v. Reilly, No. C82-6850 RPA (N. D. Cal.).

DATE: Comments on this notice of proposed rulemaking should be submitted to the Central Docket Section no later than April 19, 1991.

The EPA has received a written request for a public hearing on this action. A hearing has been scheduled for Monday, March 18, 1991, starting at 1:00 p.m. in the Maricopa County Auditorium, 201 West Jefferson, Phoenix, Arizona. Persons wishing to speak at the hearing should notify the Information Contact by March 11, 1991 at the address given below.

ADDRESS: Comments should be submitted (in duplicate, if possible) to Air Docket (LE-131), Attention: A-89-02A, U.S. EPA, Rm. M1500 Waterside Mall, 401 M Street, S.W., Washington, DC 20460.

Docket: Pursuant to section 307(d)(1)(B) of the Act, 42 U.S.C. 7607(d)(1)(B), this action is subject to the procedural requirements of section 307(d). Therefore, EPA has established a docket for this notice, Docket Number A-89-02A. Materials related to the development of this notice have been placed in this docket. Materials related to EPA's preliminary attribution of a significant portion of the wintertime visibility impairment in the Grand Canyon National Park to the NGS [54 FR 36948 (September 5, 1989)] have been placed in Docket A-89-02. For background information, materials related to the development of the visibility protection program (40 CFR 51.300 et seq.) are available in Docket A-79-40. Also, materials related to the development of the visibility new source review (NSR) and visibility monitoring strategies are available in Docket A-84-32. Materials related to the visibility long-term strategy, implementation of control strategy, and integral vista program are available in Docket A-85-26. All dockets are available for public inspection and copying between

8:00 a.m. and 4:00 p.m. Monday through Friday at EPA's Central Docket Section, Office of General Counsel, Room 1500, 401 M Street, S.W., Washington, DC. A reasonable fee may be charged for copies. Copies of this Notice, the Guidelines for Determining Bart, the BART Analysis for NGS, the Regulatory Impact Analysis and Addendum, and copies of the comments provided by the Federal land manager (FLM) are also available for public inspection at:

Department of Environmental Quality
Office of Air Quality
3003 North Central Avenue, Suite 1700
Phoenix, Arizona 85012

Department of Environmental Quality
Northern Regional Office
2501 North 4th Street, Suite 14
Flagstaff, Arizona 86004

City of Page Municipal Library
697 Vista Avenue
Page, Arizona 86040

FOR FURTHER INFORMATION CONTACT:

David H. Stonefield
U.S. Environmental Protection Agency
Office of Air Quality Planning
and Standards
MD-15
Research Triangle Park, NC 27711
(919) 541-5350 or FTS 629-5350

SUPPLEMENTARY INFORMATION:

Background

A. Regulatory Requirements

Section 169A of the Act, 42 U.S.C. 7491, sets as a national goal "the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution."

Mandatory Class I Federal areas are certain national parks, wildernesses, and international parks as described in section 162(a) of the Act, 42 U.S.C. 7472(a). Section 169A requires that EPA promulgate regulations to assure reasonable progress toward meeting the national goal for mandatory Class I Federal areas where EPA has determined that visibility is an important value. On November 30, 1979, EPA identified 156 areas, including the Grand Canyon National Park in Arizona, where visibility is an important air quality related value (44 FR 69122). Section 169A specifically requires EPA to promulgate regulations requiring States to amend their State implementation plans (SIP's) to provide reasonable progress toward meeting the national goal for the 156 areas.

On December 2, 1980, EPA promulgated the required visibility regulations (45 FR 80084, codified at 40 CFR 51.300 et seq.). In broad outline, the visibility regulations require the 36 States listed in section 51.300(b), including Arizona, to:

- (1) coordinate SIP development with the appropriate FLM's; (2) develop a program to assess and remedy visibility impairment from new and existing sources; (3) develop a long-term (10 to 15 years) strategy to assure reasonable progress toward the national goal; (4) develop a visibility monitoring strategy to collect information on visibility conditions; and (5) consider in all aspects of visibility protection any "integral vistas" (important views of landmarks or panoramas that extend outside of the boundaries of the Class I area) identified by the FLM's as critical to the visitors' enjoyment of the Class I areas. The affected States were required

to submit revised SIP's satisfying these provisions by September 2, 1981. See 45 FR 80091, codified at 40 CFR 51.302(a)(1).

The second requirement listed above is of particular relevance to today's action. Pursuant to 40 CFR 51.302(c)(2), each affected State is required to include in its SIP such emission limitations, schedules of compliance, and other measures as may be necessary to make reasonable progress toward the national visibility goal. In addition, under 40 CFR 51.302(c)(1), an FLM may certify to a State that there exists impairment of visibility in any mandatory Class I Federal area. Pursuant to 40 CFR 51.302(c)(4)(i), where impairment is certified at least 6 months prior to plan submission, an affected State must (1) identify each existing stationary facility which may "reasonably be anticipated to cause or contribute" to any such impairment which is "reasonably attributable to that existing stationary facility"; and (2) analyze for BART any facility so identified. "Reasonably attributable" impairment is impairment "attributable by visual observation or any other technique the State deems appropriate" [40 CFR 51.301(s)]. Where a State defaults on its obligations under the visibility regulations, EPA may act in place of the State pursuant to a FIP under section 110(c) of the Act, 42 U.S.C. 7410(c).¹ In such cases, all of the rights and duties that would otherwise fall to

¹Section 110(c) requires EPA to promulgate FIP's whenever a State fails to submit an implementation plan (or portion thereof) which meets the requirements of section 110; the Administrator determines that a plan (or portion) is not in accordance with the requirements of section 110; or the State fails to revise its plan within 60 days after notification by the Administrator in accordance with section 110(a)(2)(H).

the State accrue instead to EPA. Thus, EPA may utilize attribution techniques it deems appropriate, must identify "reasonably attributable" sources of impairment, conduct BART analyses, adopt BART requirements, and may promulgate such other control strategies that EPA, in its discretion, deems necessary to make reasonable progress toward the national visibility goal.

The visibility regulations promulgated at 40 CFR 51.302(c)(4)(i) require that once impairment has been certified, a State (or EPA if the State's visibility protection program addressing BART has not been approved and EPA is acting in its place) must analyze for BART any specific existing stationary facility it identifies as a "reasonably attributable" source of the impairment. Pursuant to section 169A(b) of the Act [42 U.S.C. 7491(b)] and 40 CFR 51.302(c)(4)(iii), the emission limitation representing BART for fossil-fuel fired power plants with a generating capacity in excess of 750 megawatts (MW) must be determined pursuant to guidelines promulgated by the Administrator. This statutorily required procedure for conducting a BART analysis is found in "Guidelines for Determining Best Available Retrofit Technology Analysis for Coal-Fired Power Plants and Other Stationary Facilities" (EPA-450/3-80-009b) (BART Guidelines)*. A copy of this document may be found in Docket A-89-02.

In December 1982, environmental groups, including EDF, filed a citizen's suit in the United States District Court for the Northern District of California alleging that EPA had failed to perform a nondiscretionary duty under section 110(c) of the Act, 42

* As discussed below, the agency is proposing in this rulemaking to make ~~several~~ ^{certain} modifications to these guidelines.

U.S.C. 7410(c), to promulgate visibility FIP's for the 35 States² that, at that time, had failed to submit SIP's to EPA as called for by the 1980 visibility regulations, EDF v. Reilly, No. C826850 RPA (N. D. Cal.). The State of Arizona was one of the 35 States that failed to submit a revised SIP to EPA.

The EPA and the plaintiffs negotiated a settlement agreement for the remaining States which the court approved by order on April 20, 1984. For more information on details of the provisions of the settlement, including a schedule of actions by EPA, see EPA's announcement of the agreement at 49 FR 20647 (May 16, 1984).

B. Settlement Agreement

To remedy the States' failure to submit the necessary SIP revisions during the time specified by the regulations, the settlement agreement replaced the original regulatory deadlines for visibility SIP provisions with a rulemaking schedule agreed to by the parties and approved by the court. This schedule required EPA to review the existing SIP's to determine any deficiencies, allow the States to cure those deficiencies, and to promulgate FIP's on a specified schedule for those States that still did not submit visibility SIP revisions to EPA. Specifically, the first part of the agreement required EPA to promulgate FIP's which cover the monitoring and NSR provisions of 40 CFR 51.305 and 51.307. The EPA

²The State of Alaska had submitted a SIP which was approved on July 5, 1983 at 48 FR 30623.

promulgated its monitoring strategy for 23 States and its NSR provisions for 21 States at

50 FR 28544 (July 12, 1985), 51 FR 5504 (February 1, 1986), and 51 FR 22937 (June, 1986). In separate notices, EPA approved the SIP's of the other States with respect to monitoring and NSR.

The second part of the settlement agreement required EPA to determine the adequacy of the SIP's to meet the remaining provisions of the visibility regulations, and gave the States until December 1986 to submit additional measures that would avoid the need for a FIP. These provisions are the general plan provisions, including BART and other implementation control strategies (section 51.302), integral vista protection (section 51.302-307), and long-term strategies (section 51.306). The settlement agreement required EPA to promulgate FIP's to remedy any deficiencies on a specified schedule.

Pursuant to 40 CFR 51.302(c)(1), on November 14, 1985, the Department of the Interior (DOI) certified the existence of visibility impairment in all Class I areas within its jurisdiction in the lower 48 States.

On January 23, 1986, EPA determined that the SIP's of 32 States (including Arizona) were deficient with respect to the remaining visibility provisions (51 FR 3046), and offered the States an opportunity to submit corrective SIP revisions. Thereafter, EPA and the plaintiffs negotiated revisions to the settlement agreement which extended the deadlines for State action or, if the States failed to respond, Federal action proposing FIP's

to remedy these deficiencies. The court approved these revisions by its order of September 9, 1986.³

On March 24, 1986, the DOI sent letters to EPA which supplemented its earlier certification of visibility impairment. The letter addressed Grand Canyon National Park and identified the NGS, a coal-fired power plant located near Page, Arizona, as a probable source of impairment in this Class I area. A copy of this letter may be found in Docket A-89-02.

The affected States failed to submit visibility SIP revisions in response to the notice of deficiency. Consequently, in accordance with the revised settlement agreement, on March 12, 1987 (52 FR 7802), EPA proposed to disapprove the SIP's of 32 States, including Arizona, for failing to meet the remaining provisions of the visibility regulations, including general plan requirements [which in turn includes BART and other control strategies (section 51.302) and long-term strategies (section 51.306)]. Also in accordance with the agreement, on November 24, 1987 (52 FR 45132), EPA took final action disapproving the affected SIP's, again including Arizona. The EPA promulgated, as FIP measures under section 110(c), general plan requirements and long-term strategies for these States. The EPA also determined that BART was unnecessary in 28 States because it could not reasonably attribute any part of the impairment to specific sources. In addition, under the revised agreement, EPA deferred until August 31, 1988 a

³A copy of the settlement agreement and revisions is available in docket A-85-26 at the address given at the beginning of this notice.

decision regarding the need for BART or other control measures in the FIP's for the States of Arizona, Maine, Minnesota, and Utah to address certified visibility impairments in seven Class I areas in these States which potentially could be reasonably attributed to a specific source pending acquisition and evaluation of additional monitoring information regarding the potential sources of impairment. The EPA required additional information to determine whether any part of the impairment in any of these Class I areas is "reasonably attributable" to an existing stationary facility, and to enable a BART analysis for any source so identified as causing or contributing to visibility impairment [40 CFR 51.302(c)(4)(i)].

Because EPA required information which was forthcoming but not available in time to meet the August 31, 1988 deadline, the Agency sought and received a second extension, until August 31, 1989, of the deadline for issuing a rulemaking proposal regarding the need for BART or other control measures to remedy visibility impairments in three of the remaining Class I areas (Moosehorn Wilderness, Grand Canyon National Park, and Canyonlands National Park). With regard to the impairment in the Grand Canyon National Park, EPA delayed action in order to allow the National Park Service (NPS) time to analyze the data from a 1987 winter visibility attribution study, termed the Winter Haze Intensive Tracer Experiment (WHITEX), conducted in the Colorado Plateau where this Class I area is located. In the meantime, on May 19, 1989 (54 FR 21904), in accordance with the second revision to the settlement agreement,

EPA promulgated decisions concerning certified visibility impairments in four of the seven Class I areas. Based on monitoring conducted in these areas, EPA found that no part of visibility impairments were reasonably attributable to any specific source. Therefore, EPA determined that it was not necessary at that time to revise the FIP's for the States of Maine, Minnesota, and Arizona to include BART or other control strategies to remedy impairments in Roosevelt Campobello International Park (Canada), Voyageurs National Park (Minnesota), Saguaro Wilderness (Arizona), and Petrified Forest National Park (Arizona).

In April 1989, EPA received a draft report on WHITEX from the NPS. Because of the delay in receiving this report, EPA believed that it lacked sufficient time to complete all actions in determining whether impairment in the Grand Canyon was reasonably attributable to a specific source, conduct a BART analysis, and issue a proposal regarding BART by the August 31, 1989 deadline. Accordingly, EPA and EDF filed a joint motion to revise the settlement agreement for a third time, which was approved by order of the court dated July 6, 1989. Under this revision, there was no change in the deadlines for proposed action regarding Canyonlands National Park or Moosehorn Wilderness. As to the Grand Canyon National Park, the third revision to the settlement agreement divided EPA's duty into two parts. The EPA would proceed, on a preliminary basis, to issue a finding on reasonably attributable impairment by the August 31, 1989 deadline. However, if EPA did provisionally identify a specific source of impairment, it would

solicit comments on that finding, and would have additional time to conduct a BART analysis. The EPA was to issue a rulemaking proposal on the need for BART by February 1, 1990 unless, in response to comments, EPA rejected its proposed identification and instead determined that BART was unnecessary.

In accordance with the third revision to the settlement agreement, EPA published a notice of proposed rulemaking on September 5, 1989 (54 FR 36948). Regarding Moosehorn Wilderness, EPA identified a source of the certified impairment, but proposed that BART was unnecessary at this time because the impairment would be adequately remedied by the retirement of certain existing emission units and the addition of pollution controls on other units pursuant to a permit issued under the Act's prevention of significant deterioration provisions. As to Canyonlands National Park, EPA could not reasonably attribute the certified impairment to a specific source, and so proposed that BART was unnecessary. On June 13, 1990 (55 FR 24060), EPA promulgated its decisions that BART at that time was not necessary to address impairment in either the Moosehorn Wilderness or the Canyonlands National Park.

Regarding Grand Canyon National Park, EPA preliminarily attributed a significant portion of ~~the~~ ^{winter time} visibility impairment in the Grand Canyon to emissions from the NGS. The EPA reviewed the draft NPS report on WHITEX⁴ and concurred with the findings of the NPS that NGS, located approximately 20 kilometers from the boundary

⁴Malm, et al., "The National Park Service Report on WHITEX Draft Final Report" (April 7, 1989).

of Grand Canyon National Park, is a substantial contributor to wintertime visibility impairment in the Grand Canyon. The EPA solicited comments on the merits of its preliminary attribution finding. In addition, EPA discussed certain legal and regulatory issues relating to the BART process, as it might affect NGS, that had previously been raised by the Salt River Project (SRP) and Alabama Power Company, et al., and solicited comments on those issues.

In commenting on the September 5, 1989 notice, SRP and others renewed their earlier arguments on legal and regulatory issues. They also made new arguments alleging that they could not comment adequately on EPA's preliminary attribution finding because the NPS draft WHITEX report on which it was based was subject to change. All of the issues raised by SRP are addressed in detail in a later section of this notice. The EPA notices, however, that comments regarding the adequacy of the September 5, 1989 notice and the draft WHITEX report have been rendered moot by the fact that the NPS has now issued a final report on WHITEX,⁵ and by today's notice. This notice contains the complete statement of basis and purpose for a regulatory proposal required under section 307(d)(3) of the Act, and reopens the comment period on the issue of reasonably attributable impairment, as well as providing an opportunity to comment on all other issues relevant to this rulemaking.

⁵Malm, et al., "The National Park Service Report on WHITEX Final Report" (December 4, 1989).

On August 1, 1989, the SRP, et al., and Alabama Power Company, et al., intervenors in EDF v. Reilly, moved the court to modify the rulemaking schedule under the settlement agreement. In this motion, the intervenors challenged the court's jurisdiction to order EPA to conduct any rulemaking that might result in the installation of BART at NGS. The intervenors later filed a separate motion requesting a 1-year delay in the rulemaking schedule. By order dated November 22, 1989, the court denied the intervenors' motion challenging the court's jurisdiction. By order dated January 9, 1990, the court granted the intervenors' motion to extend the deadlines. This order set February 1, 1991 as the new deadline for EPA to propose whether or not to require BART emission limits for the NGS to remedy winter visibility impairment. The order also extended the deadline for final action on any proposal regarding BART until October 1991 (6 months after the close of the comment period)⁶.

The National Research Council of the National Academy of Sciences (NAS) has reviewed the scientific methods used in the WHITEX report and has issued a report. The NAS report entitled "Haze in the Grand Canyon; An Evaluation of the Winter Haze Intensive Tracer Experiment" (October 1990) ^{concludes} ~~supports~~ EPA's ~~key~~ finding that NGS contributes significantly to haze at the Grand Canyon National Park. The NAS report has been placed in the

⁶EDF has appealed the extension of rulemaking deadlines in this case EDF v. Reilly, No. 90-15264 (9th Cir.). That appeal is pending.

as with TEX analysis purported to do.
rulemaking docket.⁷ The report also finds that the data base and data analyses techniques in WHITEX alone were not sufficient to ascertain the quantitative NGS contribution to haze at any given time. The EPA solicits comment on both the relevance of the report to today's action and its contents.

Another study effort has been undertaken by SRP. This study is intended to measure the degree of contribution by the NGS to visibility impairment in the Grand Canyon National Park during the 1989-1990 winter season. The EPA has received some preliminary results from this study and has placed them in Docket A-89-02A. However, EPA has not yet received final results of or a report on the study. If the final study results and report are submitted during comment period of this action, and if EPA's review of the report indicates that the latest information would materially affect the proposed attribution decision which is the underlying basis for this rulemaking (including the emission limitations³ proposed herein), the EPA will reopen the public comment period to consider such additional information.

C. Navajo Generating Station

The NGS is a 2250 MW coal-fired power plant located near Page, Arizona, approximately 20 kilometers from the northern boundary of the Grand Canyon National Park. The NGS is a baseload generating station consisting of three 750 MW units which became operational between 1974 and 1976. The NGS is jointly owned by the U.S. Bureau

⁷Additional copies of this report are available from the National Academy Press, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

of Reclamation, the SRP, the Los Angeles Department of Water and Power, the Arizona Public Service Company (APS), the Nevada Power Company, and the Tucson Gas and Electric Company. Existing pollution control equipment at NGS include electrostatic precipitators for particulate matter (PM) removal and specific burner design for nitrogen oxides (NO_x) control.

Potential adverse impacts to the environment, especially to air quality, have been of concern to citizens and State and Federal agencies since construction of the plant was first announced in the late 1960's. In April of 1970, the Secretary of the Interior expressed his concerns over potential environmental impacts of the NGS in a memorandum to the Assistant Secretary for Water and Power Development. Secretary Walter Hickel stated, "As you know, the Department is concerned with and is an outspoken advocate for protection and enhancement of the quality of our Nation's natural environment. The Grand Canyon area of the Colorado River is of particular concern to me. We must not allow anyone to pollute the environment there, and it would be unthinkable for us to pollute it ourselves."⁸ On February 3, 1971, in a letter to EPA, the Arizona Division of Air Pollution Control expressed its concern about the impact of the power plant on visibility in the region and requested

⁸Memorandum from Walter J. Hickel, Secretary of the Interior, to the Assistant Secretary of Water and Power Development, April 3, 1970.

EPA to provide information on the impact of the NGS emissions on visibility.⁹

In response to these and other concerns, NGS issued a strong policy statement indicating that its NGS participants were committed to ensuring environmental protection. Furthermore, the NGS stated, "the plant will be designed so that additional control equipment, including devices for removal of oxides of sulfur, can be added when developed."¹⁰ In the final environmental statement for the Navajo project, NGS participants stated, "the participants have committed themselves to installing sulfur dioxide (SO₂) removal systems on all three units at the Navajo Generating Station. . . It is planned that an SO₂ removal system will be installed and operative before . . . May 1975."¹¹ Although most commitments made by NGS for installing SO₂ removal systems centered around complying with State or Federal ambient air quality standards, NGS acknowledged in the final environmental impact statement that operation of the plant ^{might} could result in adverse visibility impacts. Furthermore, the NGS participants indicated that a goal of the participants in the Navajo Project was to prevent such adverse impacts.¹²

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⁹Letter from Arizona Division of Air Pollution Control to EPA, February 3, 1971.

¹⁰Policy statement by the participants in the NGS, 1971.

¹¹Final environmental statement for the Navajo Project, page 31, February 4, 1972.

¹²Ibid. pg. 59.

In summary, all of the above citations indicate that the protection of visibility in the Colorado River Basin was of concern prior to construction of the NGS. Moreover, statements made by the NGS participants indicate a strong commitment to protecting the environment (including visibility). All of the above historical documents, including the draft and final environmental statements for the NGS have been placed in Docket A-89-02.

Today's Action

The September 5, 1989 preliminary finding that a significant portion of wintertime impairment in the Grand Canyon was reasonably attributable to NGS was not based on any single analytical technique in the WHITEX report, but rather on the collection of techniques performed by the NPS using WHITEX and other data. All of these techniques used by the NPS support the conclusion that, for days which tracer data are available, NGS is a significant contributor to visibility impairment in the Grand Canyon during the winter months. ~~The results from these analyses indicate that NGS contributes approximately 30-40 percent on average to the observed winter impairment and approximately 50-70 percent during the worst impairment episodes.~~ The EPA has reviewed the NPS December 4, 1989 final report on WHITEX and the NAS evaluation of that report and finds no basis to reverse the Agency's preliminary finding that a significant portion of the visibility impairment in the Grand Canyon is reasonably attributable to NGS. The EPA solicits comments on the merits of today's proposed reasonable attribution finding. The EPA has reviewed comments by SRP and by others on the

The EPA is seeking additional comments on this report, but is

September 5, 1989 notice criticizing the draft WHITEX report and EPA's reliance on it in making a preliminary reasonable attribution finding. ~~The EPA is not persuaded by these comments~~ to reverse its preliminary finding at this juncture. The EPA will address in detail technical issues regarding the attribution question following receipt of comments on the final WHITEX report and NAS evaluation and will make a final attribution finding in conjunction with its final action on today's regulatory proposal.

In June of 1989, EPA began to gather preliminary information on the NGS that could be used in a BART analysis. An EPA contractor visited the power plant in order to compile site-specific data. Following publication of the September 5, 1989 notice preliminarily attributing impairment in the Grand Canyon National Park to NGS, a full-scale BART analysis was initiated. In accordance with the BART Guidelines (EPA-450/3-80-009b)¹³ and 40 CFR 51.301(c), the analysis included consideration of the following: the costs of compliance, the energy and nonair quality environmental impacts, any existing pollution control technology in use at the facility, the remaining useful life of the source, and the degree of improvement in visibility anticipated to result from application of controls. A copy of the BART Guidelines may be found in Docket A-89-02A.

~~The EPA is not required by statute or regulation to estimate monetary benefits as part of its BART analysis. However, as a~~

¹³U.S. EPA "Guidelines for Determining Best Available Retrofit Technology Analysis for Coal-Fired Power Plants and Other Existing Stationary Facilities," November 1980.

In order to evaluate

~~check for the reasonableness of its BART analysis approach, EPA considered the cost-benefit analysis conducted as a part of the preliminary Regulatory Impact Analysis (RIA) (as required by Executive Order 12291) for this rule. This analysis also satisfies the requirements of section 317 of the Act regarding economic impact assessments. A more detailed discussion of the benefits associated with improving visibility in the Grand Canyon is found in the "Benefit Analysis" section of this notice.~~

~~The BART Guidelines published in 1980 stated that the level of control necessary to meet the new source performance standard (NSPS) for power plants¹⁴ is generally available to large power plants.¹⁵ However, the guidelines do allow the State (or EPA in this case) to propose an emission limit other than NSPS if the limit proposed reflects a "reasonable balance of the various BART factors."¹⁶ The BART Guidelines further state that, because EPA believed that NSPS controls generally represented the best these sources could install as BART, if the State (or EPA) set a BART limit equivalent to the NSPS level of control, no detailed analysis of the BART factors would be required.¹⁷ The EPA does not, however, interpret the guidance as precluding the Agency from establishing emission limitations that are more stringent than NSPS if EPA concludes that controls to meet such limits are~~

¹⁴See 40 CFR 60 subpart Da.

¹⁵BART Guidelines at 1.

¹⁶*Id.* pg. 20.

¹⁷*Id.* at 20-21

Replace with language proposing to modify guidelines but only to the extent they require NSPS as a starting point. Reliance on factors set forth in the Act

~~Replace with language properly to use NSPS only to~~

readily available to the source and these controls would, at a reasonable additional cost, result in a marked improvement in visibility over the improvement that would result from controls designed to meet the NSPS. The EPA requests comments on this interpretation of the guidance and the underlying statutory and regulatory BART provisions, and the advisability of amending the BART Guidelines to clarify this intent. Conversely, the BART guidelines clearly also allow EPA to set BART limits that are less stringent than NSPS if, based upon the record before the Agency, the cost of controls, the degree of expected improvement in visibility, and the other BART factors, EPA concludes that a lesser degree of control is appropriate. The EPA requests comments on whether it should adopt BART limits less stringent than NSPS. As a related factual matter, EPA notes that several Western power plants using low-sulfur coal have retrofitted or installed in new units control equipment achieving emissions reductions equivalent to or better than those being proposed today. The EPA believes that increased use of these controls since 1980 should be considered in applying the BART Guidelines.¹⁸ In addition, EPA notes that the value of marketable allowances under section 403 of the Clean Air Act as amended by the Clean Air Act Amendments of 1990 will be made available to SRP should BART be installed. The EPA has factored the value of these allowances into its calculations of the cost of BART. The Agency believes that this

¹⁸Memorandum from Gwen Jacobs to David Stonefield dated January 29, 1991.

is consistent with the estimation of BART costs under the BART Guidelines. However, EPA also solicits comments on whether the BART Guidelines should be revised as part of this rulemaking in order to consider the value of marketable allowances available under section 403 to the Act.

In today's proposal, EPA is addressing remedies for certified visibility impairments in the Grand Canyon National Park. Based on the BART analysis performed by EPA, in accordance with 40 CFR 51.301(c) and the BART Guidelines, EPA is proposing to establish an SO₂ emission limitation for NGS of 0.3 pounds/ million British thermal units (lbs/MMBtu) which is a 70 percent reduction in currently allowable SO₂ emissions at NGS. ~~Although EPA is proposing a 30-day rolling average, there are some concerns over selecting the appropriate averaging time for this emission limit.~~ ^{but is requesting comment on whether a} ~~This longer averaging period may not adequately protect visibility in the Grand Canyon.~~ ^{be appropriate,} On the other hand, it may be difficult for the facility to meet a shorter averaging time because of variabilities in coal content and control equipment efficiency. Therefore, the EPA solicits comments on whether other averaging times should be used instead of a 30-day rolling average. Details on each of these options may be found in the "Emission Limitations" section of this notice. The EPA proposes to revise the FIP for Arizona to include this emission limit representing BART to address the visibility impairment observed in the Grand Canyon National Park. Because of the uncertainty in determining the improvement in visibility expected as a result of reducing emissions at the NGS,

EPA solicits comment on whether another emission limitation may be more appropriate. In particular, EPA solicits comments on 0.50 and 0.10. ^(which) ~~(These limits~~ represent a 50 percent and 90 percent reduction from NGS existing State emission limitations~~), as well as the option proposed by the Salt River Project~~. ^{which is discussed more fully below.}

The EPA also invites comments on the legal and regulatory issues raised by SRP and others. These issues are identified and discussed in a later section.

A public hearing on this action will be on Monday, March 18, 1991 at 1:00 p.m. in the Maricopa County Auditorium, 201 West Jefferson, Phoenix, Arizona. ^{All 4 options must be set forth more fully.}

A. Discussion of Impairment

The DOI has documented the occurrence of visibility impairment at Grand Canyon National Park during winter (November - March) inversion conditions (see discussion at 52 FR 7802). This park is a mandatory Class I Federal area located in the Colorado River area of the Colorado Plateau. The visibility impairment identified in this national park during the winter months has been described as a haze "with a bright white layer and a distinct upper edge and it occasionally includes one or more perceptible layers."¹⁹

The WHITEX study, a 6-week study conducted in January and February 1987 in the Colorado River area, was designed to evaluate the ability of a variety of receptor modeling approaches to attribute all or a meaningful portion of the visibility impairment in several Class I areas, including the Grand Canyon National Park,

^{This study was not originally conceived as an effort to study NGS effect on Grand Canyon. Use language from NGS study.}

¹⁹Malm, et al., "The National Park Service Report on WHITEX Final Report," December 4, 1989, pg. 4.

to a single source--the NGS. The WHITEX study was a cooperative effort between several utility groups including SRP--the operators of NGS--and several government agencies including NPS. The WHITEX study employed several attribution methodologies, including the use of a unique tracer injected into the NGS stack, to track the power plant's plume. A meteorological analysis was conducted to document the wind flow patterns and stagnation events occurring during the winter months.

The study area consisted of three major and nine surrounding monitoring sites. Major monitoring sites were located in Grand Canyon National Park (at Hopi Point), Canyonlands National Park, and Page, Arizona (near the Glen Canyon Dam). The surrounding sites were located in potential transport pathways in the study area. Extensive air quality monitoring was conducted at these sites to evaluate NGS' contribution to visibility impairment in the area.

The NPS calculated a light extinction budget for each of the three major sites based on optical and aerosol measurements taken simultaneously at each site. The light extinction budgets express the relative contribution to light extinction by various aerosol constituents (e.g., sulfates or organics) or the type of extinction observed (e.g., scattering or absorption). Light extinction, a standard measure of visibility impairment, is the combined effect of light scattering and absorption. The NPS found that scattering due to fine particle sulfates accounted for the largest share of

anthropogenic visibility impairment during the WHITEX study period in the Grand Canyon National Park.

The NPS then attributed the extinction (due to fine particle sulfates) to specific source(s) using various receptor modeling techniques. Both statistical methods and a deterministic model were used to estimate the relative contributions of sources within the study area to visibility impairment observed during the 6-week study. Other less quantitative techniques were also used to attribute the impairment observed to specific sources. An emissions analysis was conducted along with a meteorological analysis and an analysis of the spatial patterns and temporal trends in ambient sulfate concentrations.

The NPS report on WHITEX concludes that NGS was the largest single contributor to visibility impairment in Grand Canyon National Park during the days for which tracer data were available. The analytical techniques conducted by the NPS indicate that under certain meteorological conditions, which are common in the area during the winter months, large quantities of SO₂ and sulfate from NGS are transported into the Grand Canyon. The tracer analysis included measurement at Hopi Point (on the rim of the Grand Canyon National Park) of the unique tracer, deuterated methane, which was injected into the NGS stack. An analysis of synoptic meteorology showed that the high sulfate episodes observed during the WHITEX study period were typical results of transport and transformation of pollutants during the wintertime.

The NPS analyzed extensively the data collected at Hopi Point during the three major sulfate episodes. All of the analytical techniques used by NPS suggest that NGS is a significant contributor to visibility impairment during the winter months in the Grand Canyon National Park. The NPS data indicate that, for days tracer data are available, NGS contributes approximately 40 percent on the average to the observed wintertime visibility impairment and approximately 60-70 percent during the worst visibility impairment episodes. During some episodes, the NPS analysis identified copper smelters located in southern Arizona and Mexico as probable major contributors to visibility impairment. It is important to note that subsequent to the 1987 study timeframe, these sources have either been controlled to reduce emissions or shut down.

Using the draft NPS report on WHITEX as a basis, EPA, on September 5, 1989, proposed to find that NGS may reasonably be anticipated to cause or contribute to visibility impairment in the Grand Canyon National Park during the winter months. A copy of the final report has been placed in Docket A-89-02. As required by section 169A of the Act, EPA conducted a BART analysis to determine if new emission limits were required to address this impairment. The results of the BART analysis are discussed later in this notice.

National Academy of Sciences Review of WHITEX

In early 1990, the National Research Council of the NAS established the Committee on Haze in the National Parks and

Wilderness Areas to address issues related to visibility degradation in these protected areas. The Committee was asked by the Department of the Interior to consider the relative importance of human-derived and natural emissions that contribute to visibility reduction in these locations and to evaluate possible source-control approaches. As part of its charge, the Committee was asked to evaluate the WHITEX report and its conclusion that the Navajo Generating Station contributed to wintertime visibility impairment in the Grand Canyon National Park. The Committee met at Grand Canyon National Park from March 28-31, 1990. The Committee issued its report on WHITEX on October 11, 1990, a copy of which is in the docket. On the basis of the data presented to the Committee in the National Park Service-WHITEX report the Committee concluded that, at some times during the study period, NGS contributed significantly to haze in the Grand Canyon National Park. ~~This finding supports EPA's proposal in September 1989 that NGS causes a significant portion of the Grand Canyon wintertime visibility impairment.~~ The Committee also concluded that WHITEX did not quantitatively determine the fraction of sulfate aerosol and resultant haze in Grand Canyon National Park that is attributable to NGS. The Committee cited problems with the tracer mass balance regression (TMBR) and differential mass balance (DMB) regression calculations which, in the Committee's judgment, prevent the precise quantification of NGS' contribution to haze due to sulfate at Grand Canyon National Park. The key deficiencies cited for TMBR were lack of tracers for

other than NGS sources of sulfur, insufficient investigation of the covariance between NGS emissions and other sources, and limited evaluation of the conversion rate of SO_2 to sulfate. For DMB calculations, the Committee cited the lack of data below the rim of the canyon and that background measurements were not adequately incorporated into the data analyses as well as the limited evaluation of the conversion rate.

The Committee then used the WHITEX data in a simple technique to estimate the ranges of possible impacts from NGS. The Committee found that NGS sulfur emissions are sufficiently large to account for even more than the total sulfur concentrations measured during WHITEX at Grand Canyon National Park. The actual impact of NGS on haze depends on the rate of conversion of SO_2 to sulfate. The Committee concluded that if NGS emissions were controlled, then wintertime haze at Grand Canyon National Park would most likely be reduced, but not eliminated.

The NPS issued a technical response document to the NAS committee report on October 30, 1990. That document responds to the key points of the NAS report. The key issues of assessment of background sulfate measurements and analysis, measurements of sulfate below the rim of the canyon and rates of conversion were addressed. The NPS response has been placed in the docket. The NPS points out that the NAS review did not fully consider supplemental techniques such as Empirical Orthogonal Function analysis to TMBR and DMB which were in the WHITEX report. These supplemental analyses provided by NPS have now addressed the issue

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of other sulfur sources, and support the reasonableness of the attribution range derived in WHITEX.

1988 Visibility Follow-Up Study

The NPS has submitted a report to EPA presenting the preliminary findings of a follow-up visibility study conducted during the winter of 1988 (January 27 - February 16) at Indian Gardens in the Grand Canyon National Park. Visual examination of photographic data collected during the WHITEX study showed that haze built up within the canyon and only impacted the monitoring site (Indian Gardens) at Hopi Point after the mixing height had reached above the canyon rim. This prompted NPS researchers to locate a monitoring site for the 1988 study within the canyon to assess the concentration and estimate the origin of the aerosols within the canyon. The Indian Gardens site was located some 4,000 feet below the rim of the canyon.

Preliminary results of the study indicate much higher sulfate concentrations within the canyon than those collected on the rim during the WHITEX study. These results also show a strong relationship between total sulfur and selenium concentrations, suggesting that sulfur compounds in the canyon are a result of emissions from coal-fired sources. The WHITEX study showed that the NGS plume was rich in selenium. Finally, an examination of meteorology and photography data collected during the 1988 study indicate transport conditions similar to the one documented for the highest WHITEX sulfate episode. The clouds are shown to roll in from the direction of Page, Arizona, and fill the canyon with haze.

The NPS is continuing its analysis of data collected during this study.

Although the study conducted by the NPS in the winter of 1988 cannot be used to confirm the NPS analyses of the WHITEX data, the EPA believes that the preliminary findings of this study are consistent with those of WHITEX and generally support its previously proposed attribution decision and range of attribution used in the BART analysis. A copy of the preliminary report submitted to EPA by the NPS has been placed in Docket A-89-02A.

SRP Winter 1990 Visibility Study

In the winter of 1989-1990, SRP conducted its own monitoring study, including release of tracer from NGS. Preliminary results of that study and subsequent data analysis were sent to EPA and NPS in September and December, 1990. Initial data analysis by SRP indicates that the overall contribution of NGS to haze at the Grand Canyon National Park during the study period was less than that computed from WHITEX data. All data and analyses received have been placed in the docket.

However, preliminary data on episodic impairment levels and seasonal average data are substantially the same as ranges found in the WHITEX study that were used in the BART analysis.

The EPA believes it is inappropriate to alter the conclusions reached in EPA's attribution finding given the preliminary and inconclusive nature of the SRP data. The EPA will consider all analyses and data provided during the comment period. As stated earlier, if EPA receives the final study results and

report during the comment period and if EPA's review of the report indicates that the latest information would materially affect the proposed attribution decision, EPA will reopen the public comment period to consider such additional information.

EPA's Position on the Ability to Determine NGS' Contribution to Visibility Impairment at Grand Canyon National Park

The EPA reviewed the WHITEX report, the NAS report, NPS response to the report, and the preliminary data on the SRP 1990 tracer study. Based on this review, EPA has found no reason to change its determination that visibility impairment at the Grand Canyon National Park can be attributed to NGS. ~~Furthermore, EPA believes the source-impairment relationship can be made reasonably assessed for the purposes of determining BART.~~

B. BART Analysis

The EPA conducted a BART analysis for the NGS pursuant to the procedures found in the BART Guidelines as required by section 169A(b) and the visibility regulations promulgated at 40 CFR 51.302(c)(4)(iii).²⁰ A copy of EPA's BART analysis for NGS has been placed in Docket A-89-02A. Considering the requirements found in this document, EPA divided the BART analysis into two major parts. In the first part, EPA identified the SO₂ emission controls that are readily available to the source, the costs of such controls, and other impacts of installing and operating the controls. In the second part of the BART analysis, EPA attempted

²⁰U.S. EPA, "Draft Report on Best Available Retrofit Technology (BART) Analysis for the Navajo Generating Station in Page, Arizona," January 1990.

to define the source/impairment relationship which was then used to predict the improvements in visual air quality that can reasonably be expected to occur as a result of installing and operating the controls defined in the control technology analysis. Because EPA was faced with some uncertainties in each of the parts of the BART analysis, EPA bounded its results by giving low and high estimates.

In addition to the key areas discussed below, EPA was also required to consider the time, frequency, and duration of the visibility impairment episodes in the Grand Canyon National Park. This proposal focuses on impairment observed during the winter season (between November 1 and March 31). Based on information from the WHITEX study and previous air quality monitoring, the visibility impairment episodes were determined to occur frequently throughout the winter months, generally lasting from 3-5 days. The NPS submitted information to EPA indicating that approximately 800,000 people visited the Grand Canyon during the winter of 1989. This figure represents about 21 percent of the total annual visitation to the park. Documentation for visitation rates to the Grand Canyon National Park has been placed in Docket A-89-02.

1. Control Technology Analysis

As part of the BART analysis, EPA investigated the costs and other impacts associated with proven SO₂ removal systems. It was not the intent of the Agency to design an SO₂ control system for the NGS, but rather to evaluate the potential impacts to NGS of SO₂ control systems that have been used successfully in prior retrofit

cases. Both wet and dry scrubbing technologies were evaluated in the control technology analysis. The EPA solicits comments on other available technologies which can ~~achieve the proposed~~ ^{reduce} SO₂ emission ³ ~~limit for~~ ^{at} NGS, and which may require less capital investment and/or operating expenses than those technologies evaluated in the BART analysis.

The EPA used the Integrated Air Pollution Control System (IAPCS) cost model to predict the capital and operating cost estimates for the control systems analyzed.²¹ This model was developed by EPA for the National Acid Precipitation Assessment Program and has been used to estimate SO₂ and NO_x retrofit control costs for 200 power plants. The case-specific input parameters were determined through documents obtained from the NGS information collected during the site visit by an EPA contractor and other government records. As mentioned previously, lower and upper bound limits were generated for each control option. The results from IAPCS indicated that wet flue gas desulfurization (FGD) achieving a 0.3 lbs/MMBtu emission limit for all three units is estimated to have total capital cost requirements of between \$245.9 million and \$402 million with total levelized annual costs (including amortized capital, interest, operating, and maintenance costs) estimated to be between \$91.9 million and \$128.3 million.²² The levelized annual costs for 0.3 lbs/MMBtu wet FGD are less than those for lime

²¹Integrated Air Pollution Control System Costing Program, Version 3.0, copyright PEI and Associates, Inc., 1989.

²²All dollar amounts herein are measured in 1988 dollars.

spray drying or dry sorbent injection at the same emission rate. The wet FGD control option to meet a 0.10 lbs/MMBtu emission limitation is estimated to require a total capital investment of between \$275.7 million and \$453.2 million for all three units with total levelized annual costs estimated to be between \$103.5 million and \$145.2 million. A 0.5 lbs/MMBtu emission limitation met by a wet FGD control option is estimated to require a total capital investment of between \$213.3 million and \$357.0 million for all three units with total levelized annual costs estimated to be between \$79.5 million and \$112.2 million.

Using the costs generated by IAPCS, EPA estimated the increases in the average SRP's and Nevada Power Company's residential customers' electric utility bill if wet FGD were selected to decrease NGS SO₂ emissions to 0.10 lbs/MMBtu. This increase is expected to be no greater than 3.1 percent (about ~~\$2.50 per month~~) for the SRP customer and no greater than about a 4.4 percent increase (approximately \$2.55 per month) for the Nevada Power Company customer. Because SRP and Nevada Power receive a higher percentage of their total system power from NGS than do other co-owners of NGS and have a lower average cost per kilowatt hour, these estimated 3.1 to 4.4 percent increases are expected to be the maximum percentage increase in power costs experienced by residential customers of NGS. These price increases would be lower for 0.30 lbs/MMBtu control option. It is important to note that these estimates are based upon increasing consumer costs by the percentage increase cost of producing the electricity. They do not

Adjust
to
reflect
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option

consider that part of the consumer rates which include transmission costs; considering those costs could dampen the effect on the consumer. The actual increase to the average SRP or Nevada Power residential customer is expected to be somewhat less, since the transmission costs are not affected by the BART requirements.

Adjust to reflect proposed option
Other persons potentially affected by an increase in NGS power are customers of the Central Arizona Project (CAP). The CAP is an organization established by the U.S. Bureau of Reclamation to provide government-subsidized irrigation water to south central Arizona farmers. The CAP relies heavily on electricity from the NGS to pump and provide this water. It was estimated that if wet FGD were selected to decrease NGS SO₂ emissions to 0.10 lbs/MMBtu, the cost of water to users would increase approximately ~~\$11~~^{.30} per acre foot or about ~~3~~³ cents per 1,000 gallons. This increase in irrigation costs could raise the farmers' total variable costs by 3 percent to 4 percent per year. However, if, as expected, the CAP phases down its obligation to supplying water to the farmers, the increase in total variable costs would only be 1 percent to 2 percent per year. Again, the cost increases would be lower for the 0.30 lbs/MMBtu control option. A more detailed discussion of these impacts may be found in the RIA placed in Docket A-89-02A.

As a plausibility check for the costs generated by IAPCS, EPA requested information from the APS regarding the costs for FGD retrofit of units 4 and 5 at the Four Corners Power Plant located in Farmington, New Mexico. These units are similar to NGS in many respects including capacity and design, the burning of low sulfur

coal, and the remote location of the plant. Information supplied by APS indicates that the capital investment for the wet FGD removal system (averaging 72 percent reduction in SO₂ emissions) at Four Corners was \$119.8 million per unit. The IAPCS model generated costs for control at NGS ranging between \$82-\$134 per unit for the 0.3 lbs/MMBtu wet FGD control option. The EPA therefore concludes that the IAPCS model estimates are reasonable. A copy of the letter from APS has been placed in Docket A-89-02A.

Title IV (section 403) of the Clean Air Act Amendments of 1990 establishes a system of marketable sulfur emission allowances to help achieve the goal of reducing acid deposition. This provision does not waive any BART requirements for NGS. Nor does it require more controls than NGS currently has. However, the control cost incident with BART may be affected in part by NGS selling its excess emission reduction allowances. While the allowance system begins in 1995, western sulfur sources such as NGS are not included until 2000. The annual sulfur emission reductions at NGS due to the current proposed regulation could be offered for sale by NGS. The EPA estimates²³ the market value of sulfur reduction credits will be \$430/ton in 2000, increasing to \$590/ton in 2010. At an emission limit of 0.30 lbs/MMBtu, estimated total revenue for emission credits are \$21.4 million/year in 2000, increasing to \$29.4 million/year in 2010. Sale of emission credits would lower the estimated cost impacts on NGS during this period by 17 to 32

²³ICF Resources, Inc., 1990, "Comparison of the Economic Impacts of the Acid Rain Program of Senate Bill (S. 1630) and the House Bill H.R. 3030).

percent. The analysis of the acid deposition credit market, and analysis of the effect on NGS, have been placed in Docket A-89-02A.

In accordance with the procedures found in the BART Guidelines, the nonair quality environmental impacts of compliance were investigated. Impacts from increased water usage to operate SO₂ control systems, increased waste disposal, and effects of sludge from the SO₂ control system on ground or surface waters were examined in the BART analysis. Results from the BART analysis indicate that adequate space is available to dispose of additional wastes that would be generated by a control system. Also, the results show that the environmental effects of sludge disposal from the control system should present no increased threat to the environment beyond those currently being posed through fly ash disposal. Finally, although SO₂ controls would require an increase in water usage, NGS is only utilizing approximately 68 percent of its water allotment. The remainder of its allotment should be adequate to operate a wet FGD or dry control system. In addition, water requirements for SO₂ controls can be reduced if, as indicated in the environmental statement previously conducted for the NGS, the cooling tower blowdown water is utilized in the SO₂ control system.

2. Source/Impairment Relationship

One of the more complicated tasks in the BART analysis was defining the relationship between the SO₂ emissions at NGS and the visibility impairing sulfate (SO₄) in the Grand Canyon. This relationship had to be addressed in order to estimate the degree of

improvement in visibility that could be anticipated to result from the use of the alternative SO₂ control systems.

Because of the complex terrain in and around the Grand Canyon National Park, the EPA visibility models that are often used to estimate improvements in visibility (e.g., PLUVUE II) were determined to be inadequate for this BART analysis. Based on conversations with EPA researchers and modeling experts,²⁴ the Agency decided to define this relationship using the ratio of SO₂ emissions at NGS to SO₄ in the Grand Canyon attributable to NGS as found in the final WHITEX report. Using this ratio, EPA then applied a linear rollback model. The National Academy of Sciences' Committee on Haze in National Parks and Wildernesses used the data in WHITEX and a series of mass-balance calculations on the basis of simple, but reasonable assumptions, to estimate the contribution of NGS on visibility impairment in Grand Canyon National Park during a haze episode. The Committee concluded that it could not confirm the WHITEX estimates because some measurements needed to confirm the assumptions were not made during WHITEX. The EPA believes that the NPS data from WHITEX and other monitoring coupled with assessment techniques that do not depend directly on mass balance techniques provide adequate data concerning the NGS contribution of haze which could be used in the BART analysis. ~~No data measurements or analyses indicate that using 40 percent of the sulfate as an average contribution and 60-70 percent of the sulfate~~

²⁴Memorandum from Terry Clark, Atmospheric Research and Exposure Assessment Laboratory, to James Dicke, OAQPS, December 18, 1989.

~~attributable to NGS on an episode day is unreasonable.~~ However, the uncertainties surrounding these analyses, as pointed out by NAS committee on haze, requires that EPA consider a broad range of source impairment relationships. ~~as assessed as the actual effects~~

An important consideration in defining the source/impairment relationship was determining whether a proportional reduction in NGS SO_2 emissions would result in a proportional or less than proportional reduction in visibility impairment in the Grand Canyon attributable to NGS. Potential nonlinearities resulting from condensation of additional nitrate aerosol once the NGS sulfate is controlled were investigated.

The case mentioned above addresses the nonlinearity that may exist when SO_4 is taken out of the atmosphere. Ammonia that would have combined with the SO_4 to form ammonium sulfate would now be free to combine with nitric acid to form ammonium nitrate, an efficient light scatterer. By comparing the light extinction reduction resulting from SO_4 reduction to the net light extinction reduction resulting from the combined effects of SO_4 reductions and nitrate increases, a nonlinearity factor can be developed and applied to the rollback model calculations. The average nonlinearity factor for the hours for which all necessary data are available from the WHITEX study is 0.10. In other words, the relationship is estimated to be 90 percent linear.

The results of the rollback model (with the average nonlinearity factor applied) were used to estimate the improvements in visibility that would result from SO_2 emission limits of 0.10

and 0.30 lbs/MMBtu at NGS. Because no single standard method exists for measuring improvements in visibility, the EPA employed two of the most widely used techniques to define the improvements in visibility expected to occur in the Grand Canyon.

One of the methods used to estimate the visibility improvements in the Grand Canyon was analyzing the changes in contrast expected to occur as a result of reducing SO₂ emissions at NGS. The EPA believes that this method is particularly relevant because human observers use contrast to make judgments of how color and atmospheric clarity changes with pollutant concentration. The contrast is defined as the percent difference between the brightness of a scenic element and its background.

Using the information obtained during the WHITEX study and extrapolating it to a period from November 1 through March 31 based on historic particle composition data (and applying the nonlinearity factor), a 0.10 lbs/MMBtu SO₂ emissions rate at NGS would result in a "perceptible" change in the visibility conditions (4 percent change in contrast) approximately 65 percent of the time (100 days) during the winter season, a "quite noticeable" change in visibility conditions (10 percent change in contrast) 39 percent of the time (58 days) during the winter, and a "very apparent" change in visibility conditions (20 percent change in contrast) 14 percent of the time (21 days) during the winter.

Similarly, if SO₂ emissions are reduced to 0.30 lbs/MMBtu, the following changes in winter visibility conditions in the winter are expected: a very apparent change in visibility conditions 4.5

percent of the time (7 days); a quite noticeable change in visibility conditions 28 percent of the time (42 days); and a perceptible change in visibility conditions 58 percent of the time (88 days).

Finally, it is estimated that during an additional 29 percent of the time (44 days) during the winter months there would be a "perceptible" (or greater) improvement in visibility with an SO₂ emission limit of 0.10 lbs/MMBtu as compared to 0.30 lbs/MMBtu. Documentation for these numbers, including assumptions and methodology, has been placed in Docket A-89-02A. In addition to analyzing the changes in contrast in order to describe the improvement in visibility expected to occur as a result of controlling SO₂ emissions at NGS, the EPA also estimated the improvements in visual ranges expected to occur. Although this method is somewhat less desirable than analyzing contrast changes (because it is sometimes misunderstood by the layman), it is often used by scientists to measure visibility improvements. Table 1 contains the estimated improvements in visual ranges calculated for the maximum measured light extinction day and for an average day during the WHITEX study for the 0.10 lbs/MMBtu and 0.30 lbs/MMBtu control options using the results from the tracer mass balance regression analysis performed by the NPS using the WHITEX data.

As noted above, however, the uncertainty of these analyses, as pointed out by the NPS committee on haze, suggests that the actual effects of such emission reductions may be substantially different from these estimates.

Table 1. Estimates of Improvements in Visual Ranges with SO₂ Control at NGS

SO ₂ Emission Limit (lbs/MMBtu)	Maximum Light Extinction Day Change in Visual Range	Average WHITEX Day Change in Visual Range
0.10	Increase from baseline of 150 km to 380 km	Increase from baseline of 200 km to 229 km
0.30	Increase from baseline of 150 km to 283 km	Increase from baseline of 200 km to 222 km

In addition to the wintertime Grand Canyon National Park visibility impairment described above, it is believed that the control of SO₂ emissions at NGS will result in other visibility improvements. Although not specifically addressed in this rulemaking, EPA and NPS suspect that NGS emissions may contribute to visibility impairment in the Grand Canyon during other seasons of the year. Thus, a significant decrease in SO₂ emissions at NGS may improve visibility in other months as well as during the winter months. Furthermore, a decrease in SO₂ emissions from NGS may improve visibility in other Class I areas in the Colorado Plateau.

C. Benefit Analysis

As stated previously in this notice, EPA was not required as a part of its BART analysis to estimate monetary benefits associated with improving visibility in the Grand Canyon. However, as a check of reasonableness for its approach, EPA

evaluated and considered the benefit analysis developed as a part of the RIA.

Because of its size, unique rock formations, and sheer beauty, the Grand Canyon is considered by many to be one of our Nation's most prized national parks. Indeed, millions of people from the United States and all over the world travel to Arizona each year to view this national treasure. Placing a quantitative value on the protection of the beauty of the Grand Canyon is a formidable task. However, in conjunction with the BART analysis (and as part of the RIA), an attempt was made to identify some of the societal benefits related to the predicted improvements in wintertime visibility at the Grand Canyon National Park due to reductions in sulfur emissions at NGS. The following paragraphs summarize the findings of the benefit analysis. A more detailed discussion of benefits may be found in the RIA developed for this rule. A copy of the draft RIA has been placed in Docket A-89-02A.

A key factor in assessing the benefits of visibility is understanding attitudes and preferences of individuals. Surveys²⁵ of visitors to the Grand Canyon National Park indicate that the vast majority (over 80 percent) view clean, clear air as very important or extremely important to their recreational experience and indicate the viewing-related activities are particularly important at the Grand Canyon National Park. This

²⁵National Park Service 1988, "Air Quality in the National Parks," Natural Resources report 88-1.

research also shows that visitors are aware of increasing haziness and that it is strongly correlated with decreased enjoyment of the site and with increasing dissatisfaction with air quality. Studies at recreational sites, including the Grand Canyon National Park, indicate that visitors would plan to, and do, reduce the length of park visits and time at vista points as visibility conditions are degraded.

General citizen surveys provide further support. One survey²⁶ found that the vast majority of Americans felt there should be no air pollution that would "interfere with recreation and natural resources." Another citizen survey²⁷ found that 80 percent of households would definitely agree to having their tax money spent on preserving and managing park areas, even if they personally could not visit them, and another 17 percent would possibly do the same.

Several studies have attempted to measure in dollar terms societal values for varying degrees of visibility protection at the Grand Canyon National Park.^{28,29} Because visibility is not

²⁶Opinion Research Corporation 1981, "Public Attitudes Toward the Clean Air Act."

²⁷Chestnut and Rowe, 1989, "Preservation Values for Visibility Protection at the National Parks," draft report to the U.S. Environmental Protection Agency.

²⁸Schulze, Brookshire, Walther and Kelley, 1989, "The Benefits of Preserving Visibility in the National Parklands of the Southwest," Vol. VIII, Methods Development for Environmental Control Benefit Assessment, U.S. EPA.

²⁹Rowe and Chestnut, 1983, "Valuing Environmental Commodities: Revised," Land Economics 59.

bought or sold in a conventional marketplace, researchers have used various survey approaches known as the "contingent valuation method." This research has consistently shown the public's collective willingness to pay to protect visibility at the Grand Canyon National Park is substantial. The benefit analysis for this rulemaking interprets and transforms the existing economic research. ~~The research selected as the basis for the benefits analysis finds substantially lower visibility values than most other studies.~~ Uncertainties arise in this interpretation and transformation process. Consequently, results are reported and should be interpreted as depicting the direction, character, and expected order of magnitude of some of the economic benefits rather than depicting the exact amounts. *Insert*

The benefit analysis for a 0.30 lb/MMBtu emission limit at NGS indicates in 1995 the average United States household would be willing to pay on the order of \$1.00 to \$1.90 per year per household. National total benefit estimates for 1995 range from \$100 to \$190 million. The annual benefits are expected to increase over time due to increasing population and income. The present value (using a 10 percent discount rate) of 30 years of benefits is \$1.6 to \$2.3 billion. Using a 3 percent discount rate, the present value of the benefits range from \$4.0 to \$5.5 billion.

The benefit analysis for a 0.10 lbs/MMBtu SO₂ emissions rate from NGS indicates in 1995 the average United States household would be willing to pay on the order of \$1.30 to \$2.50 per year

Uncertainties arise in this interpretation and transformation process. Consequently, results are reported and should be interpreted ~~only~~ as depicting the direction and character of the willingness-to-pay. The benefit estimates developed here are based on the changes in visual range estimated by EPA in Table I. However, given the uncertainties surrounding these analyses (as discussed above), changes in visual range could be substantially ~~smaller~~ ^{different} than the change used in developing these WTP estimates. In addition, these WTP estimates are based on responses elicited from contingent valuation studies that examined a substantial, year-round change in Grand Canyon visibility. While the analysis presented below attempted to adjust for differences between the contingent valuation studies and the specific visibility affects attributed to the Grand Canyon, there are important uncertainties with the WTP estimates described below.

sought

per household. By this measure, national total benefit estimates for 1995 range from \$130 to \$250 million increasing over time due to growth in population and income. The present value, using a 10 percent discount rate, of 30 years of benefits is \$2.1 to \$3.1 billion. Using a 3 percent discount rate, the present value of the benefits range from \$5.3 to \$7.4 billion. The annualized benefits are \$220 to \$330 million. The benefits for a 0.50 lbs/MMBtu SO₂ emission rate would be substantially less than those calculated for 0.30 lbs/MMBtu.

A household's willingness to pay for visibility improvement at the Grand Canyon National Park arises from three different motivations. Across all United States households, 31 percent of the total willingness to pay is an option price, or the desire for the household members to be able to enjoy good visibility during their own visits to the Grand Canyon National Park now and in the future. ^{Insert B} About 38 percent is bequest value, or the desire for other people to enjoy good visibility now and in the future, and about 31 percent is existence value, or the desire to protect the Grand Canyon National Park even if no one were to ever visit.

In September 1990, EPA received a draft report of a new benefits study on improving visibility in the Grand Canyon. The report³⁰ details the methodology and results of a pilot contingent valuation willingness-to-pay study conducted on behalf

³⁰Development and Design of a Contingent value Survey for Measuring the Public's Value for Visibility Improvements at the Grand Canyon National Park: Revised Draft Report," September 1990, Decision Focus, Inc.

Estimates based on willingness-to-pay surveys (McFarland, et al, Schulze) of actual visitors to the Grand Canyon suggest substantially lower WTP, however, than would be expected from the "option" value estimate used in this benefits analysis.

of SRP in 1990. The draft report concludes that the benefits of reducing sulfur emissions from the NGS are substantially lower than those in EPA's draft RIA. The EPA's preliminary assessment of the SRP-sponsored draft report is that this conclusion results primarily from two factors. First, the SRP-sponsored draft report predicts visual range improvements which are much lower than EPA's estimates. Second, the SRP-sponsored draft report subjectively discards willingness-to-pay data for visual range improvement. The effect of the data adjustment is to lower the mean willingness-to-pay estimates by a factor of 20. A copy of the report was provided to EPA by SRP, and has been placed in Docket A-89-02. By today's notice, the EPA solicits comments on this new information on benefits, as well as on the benefits analysis developed as part of the RIA.

D. Emission Limitations

Taking into consideration the uncertainties in the analyses, such as the attribution calculation and social benefits estimates, EPA is proposing a 0.30 lbs/MMBtu emission limit, rather than the alternative that produces the maximum estimated economic gains (0.10 lbs/MMBtu). The EPA solicits comment on, and will consider, any appropriate SO₂ emission limitation in its final determination of BART. The EPA is particularly interested in additional information that would show more precisely the range of visibility changes expected from changes in emissions from NGS or better confirm the range used in the BART analysis as well as any quantitative information on the visibility

improvements that could be expected in times other than winter and in areas other than the Grand Canyon National Park.

Additional information on control alternatives and their costs, as well as appropriate use of data on social benefit for

improving visibility is also solicited. ~~Bart is an emission limitation within the meaning of section 302(k) of the Act [see sections 169A(b) and (g)(2)]. Section 302(k) provides that emission limitations must require continuous emission reductions.~~

Accordingly, ~~T~~ the proposed emission limitation is based on year-round control. However, EPA solicits comment on legal and policy issues relating to the use of seasonal controls instead. For a discussion of seasonal control, please refer to the section

"Discussion of Seasonal Controls as a BART Emission Limitation" elsewhere in this notice. Consistent with the similar emission limitations implemented at other facilities over the past 10

years, EPA is proposing that compliance be determined on a 30-

6 day ~~rolling~~ average. ^{Nevertheless,} ~~Since there is concern that visibility~~

~~events occur on a shorter time period,~~ EPA invites comments on other options for averaging times that could be used to determine compliance. ~~The current State of Arizona emission limit is 1.0~~

~~lbs/MMBtu, 3-hour average. Compliance with this limitation would be determined using continuous emission monitoring systems (CEMS).~~

Two other pollutants, NO_x and PM, emitted by NGS could contribute to visibility impairment. The current emissions of NO_x and PM from NGS have not been identified as significantly

contributing to the visibility impairment in the Grand Canyon.

However, EPA is concerned that increased emissions of these pollutants could result in impairment in the Grand Canyon.

Although the NGS is not subject to any NO_x emission limitations, SRP has stated that NGS currently emits NO_x at a rate of 0.4 to 0.5 lbs/MMBtu. Therefore, EPA is proposing an NO_x emission limit consistent with NGS's existing emission rate, as well as the rate at other similar plants, of 0.5 lbs/MMBtu. As with the SO₂ emission limit, compliance would be determined using CEMS.

Particulate matter emissions for the NGS are currently limited in two ways. The Arizona SIP has both an emission rate limitation of 0.06 lbs/MMBtu and an opacity limit of 40 percent for NGS. The SRP has stated that NGS currently emits particulate matter at a rate of 0.03 lbs/MMBtu with an opacity of between 10 and 15 percent. Thus, the opacity limit of 40 percent is well above the NGS existing emissions. Therefore, EPA is proposing a 20 percent opacity limitation consistent with current NGS emissions opacity in order to preclude any visibility deterioration that would be caused by an increase in PM emissions. ~~Compliance would also be determined using CEMS.~~

In conjunction with the proposed BART limits for SO₂ emissions, these emission limitations for NO_x and PM should result in reasonable progress toward the national visibility goal.

E. Emission Limitation Compliance Schedule

Section 169A requires BART to be applied "as expeditiously as practicable, but in no event later than five years after the

date of approval." However, the operators of NGS may be able to develop in the next few years technologies capable of meeting the same stringent BART limitation proposed today at costs substantially lower than those we have assumed using currently demonstrated technologies. Given that, EPA proposes the required emission limitation to be achieved in three phases. The final BART emission limitation would need to be met on one unit by January 1, 1995, on two units by January 1, 1997 and on all three units by January 1, 1999. This flexibility would allow the operators ample time to install, test and evaluate innovative technologies in meeting the emission limitations.

The EPA is also considering allowing the operators the option of averaging the needed emission reductions across all three units during each milestone of the phase-in period. This would allow, if the 0.30 lbs/MMBtu emission limitation is selected as BART for example, 25 percent emission reductions at two units and 20 percent reductions at the third unit be achieved by 1995 rather than achieving the 0.30 lbs/MMBtu limit by 1995 at just one unit. This would provide greater flexibility in study and design of new control approaches than a strict unit-by-unit requirement. The EPA is aware that this approach will raise questions regarding regulatory intent for installation of BART. Under this approach, BART would begin before the 5-year requirement and controls would be installed on all three units within an average of five years. The EPA solicits comments on whether it is legally permissible and, in the final analysis,

appropriate from a policy perspective, to rely on the date of controls on the first unit or the average date of controls on all units in complying with the timing requirements of the Statute. In addition, EPA solicits comments on the averaging of the phase-in across units in order to provide the maximum flexibility in evaluating alternative control technologies.

Proposal from Salt River Project

On January 10, 1991, EPA received a proposal from representatives of Salt River Project as an alternative to BART. The proposal addresses a broader scope of issues, including the contribution that NGS makes to the existing regional haze problem in the desert southwest region, which includes many Class I areas including the Grand Canyon, Canyonlands, Bryce Canyon, Petrified Forest, Zion, and other national parks and wilderness areas. The proposal has four components; ~~which are summarized as follows.~~

~~The alternative agreement would require that:~~ (1) SRP ^{would} help fund, and cooperate fully with the regional haze studies that EPA is required to conduct under the new section 169B of the Act; (2) EPA would expedite establishment of the Grand Canyon Visibility Transport Commission, ~~and that~~ SRP would cooperate with the Governors of the affected States and the Commission in conduct of its inquiry and mandated report to the Administrator on appropriate action to address regional haze; (3) SRP would undertake tests to try to demonstrate the feasibility of several promising clean coal technologies that may provide much lower cost alternatives to conventional scrubbers or current dry

technologies on plants fired by low sulfur western coal. If one the technologies were demonstrated to achieve an agreed upon minimum removal efficiency at an agreed upon cost, SRP would commit to install that technology and operate it on a seasonal basis to address the alleged effect of NGS on wintertime visibility; and (4) SRP would agree that if none of the technologies met the test criteria, it would then install pollution control devices that would remove at least 70 percent of the uncontrolled SO₂ emissions (emission limit of 0.30 lbs/MMBtu) measured on an annual basis by January 1, 2000, the year upon which the first allowances would be issued to the plant under the 1990 Amendments. A copy of the letter containing the full explanation of this offer is in the Docket. ~~While the EPA does not feel this proposal meets the requirements of section 169A, EPA is requesting public comment on how this proposal, legally and technically, may fulfill the intent of section 169A, as well as the provisions of section 169B. Specifically, in addition to the concerns stated elsewhere in this notice that seasonal controls are neither legally permissible nor appropriate from a policy perspective as BART, EPA has concerns with the use of seasonal controls given the indication by SRP that NGS contributes to regional haze. The EPA also has concerns about the delay in application of controls so far beyond any interpretation of the 5-year statutory requirement. In addition, EPA requests comment on the proposal's usefulness in addressing new legislative requirements on EPA to conduct regional haze~~

With respect to this proposal,

studies and on the role of cooperation with industry in addressing regional haze through the Grand Canyon Visibility Transport Commission.

Legal and Regulatory Issues

On May 15, 1989, the SRP submitted comments on various legal and regulatory issues pertaining to potential BART emission limits affecting NGS. In addition, SRP and Alabama Power Company, et al., a consortium of utility groups (referred to collectively in this section as "SRP"), have submitted various motions to the court in EDF v. Reilly seeking to modify and delay the settlement agreement governing this rulemaking. The EPA addressed these issues and solicited comment on them in the September 5, 1989 notice. See 54 FR 36951-52. The EPA's earlier discussion is incorporated by reference as part of today's statement of basis and purpose. In comments on the September 5, 1989 notice, and in further pleadings in EDF v. Reilly, SRP and Alabama Power Company, et al., have continued to press these issues and to raise new ones. Similar views were also presented by other commenters on the September 5, 1989 notice. By its order of November 22, 1989, the court rejected all of SRP's arguments insofar as they sought to prevent EPA from proceeding with this rulemaking pursuant to the court's jurisdiction to oversee BART rulemaking under a FIP. The effect of that decision is to refer SRP's arguments to the rulemaking process and, ultimately, a decision by the Court of Appeals, should SRP seek review of final rulemaking action by EPA under

section 307(b) of the Act. For the benefit of comments on today's proposal, these issues are identified below, and EPA has set forth again its present position on these issues. The EPA will take a final position on all of these issues in response to comments on today's notice.

A. Scope of the Current Visibility Regulations

The SRP asserts that regulation of haze that cannot be attributed to a source through visual observation, but only through analytical techniques such as those used in WHITEX, is beyond the scope of EPA's current visibility regulations. The EPA disagrees with this contention. The current regulations focus on impairment due to discrete, discernible plumes attributable to a source through visual observation, but they are not limited to the type of visibility impairment known as "plume blight." Rather, as to BART, the visibility rules regulate any impairment that is "reasonably attributable" to an existing stationary facility [see, e.g., 40 CFR 51.302(c)(4)(i)]. While such "reasonably attributable" impairment may be in the form of a haze, this is still distinguishable from impairment in the form of "regional haze" that is beyond the scope of EPA's current regulations because it cannot be attributed, in whole or significant part, to a single source or small group of sources.

B. Attribution Techniques

The SRP also claims that the visibility regulations prohibit EPA from basing a finding of reasonable attribution on the WHITEX study, asserting that sophisticated attribution techniques are

beyond the scope of the 1980 visibility regulations. The EPA disagrees with this interpretation. While the 1980 regulations do not require the use of techniques other than visual observation, they do not prohibit them either.

The SRP also asserts that if sophisticated techniques are permissible at all, their use is limited to the States. The SRP points to 40 CFR 51.302(s), which defines "reasonably attributable" as "attributable by visual observation or any other techniques the State deems appropriate." In SRP's view, the rules on their face authorize only States, and not EPA, to use techniques other than visual observation to make a reasonable attribution decision. The EPA disagrees with this view. The Part 51 visibility regulations, including the definition in question, contain numerous references to the duties of "States" in the SIP planning process for the obvious reason that those regulations' principal purpose is to set forth the requirements that SIP's must meet to comply with the regulations. In this instance, however, Arizona has defaulted on its responsibility, as it has failed to submit a visibility SIP or any portion thereof despite EPA's notice of deficiency, and EPA has disapproved the SIP for such failure. Consequently, EPA has an obligation under section 110(c)(1) of the Act to promulgate such visibility measures as may be necessary to fulfill the requirements of the visibility regulations at 40 CFR 51.300, et seq. In so doing, EPA stands in the shoes of the defaulting State, and all of the rights and duties that would otherwise fall

to the State accrue instead to EPA. Thus, in this instance, EPA is in effect acting as a "State," and may utilize any attribution technique it deems appropriate, not just visual observation. Moreover, there is no inherent reason why EPA should be limited to visual observation when it acts under section 110(c) if a State is not so limited in developing a SIP. Similarly, 40 CFR 51.302(c)(4)(i) provides that the "State" must identify and analyze for BART any source as to which a reasonable attribution finding is made. Nevertheless, where EPA is acting in place of the "State" under section 110(c), these duties, as well as all other duties of "States" under the Part 51 visibility regulations, fall to EPA. In this case, EPA is acting in the place of Arizona. The EPA has found that the Arizona SIP is deficient for failing to meet the requirements of 40 CFR 51.302, including reasonable attribution and BART requirements, and has disapproved the SIP for that failure (51 FR 3046, 3048 (January 23, 1986); 52 FR 45132, 45133). The EPA believes that its position represents a reasonable interpretation of the Act and its own regulations, and is fully in keeping with the language, goals, and purposes of the Act and those regulations. However, in the September 5, 1989 notice, EPA solicited comments on whether it would be appropriate to make changes in the definitional provisions of 40 CFR Part 51 in order to provide additional clarification on EPA's interpretation that the Administrator, like a "State," may utilize whatever techniques he deems appropriate in making any "reasonably attributable"

findings in promulgating a plan under section 110(c) of the Act. By today's notice, EPA again solicits comments on this issue. Upon the close of the comment period that commences today, EPA may proceed to make clarifying changes without further public notice.

C. Attribution of Impairment to a Significant Contributor

Section 169A(b)(2)(A) of the Act, 42 U.S.C. 7491(b)(2)(A) requires that emission limitations representing BART be established for an existing source which emits any air pollutant which may "reasonably be anticipated to cause or contribute to any impairment of visibility in any [Class I] area." The EPA regulations further refine this statutory requirement by limiting BART to cases of reasonably anticipated impairment "where the impairment is 'reasonable attributable' to the source." 40 CFR 51.302(c)(4)(i). The SRP argues that a finding of reasonable attribution cannot be made unless one source (or a small group of sources) is the sole contributor to visibility impairment. In support of this view, SRP states that control of one source would result in significant improvement in visibility only if the impairment was being caused by that source alone, whereas if many sources are contributing, all must be controlled to result in improved visibility. The EPA disagrees, because SRP's position appears to contravene the legal requirement flowing from the statute and regulation that BART be installed whenever a source may reasonably be anticipated to either cause or "contribute" to "any impairment" in "any" Class I area, where the impairment is

"reasonably attributable" to that source. In addition, EPA preliminarily believes that SRP's position is flawed logically, and assumes key facts that the WHITEX data indicate are untrue, or which are contravened by EPA's BART analysis. Specifically, if NGS is a significant contributor to wintertime impairment in the Grand Canyon, notwithstanding that other sources may also contribute to the impairment, it follows that the addition of emissions controls at NGS alone may result in significant improvement in visibility. In addition, as discussed above, the WHITEX data indicate that NGS is, in fact, a significant contributor to wintertime impairment in the Grand Canyon. In its review of WHITEX, NAS likewise refuted SRP's reasoning when NAS concluded that if NGS were controlled, then the wintertime haze of the Grand Canyon National Park would likely be reduced. Thus, in today's notice, EPA has proposed to determine that the impairment in question may be reasonably attributable to NGS. In addition, today's notice reflects that EPA's BART analysis has concluded that control of NGS alone would result in a significant improvement in visibility. ~~The EPA believes that these findings and interpretations are adequate to proceed with its proposal of BART emission limits under the present visibility regulations to remedy this impairment. The EPA also believes that proposing to require BART under these circumstances is supported by the BART exemption provisions under the Act. Section 169A(c)(2) of the Act, 42 U.S.C. 7491(c)(2) provides that large power plants may be exempted from BART only if the source owner or operator~~ *may* *at this time*

Although the EPA is seeking additional comment on these studies, and is prepared to analyze any additional data that is submitted, it

demonstrates to the satisfaction of the Administrator that the plant is located at such distance from any Class I area that the plant will not, "by itself or in combination with other sources" emit pollution which may reasonably be anticipated to cause or contribute to "significant impairment" of visibility in any Class I area. See also 40 CFR 51.303. These provisions strongly suggest that Congress intended BART to apply whenever a State or EPA has reasonably identified an existing source as a likely contributor to significant visibility impairment, and that the burden is on the source owner or operator to demonstrate why BART should not apply whenever the threshold test for applying BART has been met. The EPA specifically solicits comments on its view that it is appropriate under the current visibility rules to impose BART limits on a source which is a significant contributor to, but not the sole source of, a visibility impairment in a Class I area when that impairment may also be due in part to undifferentiated regional sources.

D. EPA's Present Authority to Conduct a BART Rulemaking

The SRP and Alabama Power Company, et al., assert that, with respect to visibility impairment in the Grand Canyon, EPA has no present authority to conduct a BART analysis or propose or promulgate emissions limitations representing BART because there has been no valid certification of impairment, because there has been no finding of substantial inadequacy as to Grand Canyon impairments and subsequent failure by Arizona to remedy such inadequacy, and because the Administrator has not made a final

reasonable attribution decision. The EPA disagrees with these assertions, because they seriously misread the applicable statutory and regulatory requirements.

Regarding the certification of impairment, EPA believes that the DOI letters of November 14, 1985 and March 24, 1986 discussed above satisfy the certification requirements of the regulations, because they represent the considered views of responsible DOI officials, and Arizona was given notice of them by the January 1986 notice of deficiency and March 1987 proposed SIP disapproval prior to EPA's disapproval of the Arizona SIP for failing to submit remedial measures in response.

Regarding the purported need to afford Arizona another opportunity to perform its own BART analysis, there is likewise no basis for such a requirement, because Arizona has clearly defaulted on its obligations, and EPA must provide a complete visibility plan, including measures to remedy Grand Canyon impairment. Specifically, the prerequisites for remedial action by EPA to promulgate appropriate FIP measures under all of the subsections of section 110(c)(1) of the Act have already been met, although satisfying only one is adequate. As explained above, Arizona failed completely to submit any visibility SIP provisions, thereby satisfying the prerequisite in section 110(c)(1)(A). Moreover, EPA, in January 1986, issued a notice of SIP deficiency meeting the requirements of section 110(a)(2)(A) and afforded Arizona an opportunity to submit corrective measures. Arizona failed to submit the

required plan revision to correct this inadequacy and so EPA satisfied the prerequisite in section 110(c)(1)(A)³¹. There was no need to specifically identify Grand Canyon impairment in that notice, because the State had been properly informed that the SIP as a whole was inadequate to remedy impairment which DOI certified as existing in all Class I areas within the State. In addition, EPA's proposed SIP disapproval in March 1987 specifically alerted Arizona to the presence of wintertime impairment in the Grand Canyon and the need for corrective action. See 52 FR 17804, 17806. Also, in November 1987, EPA disapproved Arizona's SIP for failure to provide remedial visibility SIP measures, thereby satisfying the prerequisite in section 110(c)(1)(B). Finally, in letters submitted to the docket for this rulemaking, the State of Arizona has stated its agreement that EPA, and not the State, should proceed to address BART to remedy Grand Canyon impairment without a further specific opportunity for rulemaking by the State. Clearly, under these circumstances, it would serve no purpose to take the additional steps suggested by SRP, as both the letter and spirit of section 110(c)(1) have been satisfied.³²

³¹Prior to the revisions to section 110(c)(1) enacted by section 102(h) of the Clean Air Act Amendments of 1990, P.L. 101-549 (November 15, 1990), the failure of a State to make a required submission in response to a Notice of SIP inadequacy under section 110(a)(2)(H) was set forth in a separate subsection, 110(c)(1)(C), that has now been merged in to subsection 110(c)(1)(A).

³²On November 15, 1990, President Bush signed into law the Clean Air Act Amendments of 1990, Pub. L. 101-549. While the Amendments revised the Act in several areas, they do not include any changes that materially affect either prior FIP actions

regarding Arizona or this rulemaking. In particular, section 102(h) of the Amendments revised the language and organization of section 110(c)(1) of the Act, but did not affect the standards for a default in Arizona's SIP planning obligations or EPA's FIP obligations arising from such failure in any material way. Section 101(c) of the Amendments added a savings clause as section 110(n)(1) of the revised Act that preserves implementation plan provisions already promulgated by the Administrator, including those portions of the Arizona FIP that have already been promulgated. A companion provision, section 108(1) of the Amendments, added a savings clause as section 193 of the revised Act that preserves every regulation, standard rule, notice, order and guidance promulgated or issued by the Administrator, except as otherwise provided by or inconsistent with the Amendments, or revised by the Administrator. Section 108(j) of the Amendments adds a new section 302(y) to the revised Act that defines "federal implementation plan" in pertinent part to mean a plan or portion thereof promulgated by the Administrator to fill all or a portion of a gap or otherwise correct all or a portion of an inadequacy in a SIP, and which includes enforceable emission limitations. Section 816 of the Amendments added a new section 169B of the revised Act that calls upon EPA to study and possibly adopt a regulatory program to address the problem of regional haze in Class I areas.

Taken together, the FIP and savings clause provisions constitute an "anti-backsliding" approach by Congress, and do not affect any pre-existing actions of EPA, except to the extent that new or revised substantive provisions call into question the validity of those actions. Thus, prior visibility FIP actions affecting Arizona, in particular, Arizona's default with respect to its BART obligation and EPA's assumption of that obligation, remain in place. With respect to outstanding FIP obligations, there is no indication that Congress intended to disturb such obligations except where the Amendments alter the underlying SIP planning obligations in a manner that evinces congressional intent to reinstitute State primacy. Thus, for example, a court has relieved EPA of a preexisting obligation to promulgate a FIP to meet the ozone NAAQS in Southern California, because the Amendments granted States additional time to develop their own attainment plans for ozone. See Coalition for Clean Air v. EPA, (C.D. Cal., Order granting motion to vacate settlement agreement, Jan. 9, 1991) ("the structure of the amended Act, with revamped criteria and timing for SIPs, and with an obvious policy that the States are encouraged to take the lead, with the potential FIP to be the stick that drives them, is clear"). In contrast, with respect to this rulemaking, Congress took no action to suggest that it intended to alter either the substance or timing of the requirement to apply BART to sources that may reasonably be anticipated to cause or contribute to visibility impairment in Class I areas where, as here, EPA acts

Regarding the purported need for a "final" attribution determination before proceeding to a BART analysis, there is no support in the regulations for the notion that EPA must proceed in this fashion. Indeed, 40 CFR 51.302(c)(4) speaks of a single requirement to "identify and analyze for BART." In its order of July 6, 1989, the court in EDF v. Reilly granted the EPA's and EDF's joint request that EPA be given a short additional time to conduct a BART analysis and issue a proposal on the need for BART (this time was further extended at SRP's request by the court's order of January 9, 1990), but the regulations do not suggest that it is necessary to formalize EPA's voluntary bifurcation of a single decision, and make a "final" determination on the first portion before proceeding to the second. Nor is it necessary to proceed in the fashion these commenters suggest in order to satisfy the rulemaking requirements of the Act of the Administrative Procedure Act, because neither a "proposed" nor a "final" reasonable attribution determination is a promulgated regulation or other "final action" within the meaning of those statutes, and is not subject to judicial review. Rather, it is a preliminary finding that may lead to a final rule or other final action (i.e., a final decision that emission limitations

under its present regulations addressing impairment that can be "reasonably attributed" to a source. In particular, the regional haze provisions of section 169B do not affect the present action regarding "reasonably attributable" visibility impairment under section 169A and 40 CFR Part 51, Subpart P, and there are no other new or revised substantive provisions that would relieve EPA of its obligation to complete this FIP action. Thus, EPA's obligation to complete this BART rulemaking remains in place.

representing BART are unnecessary, or the imposition of such limitations) that is subject to review.

E. Discussion of Seasonal Controls as a BART Emission
Limitation

In a letter dated January 14, 1990, SRP submitted a position paper to EPA in support of SRP's belief that EPA could lawfully provide for the seasonal application of pollution control technology in establishing BART. For the reasons summarized below, EPA believes at this time that seasonal controls are not appropriate under the circumstances of this rulemaking. However, EPA solicits comments on (1) the appropriate use of seasonal controls as BART; and (2) whether, if seasonal controls may be allowed, the record of this rulemaking would support imposition of only seasonal controls at NGS.

The apparent statutory basis for a seasonal variance would be the procedures contained in the BART exemption provisions of section 169A(c)(2) and (3) and 40 CFR 51.303. The statute explicitly addresses the possibility of BART exemptions for large power plants such as NGS, and establishes a very high hurdle for granting any such exemption. It requires the source owner or operator to demonstrate to the satisfaction of the Administrator "that such powerplant is located at such distance from all [Class I areas] that such powerplant does not or will not, by itself or in combination with other sources, emit any air pollutant which may reasonably be anticipated to cause or contribute to a significant impairment of visibility in any such area." It

Mike - Pls call me ASAP about this section. It needs to be substantially revised

further requires the concurrence of the appropriate Federal Land Managers. Thus, if such a variance or exemption could be allowed the burden would be upon SRP and/or its co- owners to make the necessary demonstration. Because there would be no need for a BART exemption until such time as final BART emission limits are established, any such request for exemption should be submitted after completion of the BART rulemaking, in the form of a request for partial (i.e., seasonal) relief from any final BART limits that might be established as a result of this rulemaking. See 40 CFR 51.303. Under the exemption regulations, in order to demonstrate no "significant impairment," i.e., the absence of "a level of impairment that interferes with the visitor's visual experience of the area," the owner or operator "should address the frequency, extent, time, intensity and duration of the impairment." See 45 Fed. Reg. 80084, 80087. Thus, the factual basis for such a demonstration with respect to this case would be a showing that NGS does not contribute to any significant impairment in any Class I area in seasons other than winter. In this regard, SRP contends that the record demonstrates that summer impairment at Grand Canyon is not attributable to NGS (SRP has not to date addressed potential impacts of NGS at other Class I areas in the vicinity, such as Bryce Canyon National Park, Zion National Park, and Canyonlands National Park). The limited information in the record at this time, however, suggests the contrary.³³ As stated earlier, EPA and NPS suspect that

³³Summary Statement by Brand Niemann, March 21, 1990.

emissions from NGS may contribute to regional visibility impairment during the entire year and that a decrease in SO₂ emissions from NGS may improve regional visibility in many Class I areas in the Colorado Plateau. The EPA solicits comment on whether a seasonal variance could be allowed under section 169A(c) in the manner discussed above or under some other statutory authority, on whether such a variance could be considered only after completion of this rulemaking, and (in the event that EPA concludes it would be appropriate to consider a seasonal variance in conjunction with the present proceeding) on the factual question of whether NGS contributes to any significant impairment in any Class I area.

F. The Adequacy of the September 5, 1989 Notice

The SRP asserts that the September 5, 1989 notice was inadequate to meet the requirements set forth in section 307(d)(3) of the Act for a statement of basis and purpose to accompany a notice of proposed rulemaking. The EPA agrees. However, as explained above, comments regarding the adequacy of the September 5, 1989 notice and the draft WHITEX report have been rendered moot by the fact that the NPS has now issued a final NPS report on WHITEX, and by today's notice. This notice contains the complete statement of basis and purpose for a regulatory proposal required under section 307(d)(3) of the Act, and reopens the comment period on the issue of reasonably attributable impairment, as well as providing an opportunity to comment on all other issues relevant to this rulemaking.

Moreover, EPA believes that, insofar as the September 5, 1989 notice addresses the Grand Canyon National Park, the preliminary attribution finding therein was not a regulatory proposal that triggered the requirements of section 307(d)(3).

The SRP also complains that EPA has not disclosed the criteria it is applying for attribution decisions or its position on the validity of the WHITEX report, and so interested parties are unable to prepare meaningful comments. The EPA disagrees. The analyses in the WHITEX report speak for themselves. Except where specifically noted otherwise, EPA agrees with the individual analyses conducted by NPS and with the report's conclusions that the NGS is a significant source of wintertime visibility impairment in the Grand Canyon. The EPA believes that this notice, together with the WHITEX report and the other analyses that have been placed in the docket, provides an adequate basis on which to prepare comments on the technical merits of WHITEX and on the merits of today's proposal in general. The EPA will respond to technical comments when it takes final action on today's proposal.

Regarding SRP's complaint about the absence of "standards" for deciding whether Grand Canyon impairment is reasonably attributable to NGS, it appears that SRP is calling upon EPA to set a percentage benchmark for its attribution decision. The EPA tentatively believes that it is neither necessary nor appropriate under the visibility regulations to establish such a percentage criteria. The provision in 40 CFR 51.303 allowing exemptions

from BART limits where a source owner or operator demonstrates that it does not cause or contribute to a "significant" visibility impairment strongly suggests that a percentage cutoff is inappropriate. Consequently, EPA believes that today's proposed finding of reasonably attributable impairment in the Grand Canyon due in a "substantial" or "significant" degree to emissions from NGS is satisfactory. However, EPA solicits comments on whether, in taking final action on today's proposal, it should establish a percentage criterion for determining whether impairment is reasonably attributable to a stationary facility.

Format for Remedial Action

With respect to passed implementation of their visibility requirements, because of the large number of States involved and the ongoing nature of the regulatory requirements, EPA deemed it appropriate to promulgate generic Federal implementing regulations, and insert them into the SIP's of the affected States. See, e.g., 40 CFR 52.26 (visibility monitoring strategy, implementing 40 CFR 51.305); 40 CFR 52.27 and 52.28 (visibility new source review, implementing 40 CFR 51.307); 40 CFR 52.29 (implementing long-range strategies, 40 CFR 51.306); 40 CFR 51.145(b) and (c) (incorporating these provisions into the Arizona SIP). With respect to source attribution and BART, however, Arizona is the only State for which remedial Federal measures are even potentially needed at this time. Accordingly, EPA proposes to simply follow the appropriate provisions of the

Part 51 visibility regulations in making source attribution and BART findings regarding NGS and, if those findings result in the imposition of actual emissions limitations under BART, to amend the visibility FIP for Arizona in 40 CFR 52.145 to incorporate such limitations.

Nonprecedential Effect of This Action

Today's proposal is limited to the rulemaking obligation currently before EPA: to determine whether to require the application of BART at NGS in order to remedy visibility impairment in Grand Canyon National Park. As such, it has no direct precedential effect on any other rulemaking action EPA might undertake in the future regarding other existing sources or Class I areas. This is so because the outcome of this rulemaking will be highly dependent upon facts and circumstances that are unique to this proceeding and thus may not be decisive for other cases. For example, the tracer studies and other analyses contained in the WHITEX report that are keyed to NGS are not necessarily determinative in any other rulemaking addressing other potential sources of visibility impairment. Should EPA or State agencies conduct visibility rulemakings regarding other Class I areas and other existing sources of pollution in the future, they will need to rely on studies and analyses tailored specifically to the circumstances of those other areas and sources in order to make reasoned regulatory decisions. They will not be able to rely solely on WHITEX findings that specifically address the Grand Canyon and NGS to determine the

existence of impairment that is reasonably attributable to any such other source. Likewise, the final BART emission limit that emerges from this rulemaking will not have direct precedential effect elsewhere. The statutory requirement that EPA weigh the costs of compliance, expected improvement in visibility, and other BART factors before reaching a decision is by nature a case-specific process.

Upon completion of final rulemaking action regarding NGS, EPA will have completed its obligations under the settlement agreement in EDF v. Reilly, and under the first round of SIP/FIP planning called for in the visibility regulations. EPA will then focus its attention on establishing the visibility transport commissions and conducting the regional haze studies called for in new section 169B of the Act, added by the Clean Air Act Amendments of 1990. In addition, ~~in accordance with the congressional directive,~~³⁴ EPA plans to conduct a tracer study of emissions from the Mojave Power Plant.

Solicitation of Comments

The EPA solicits comments on all aspects of today's proposal to revise the FIP for the State of Arizona to include emission limits for NGS to address the visibility impairment observed during the winter months in the Grand Canyon National Park.

Specifically, EPA is reopening the comment period for issues pertaining to today's proposed finding that a portion of the

³⁴H.R. Rep. 900, 101st Congress, 2d Sess., at 88 (Oct. 1990).

visibility impairment in Grand Canyon National Park is reasonably attributable to NGS.

In addition, EPA solicits comments on all aspects of the BART analysis for NGS including, but not limited to, the following: assumptions made in the IAPCS cost model, the model selected to determine the improvements in visibility expected to occur in the Grand Canyon as a result of SO₂ controls at NGS, the emission limits representing BART, the appropriate averaging time to be used to determine compliance, the use of seasonal controls, and schedule for compliance. The EPA also solicits comments on the appropriateness of establishing opacity and NO₂ limits similar to plants with emission limitations developed over the past 10 years and NGS's existing emission rates. The EPA also solicits comments on the benefit analysis performed in conjunction with the BART analysis and on the pilot benefits study submitted to EPA by SRP.

Finally, EPA solicits comments on the legal and regulatory issues discussed above, and on the format for remedial action.

The EPA has established a docket for this proposal, Docket Number A-89-02A. The docket is an organized and complete file of all significant information submitted to or otherwise considered by EPA during this proceeding. This docket will serve as the record in the case of judicial review under section 307(b) of the Act, 42 U.S.C. 7607(b).

Classification

Executive Order No. 12291 requires each Federal agency to determine if a regulation is a "major" rule as defined by the order and "to the extent permitted by law," to prepare and consider an RIA in connection with every major rule. Major rules are defined as those likely to result in:

- 1) an annual cost to the economy of \$100 million or more;
or
- 2) a major increase in costs or prices for consumers or individual industries; or
- 3) significant adverse effects on competition, employment, investment, productivity, innovation, or international trade.

The EPA has judged the proposed BART regulation for NGS to be a major rule based on projected annualized costs potentially in excess of \$100 million. The EPA has prepared a preliminary RIA that includes estimates of costs, benefits, and net benefits for three control options. The preliminary analysis, titled "Regulatory Impact Analysis of a Revision of the Federal Implementation Plan for the State of Arizona to Include SO₂ Controls for the Navajo Generating Station," and an addendum, titled "Addendum to the Regulatory Impact Analysis of a Revision of the Federal Implementation Plan for the State of Arizona to Include SO₂ Controls for the Navajo Generating Station" are available in Docket A-89-02A.

The preliminary RIA finds that given the estimates and uncertainties captured by the benefit and cost analysis, a 0.10

lbs/MMBtu emission limit will result in potential economic gains to society among all examined alternatives, i.e., the net benefits (estimated benefits minus estimated costs) are positive. An examination of less stringent regulatory alternatives (e.g., a 0.30 lbs/MMBtu and 0.50 lbs/MMBtu SO₂ emission limit) resulted in smaller but still positive estimated net benefits. Taking into consideration the uncertainties in the analysis, the EPA is proposing a 0.30 lbs/MMBtu emission limit, rather than the alternative that produces the maximum estimated economic gains. With implementation of the proposed regulation, the cost of power generation at NGS will increase. The projected cost increase is estimated to raise the average cost of power generation by less than 5 percent for utilities using NGS power. The cost impacts could be lower if the acid deposition allowances are sold.

In particular, the cost increase may be partially offset by revenue earned through the sale of SO₂ marketable allowances. NGS may use this revenue to recover ^{part of} the cost of SO₂ control technology, or may bank it against the operator's future expansion.

The preliminary RIA was submitted to the Office of Management and Budget (OMB) for review under Executive Order 12291. Written comments from OMB and written EPA response to these comments are available for public inspection at the docket office cited above. A final RIA will be issued at the time of the final rulemaking.

Paperwork Reduction Act

This rule will impose a modest reporting burden on the owners of the NGS to enable EPA to ensure compliance with the emission limits. Because the reporting burden affects only a single source, it is not subject to OMB review under the Paperwork Reduction Act.

Section 317(c) Economic Impact Assessment

The economic impact assessment required by section 317(c) of the Act is incorporated in the RIA.

Regulatory Flexibility Act

Under the Regulatory Flexibility Act, an agency proposing or promulgating a rule must determine if the rule will have a significant impact on a substantial number of small entities. If a significant impact on a substantial number of small entities is anticipated, a Regulatory Flexibility Analysis (RFA) must be prepared. None of the owners of the NGS are classified as small according to guidelines developed by the Small Business Administration.

For most of the utilities using NGS power, the impact on utility rates will be substantially less than 5 percent which applies to the most affected utility (Nevada Power).

Accordingly, I hereby certify that the proposed regulation will not have a significant impact on a substantial number of small entities. Therefore, this proposed regulation does not require an RFA.

Date

Administrator

* * *

40 CFR 52.145 is amended by adding

"(d) This paragraph is applicable to the fossil fuel-fired steam generating equipment designated as Units 1, 2, and 3 at the Navajo Generating Station in the Northern Arizona Intrastate Region (§81.270 of this chapter).

(1) No owner or operator of the fossil fuel-fired steam generating equipment to which this paragraph is applicable shall discharge or cause the discharge of:

(i) Sulfur oxides into the atmosphere in excess of 126 ng/J [0.30 pounds per million British thermal units (lbs/MMBtu)] heat input. Compliance with this emission limit to be determined on a 30-day ~~rolling~~ average.

(ii) Nitrogen oxides into the atmosphere in excess of 210 ng/J (0.50 lbs/MMBtu) heat input based on a 30-day ~~rolling~~ average.

(iii) Stack emissions which exhibit greater than 20 percent opacity (6-minute average) except for one 6-minute period per hour of not more than 27 percent opacity.

~~(iv) The owner or operator of the NGS shall install and maintain continuous emission monitors to determine compliance with the emission limitations in subparagraph (i), (ii), and (iii) above on a continuous basis. This equipment shall meet the specifications listed in Appendix B of 40 CFR Part 60. The facility shall comply with the quality assurance procedures found in Appendix F of 40 CFR Part 60.~~

(2) The owner or operator of the fossil fuel-fired stream generating equipment to which this paragraph is applicable (i) shall notify the EPA Regional Office or its designee, of the SO₂, NO_x, oxygen and carbon dioxide emissions, and opacity according to the procedures found in 40 CFR 60.7.

(ii) Shall maintain records according to the procedures found in 40 CFR 60.7.

(3) The requirements of this sections (1) and (2) of this paragraph shall be applicable to one unit at the facility by January 1, 1995, two units by January 1, 1997, and all units by January 1, 1999.

FAX COVER SHEET

DILWORTH, FAXSON, KALISH & KAUFFMAN
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(202) 624-5900
(202) 624-5904 (Fax)

DATE: _____

TO:

NAME

Jeff Holmstead

COMPANY NAME

White House Counsel

TELECOPY #

456-7929

FROM:

NAME

John Cooney

TELEPHONE #

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(202) 624-5900**

The Honorable William K. Reilly
Page 2

* * * *

With respect to deadline cases under the Clean Air Act, since the date of your letter the Clean Air Act Amendments of 1990 (Pub. L. 101-549) have been enacted. Section 701 of the Amendments amends existing section 113, 42 U.S.C. Sec. 7413, by adding to it new subparagraph (g), which provides for public notice and comment on settlements of all defensive litigation. EPA will, of course, promptly implement this new statutory requirement. We will closely monitor our experience under section 113(g) of the Clean Air Act. That experience will provide a basis for deciding whether to adopt a policy of soliciting public comment on defensive settlements under all environmental statutes.

I commend you for the above actions (which also apply, as I understand it, to revisions to agreements such as have occurred in the above case). As a result of discussions by our staff with EPA staff, I understand the term "defensive litigation" will be broadly applied to include, for example, counter claims in enforcement or other actions. At the same time, I want to observe that so-called "deadline" suits, such as EDF v. Reilly are not always limited to the issue of a deadline. As your enclosed letter shows, "under the terms of the July 1989 revision of the settlement agreement, EPA agreed to take comments on its attribution finding regarding Navajo," even though EPA believed then that "no public comment procedures are required in connection with an attribution finding" under EPA's regulations (although administrative law may require them) and EPA points out that "public process has been expanded, not abbreviated, by virtue of the settlement agreement." Thus, as I have noted before, deadline cases often involve agreements and actions by judges that cover more than just a new deadline.

As to the 6-month trial period, I assume it starts with the date of your letter and will end in June 1991. I expect the consultation will occur in June. My counsel, Mr. David B. Finnegan, will be the Subcommittee's person to contact and to receive the information.

I also appreciate your providing the Subcommittee with a copy of the October 1990 National Research Council's (NRC) evaluation of winter haze at the Grand Canyon National Park. The report's estimate of the range of impacts and its conclusions are as follows:

The [NRC] committee used the WINTER data obtained during a haze episode in GCMF to estimate the ranges of possible impacts from NPS. These estimates consist of a series of mass-balance calculations made on the basis of simple, but reasonable, assumptions. These calculations

The Honorable William K. Reilly
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were made for illustrative purposes; they cannot, in themselves, be used to quantify the impacts of NGS on visibility in GCNP, in part because measurements needed to confirm some of the assumptions were not made during winter. The committee's analysis indicated that NGS sulfur emissions are sufficiently large to account for even more than the total sulfur concentration measured in GCNP. However, the actual impact of NGS emissions on haze in GCNP depends on the rate of conversion of SO₂ to SO₄. The extent of conversion is extremely sensitive to meteorological conditions and the availability of oxidants; the extent could range from a very small percentage to nearly 100%. Conversion rates would tend to be high during cloudy and foggy conditions, such as those observed during WHITEX haze episodes. Under these conditions, NGS emissions could produce SO₄ concentrations similar to those measured in GCNP. However, the WHITEX data also show that there are important sulfur sources in addition to NGS that appear to contribute to regional background SO₄ aerosol levels. These additional sources evidently account for a significant fraction of the haze observed in GCNP. Thus, if NGS emissions were controlled, then wintertime haze at GCNP would most likely be reduced, but not eliminated.

The committee cautions that its conclusions do not resolve whether EPA should require NGS to install the best available retrofit technology (BART). First, the committee's conclusions are not binding on EPA or any other government agency. Second, even if accepted by EPA, the committee's conclusions would not dictate a particular result to EPA's rule making. Section 169A of the Clean Air Act generally requires the installation of BART on any "major stationary source" built after 1962 if that source "emits any air pollutant which may reasonably be anticipated to cause or contribute to any impairment of visibility" in a listed Class I area, such as GCNP. The phrase "may reasonably be anticipated" suggests that Congress did not intend to require EPA to show a precise relationship between a source's emissions and all or a specific fraction of the visibility impairment within a Class I area. Rather, EPA is to assess the risk in light of policy considerations regarding the respective risks of overprotection and underprotection. These considerations transcend scientific issues and are, therefore, outside this committee's purview. (Underlining supplied.)

According to the November 30, 1990 edition of Inside EPA, there is also a new industry study which you did not provide. (Please provide a copy.) That study is apparently also relevant to this matter. Please explain how and to what extent these two

The Honorable William K. Reilly
Page 4

studies compliment each other and the extent to which the studies support or do not support regulatory activity under section 169A of the Clean Air Act. Please explain how and to what extent each differs on the contribution of haze by various sources and the wintertime impact on the Park. Please also identify any studies relied upon by EPA and explain how and to what extent those studies differ and are consistent with these new studies. How will EPA utilize these studies? To what extent has EPA identified all of the other "important sulfur sources" and their contribution to this problem?

I also request your explanation of the actions planned or to be taken under the amended Clean Air Act concerning new visibility transport commissions, including the Grand Canyon Visibility Transport Commission, required by the newly amended law and an explanation as to the impact of the new legislation on the revised agreement in EPA v. Reilly, including the new allowance system established by Congress and applicable to this utility and others. Is EPA planning to establish a precedent in this case for utilities or is this case considered unique and in most instances EPA will generally plan to rely on the new allowance system? I note that the court, in approving that agreement on January 9, 1990, clearly said that EPA has a free hand, as far as the court is concerned, on how to deal with this matter, particularly in light of the new amendments to the law. The court said:

In the case at bar, intervenors argue that the final outcome of the rulemaking will result in a \$1.6 billion dollar expenditure by the intervenors. They argue that such an expense is not justified in light of the minimal help it could render to visibility concerns. The Court finds that the possible expenditure of \$1.6 billion dollars constitutes a showing of good cause for adjustment of the time limits. Such an enormous expense would eventually be passed on to utility consumers for years to come. This overwhelming possibility requires the Court to extend the time limits of the Order.

Finally, the Court does not seek to impose its own decisions upon the parties regarding the nature of the rulemaking. This would be in direct contradiction to the Vermont Yankee case cited above. The Court merely extends the period of time in which the rulemaking may occur, and does not impose any particular decision on the EPA. (Underlining supplied.)

Does EPA plan to refer the matter to the Commission under the new legislation and to seek a further deferral of the regulatory matter? Please explain. Also, what are EPA's options under section 169A(b)(2)(A) and (B)? What is the likely result under both? What are the criteria for both?

Enclosed also are two relevant media articles for your review and comment.

The Honorable William K. Reilly
Page 5

Returning to your September letter and the comment that EPA's regulations do not "call for any separate comment period regarding attribution findings." Please explain the legal basis for this conclusion.

Incidentally, your letter of August 3, 1990 states:

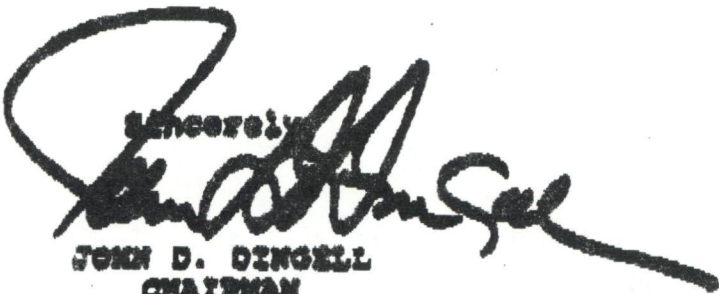
In light of the continuing failure of the State of Arizona to submit visibility SIP revisions, the 1988 revision to the settlement agreement required EPA to make a finding on whether the NGS was a reasonably attributable source of impairment in the Grand Canyon National Park and issue a rulemaking proposal on the need for BART at Navajo by August 31, 1989.

Please explain this failure, its status, and the actions taken or planned by EPA to correct this failure by Arizona. What enforcement actions are available (or required) under the Clean Air Act, as amended, and what will EPA do and in what timeframe to institute such actions? How will these actions affect the Park and this utility?

I request your reply within 45 days after receipt of this letter.

With best wishes.

Sincerely,



JOHN D. DINGELL
CHAIRMAN

Enclosure

cc: The Honorable Thomas J. Bliley, Ranking Republican Member
Subcommittee on Oversight and Investigations

The Honorable E. Donald Elliott, General Counsel
Environmental Protection Agency

The Honorable James D. Watkins, Secretary
Department of Energy

The Honorable Charles A. Bowsher, Comptroller General
General Accounting Office

Mr. Roger Porter, Assistant to the President
for Economic and Domestic Policy
The White House

MEMORANDUM FOR HANK HABICHT
BILL ROSENBERG

FROM: Al Hubbard
SUBJECT: Navajo Power Station Rule

We are disappointed with the revised draft of the NPRM for Navajo. The draft does not appear to reflect many of the provisions on which we thought we had agreed.

- Because of the uncertainty in the information available, we thought we had agreed to set out 4 alternatives for comment, with a soft preference for the 0.3 lb/MM Btu option. EPA's draft provides almost no discussion of the 0.5 lb/MM Btu (50% control) option, however. The Salt River proposal appears only in an entirely separate section of the draft NPRM and is clearly characterized as unacceptable.
- We thought we had agreed to move away from the 1980 BART guidelines as a basis for standard setting. The draft proposal embraces the 1980 BART guidelines.
- We thought we had agreed to a balanced discussion and request for comments on seasonal controls. The draft proposal characterizes seasonal control as "neither legally permissible nor appropriate" and provides only the most contorted and perverse rationale that would allow seasonal control under the Clear Air Act.
- We thought we had agreed that NOx and PM controls would be based on a clear visibility based rationale/need for limits. Instead the draft adopts limits between current State PM/NOx limits and the more stringent emission levels currently being met by Navajo.

In reviewing the draft rule we have made a number of other comments, particularly regarding the WHITEX and NAS studies. These comments will help ensure a full and fair description of these reports.

MAJOR POINTS

1. EPA interprets the BART Guidelines as allowing EPA to impose NSPS without justification. This approach is bad law and bad precedent. States may impose NSPS as BART without justification because States have sovereign authority recognized by § 116 to establish limits that are more stringent than federal requirements. Because the BART Guidelines presume that NSPS is the most stringent that BART can be, a State's equating BART to NSPS must be at least as stringent as the federal requirement. In other words, the BART Guidelines stand for the proposition that BART does not exceed NSPS, and that EPA need not waste its time reviewing a State justification for a decision that satisfies the federal requirement on its face. When EPA "stands in the shoes" of the state, it must justify any BART limit through balancing the BART factors because EPA does not have the sovereignty of a State to exceed the minimum federal standards. In response to the federal requirement in the BART Guidelines for balancing, EPA must provide a justification to support any deviation from the status quo. See p. 20-21 of the EPA draft.

2. As to the visibility effect of NGS, EPA relies exclusively on NPS' quantifications in the WHITEX report of the NGS effect even though these have been discredited by NRC. This reliance needs to be qualified. The preamble, at a minimum, should report the SRP preliminary results:

- a. NGS emissions do not contribute during periods of worst impairment.

- b. NGS emissions can contribute to impairments only 4 to 7 percent of the wintertime.
- c. It remains to be seen what portion of that time impairments due to NGS would be perceptible.

The preamble should also include a statement that, if these findings are reflected in the final SRP report, EPA would have to reconsider its proposals. Page 30.

3. EPA relies on Chestnut-Rowe's contingent valuation study and reports in the preamble numbers which show that the 90 percent scrubber option is the preferred option. Balance and disclosure is needed in this discussion. See p. 44-46. Insert A for page 46:

"This contingent valuation study values the visibility improvements that would result from transforming summer haze impairments into a winter clear day. A study based on this comparison inflates the estimates of the value of the visibility improvements that may result from additional controls on NGS.^{1/}"

Insert B for page 47:

"The SRP-sponsored study was based on changes in winter haze. While this work was based on an exaggeration of the potential effect of controls, the study reported that about 85% of the subjects stated no value for the potential visibility improvements and that the costs of a scrubber greatly would exceed the total public value of the improvements. Thus, if SRP's study is a reliable gauge of the value of the improvements that can be expected as a result of controls, the valuation would be much lower than those based on the Chestnut-Rowe data."

4. EPA states that the seasonal control option is illegal. Page 48 (citing requirement for "continuous"

^{1/} The shift in sun angle and other seasonal effects make the winter scene very different from the summer scene, even ignoring changes in visual air quality. Thus, emission reductions cannot make a summer day look like a winter day.

- 3 -

limitations followed by sentence beginning "Accordingly".) EPA's discussion of "seasonal controls" (p. 64) creates the strawman that seasonal controls must be based upon the "significant" impairment criteria for variances from BART. It is not. It is based on the legal requirement that BART cannot be imposed unless there is a "reasonably attributable" impairment. There is no summer impairment that is "reasonably attributable" to Navajo. Either the discussion should be deleted and comments simply solicited on the seasonal control issue or the fact that seasonal only controls may be required where impairments are only "reasonably attributable" during one season should be explicitly stated. (The latter would be preferred.)

5. EPA proposes NSPS limits on NOx and PM without any attribution finding with respect to these pollutants. This is a terrible precedent. The assertions in the preamble that the units are meeting these limits is simply untrue. For example, no continuous monitors are in place for NOx; and there is no basis for concluding that these limits are achievable on a 30 day basis. In any event, visibility is like PSD or ambient standards; it contemplates controls on only those pollutants that trigger the statutory obligation. Here, the obligation is to regulate pollutants to which visibility impairment is reasonably attributable; and the only pollutant for which EPA has made such a finding is SO2. See p. 48-49.

6. EPA's discussion on pages 57 to 59 announces an exceptionally expansive view of its current rules. It

- 4 -

obliterates the distinction between Phase I (plume blight) and Phase II (regional haze) impairments made when the rules were promulgated. In promulgating final rules, EPA made clear that its rules covered only the causes of plume blight, and that the regulation of the contributors to regional haze was expressly deferred. Because the statute is not self executing, the Agency can only regulate those visibility impairments -- plume blight -- for which EPA has promulgated rules. The Second Circuit in *Vermont v. EPA*, 850 F.2d 99, 103-104 (2d Cir. 1988), affirmed EPA's positions that regulations were needed to implement § 169A and that the "any impairments" language does not create a duty to regulate all impairments.^{2/} EPA's current argument undermines well-established precedent and invites further litigation on the nature of EPA's current obligations under the Act. Rather than attempting to make sense of this paragraph, it should be deleted; and the balance of the preamble changed accordingly. See p. 57-59.

7. The proposal states that current limits are 3-hour average limits determined with continuous monitors. This is not correct. EPA probably includes the statement to lay the

^{2/} In *Maine v. Thomas*, 874 F.2d 883, 885 (1st Cir. 1989), the First Circuit also held that the current visibility rules did not reach regional haze.

Moreover, the Second Circuit explained that technological evolution would not -- without additional rulemaking -- permit an expansion of the scope of the visibility rules. Thus, the publication of the WHITEX report and its novel analyses does not alter the scope of the current visibility rules.

- 5 -

groundwork for shifting to a shorter averaging time in the final rule. Just delete the sentence. See p. 48.

NAVAJO FINAL INSERTS

INSERT RE NSPS IN BART GUIDELINES --P. 20

GCFINAL
130

In light of ~~EPA's extensive experience since 1980 in promulgating and approving emission limitations for coal-fired power plants, and considering the effects of the Clean Air Act Amendments of 1990,~~ EPA believes that the BART Guidelines are outdated in certain respects, and should be revised.

Specifically, EPA notes that numerous power plants, including several Western power plants using low-sulfur coal have retrofitted or installed in new units control equipment achieving emissions reductions equivalent to or better than the reductions that would be achieved by the ⁰.03 lb/mmBtu limit being proposed today, which is the limit that would be applicable if NGS were subject to the NSPS at 40 CFR Part 60, Subpart Da. ¹⁸ ~~[mark footnote 18 here]~~ Based on this experience, the EPA believes it is no longer clear that NSPS controls represent the best these sources could install as BART, and that the increased use of these controls since 1980 should be considered in conducting BART analyses. In addition, The 1990 Amendments embody certain statutory changes that represent a Congressional policy judgment to move away from rigid control technology requirements and towards an emphasis on air pollution control strategies that reflect flexibility and market-based incentives. In particular, section 403 of the Amendments revised section 111(a)(1) of the Act to repeal the percent reduction requirement under the NSPS program. Also, Title IV of the

the various factors of
BART (cost, energy effects, and
the degree of
visibility improvement)

Amendments added an acid deposition control program, the essence of which is the use of market-based incentives (through freely tradable allowances under section 403 of the revised Act) to achieve the greatest reductions in SO₂ emissions at the least cost. In light of these developments, and considering the statutory mandate in section 169A to consider ~~the various BART factors~~, EPA believes it would be both arbitrary and inconsistent with the statute to allow BART analyses to simply default to NSPS-level controls ~~without consideration of the statutory BART factors~~. EPA ~~has conducted a thorough analysis of the statutory BART factors in this case that is consistent with the existing Guidelines and hence, does not need to rely on any specific presumption regarding the advisability of using NSPS-level controls as BART.~~ The Agency deems it appropriate to ensure that all future BART analyses consider the statutory BART factors as well. Accordingly, by this notice EPA solicits comment on whether the BART Guidelines should be amended concurrently with this BART rulemaking to reflect the above concerns. Based on those comments, EPA will decide at the time of final action on today's BART proposal for NGS whether to amend the Guidelines, and may do so without further notice.

, and ~~on~~ specifically on
whether they
~~BART Guidelines~~

In order to evaluate its BART analysis approach, EPA considered the cost-benefit analysis conducted as a part of the preliminary Regulatory Impact Analysis (RIA) (as required by Executive Order 12291) for this rule. This analysis also satisfies the requirements of section 317 of the Act regarding economic impact assessments. A more detailed discussion of the benefits associated with improving visibility in the Grand Canyon is found in the "Benefit Analysis" section of this notice.

The BART Guidelines published in 1980 stated that the level of control necessary to meet the new source performance standard (NSPS) for power plants¹⁵ is generally available to large power plants.¹⁶ However, the guidelines do allow the State (or EPA in this case) to propose an emission limit other than NSPS if the limit proposed reflects a "reasonable balance of the various BART factors."¹⁷ The BART Guidelines further state that, because EPA believed that NSPS controls generally represented the best these sources could install as BART, if the State (or EPA) set a BART limit equivalent to the NSPS level of control, no detailed analysis of the BART factors would be required.¹⁸ In light of ~~EPA's extensive~~

¹⁵See 40 CFR 60 subpart Da.

¹⁶BART Guidelines at 1.

¹⁷Id. pg. 20.

¹⁸Id. at 20-21.

~~experience since 1980 in promulgating and approving emission limitations for coal-fired power plants, and considering the effects of the Clean Air Act Amendments of 1990, EPA~~ believes that the BART Guidelines are outdated in certain respects, and should be revised.

~~Specifically, EPA notes that numerous power plants, including several Western power plants using low-sulfur coal have retrofitted or installed in new units control equipment achieving emissions reductions equivalent to or better than the reductions that would be achieved by the 0.03 lb/mmBtu limit being proposed today, which is the limit that would be applicable if NGS were subject to the NSPS at 40 CFR Part 60, Subpart Da.¹⁹ Based on this experience, the EPA believes it is no longer clear that NSPS controls represent the best these sources could install as BART, and that the increased use of these controls since 1980 should be considered in conducting BART analyses. In addition, The 1990 Amendments embody certain statutory changes that represent a ^{general} Congressional policy judgment to move away from rigid control technology requirements and towards an emphasis on air pollution control strategies that reflect flexibility and market-based incentives. In particular, section 403 of the Amendments revised section 111(a)(1) of the Act to repeal the percent reduction requirement under~~

¹⁹ Memorandum from Gwen Jacobs to David Stonefield dated January 29, 1991.

of cost, energy effects, and the degree of visibility improvement,
the NSPS program. Also, Title IV of the Amendments added an acid deposition control program, the essence of which is the use of market-based incentives (through freely tradable allowances under section 403 of the revised Act) to achieve the greatest reductions in SO₂ emissions at the least cost.

P In light of these developments, and considering the statutory mandate in section 169A to consider the various BART factors, EPA believes it would be both arbitrary and inconsistent with the statute to allow BART analyses to simply default to NSPS-level controls ~~without consideration of the statutory BART factors.~~ *In this case,* EPA has conducted a thorough analysis of the statutory BART factors ~~in this case~~ that is consistent with the existing Guidelines and hence, does not need to rely on any specific presumption regarding the advisability of using NSPS-level controls as BART. The Agency ~~believes that~~ *also* ~~deems it appropriate to insure that~~ all future BART analyses ~~should carefully balance~~ *consider* the statutory BART factors ~~as well.~~ *The BART Guidelines, and specifically on* Accordingly, by this notice EPA solicits comment on whether the BART Guidelines should be amended concurrently with this BART rulemaking to reflect the above concerns. Based on those comments, EPA will decide at the time of final action on today's BART proposal for NGS whether to amend the Guidelines, and may do so without further notice.

The EPA does not, however, interpret the current Guidelines as precluding the Agency from establishing emission

limitations that are more stringent than NSPS if EPA concludes that controls to meet such limits are readily available to the source and these controls would, at a reasonable additional cost, result in a marked improvement in visibility over the improvement that would result from controls designed to meet the NSPS. The EPA requests comments on this interpretation of the guidance and the underlying statutory and regulatory BART provisions and the advisability of specifically amending the BART Guidelines to clarify this intent. Conversely, the current BART Guidelines clearly also allow EPA to set BART limits that are less stringent than NSPS if, based upon the record before the Agency, the cost of controls, the degree of expected improvement in visibility, and the other BART factors, EPA concludes that a lesser degree of control is appropriate. Regardless of whether EPA revises the BART guidelines in this proceeding the EPA requests comment on whether it should adopt BART limits in this case that are less stringent than NSPS.

²⁰ In addition, EPA notes that the value of marketable allowances under section 403 of the Clean Air Act as amended by the Clean Air Act Amendments of 1990 will be made available to SRP should BART be installed. The EPA has factored the value of these allowances into its calculations

²⁰ Increased use is documented in a memorandum from Gwen Jacobs to David Stonefield dated January 29, 1991.

of the cost of BART. The Agency believes that this is consistent with the estimation of BART costs under the BART Guidelines. However, EPA also solicits comments on whether the BART Guidelines should be revised as part of this rulemaking in order to consider the value of marketable allowances available under section 403 of the Act. In today's action, EPA proposes to revise the FIP for Arizona to include this emission limit representing BART to address the visibility impairment observed in the Grand Canyon. Because of the uncertainty in determining the improvement in visibility expected as a result of reducing emissions at the NGS, EPA is considering and solicits comment on four options for BART at NGS:

1. ~~Continuous~~ ^{Year-round} emission limitation of 0.³50 pounds of SO₂ per million British Thermal Units (lbs/M^Btu) ~~of a 70 percent reduction in currently allowable SO₂ emissions.~~ Compliance^{ce} would be determined on a 30 day rolling average and would be phased in between 1995 and 1999.
2. ~~Continuous~~ ^{Year-round} emission limit^{HTM} of 0.50 lbs/M^Btu ~~of a 50 percent reduction in currently allowable SO₂ emissions.~~ Compliance would also be determine^d on a 30 day rolling average and would be phased in between 1995 and 1999.

3. A continue^{ous} emission limit of 0.10 lbs/~~mm~~^{MB}tu ~~on a 90~~
~~percent reduction in currently allowable SO₂ emissions.~~
COMPLIANCE WOULD ALSO BE DETERMINED ON A
30 DAY ROLLING AVERAGE AND WOULD BE PHASED IN
BETWEEN 1995 AND 1999.
4. SRP would test alternating^{ies} control technologies and if
one of the technology^{ies} met a minimum removal efficiency
at a set cost the NGS would install that technology and
operate it in the winter time.

If none of the technologies met the test criteria, NGS
would reduce its emissions by 70 percent (~~0.30 lbs/mm~~^{MB}tu
emission limit) measured on an annual basis^{ies} by the
year 2000.

MORE DETAILS ON THESE OPTIONS ARE PROVIDED
The^{se} options are discuss in more detail later in this notice.
BELOW.

The EPA is proposing this first option of 0.30 lbs/mm^{MB}tu
emission limit. That option includes a 30-day rolling
average but EPA is requesting comment on whether a different
averaging period may be more^{more} appropriate.

On other options that may be appropriate given the cost of control^{and} the expected
effect of control on visibility^{and the other}
The EPA also invites comments on the legal and
regulatory issues raised by SRP and others. These issues
are identified and discussed in a later section.

A public hearing on this action will be on Monday,
March 18, 1991 at 1:00 p.m. in the Maricopa County
Auditorium, 201 West Jefferson, Phoenix, Arizona.

A. Discussion of Impairment

EPA's Proposed Regulation of the Navajo Generating Station at the Grand Canyon National Park

Our National Parks Face Several Challenges

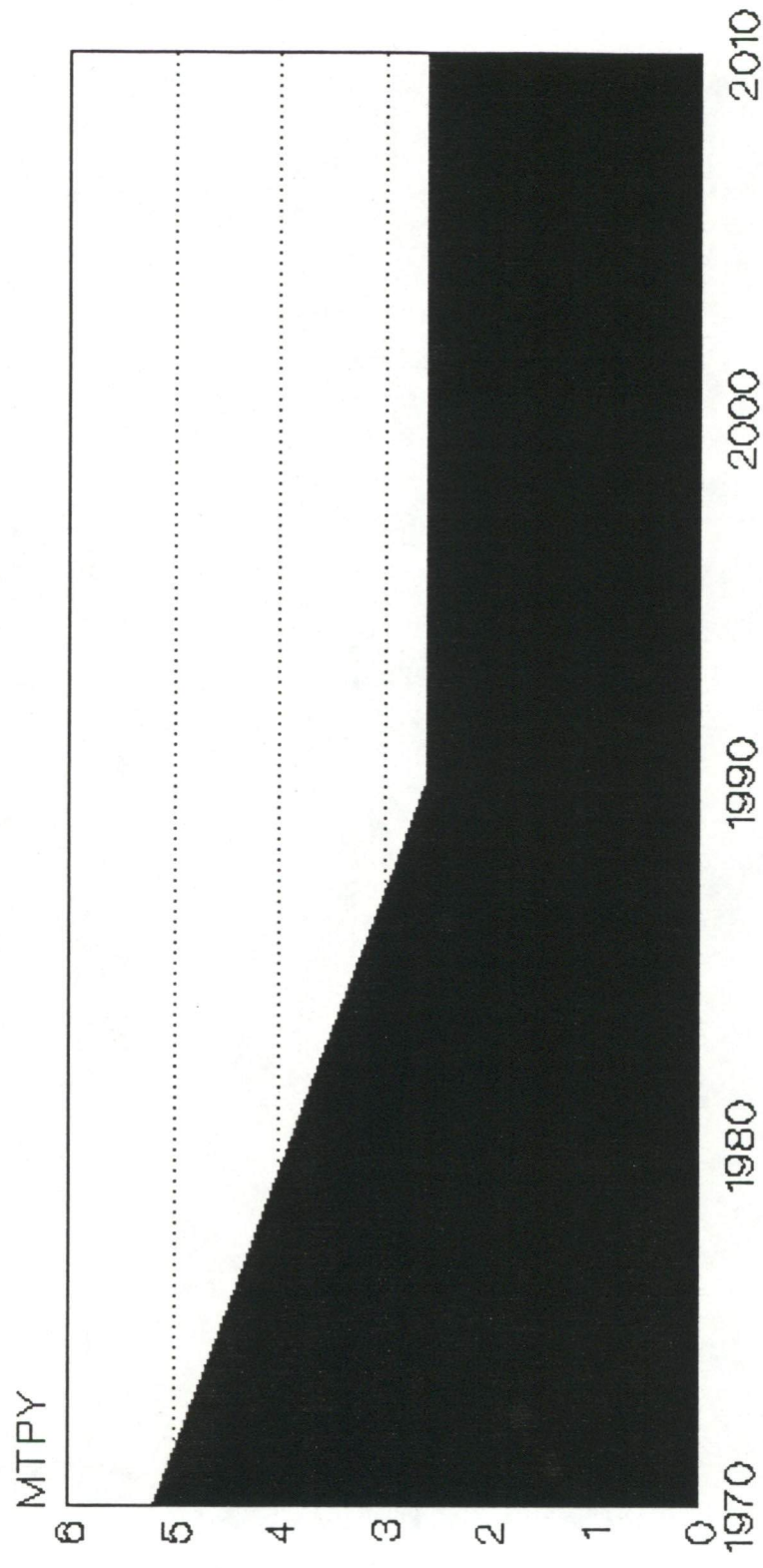
- Visitors are increasing dramatically. This year, nearly 300 million people will visit facilities of the National Parks Service.
- Within 15 years, this number will double.
- Transportation is a problem within some Parks.
- Commercial development threatens the natural beauty of the Parks.
- Automobile and other pollution has degraded visibility in some Parks.
- Water usage increasingly affects flows through the Parks.

Visibility in the Grand Canyon

It is Worse in the East

- Visibility in some Parks is declining, particularly in the east and south.
- The visibility problem in eastern parks is at least 10 times worse than in western parks.
- Visibility in the Colorado Plateau, which includes the GCNP, is the second best of all the National Parks.
- Visibility is the worst in the Shenandoah National Park and in the Great Smoky Mountains National Park.

SO₂ emissions in the southwest are declining



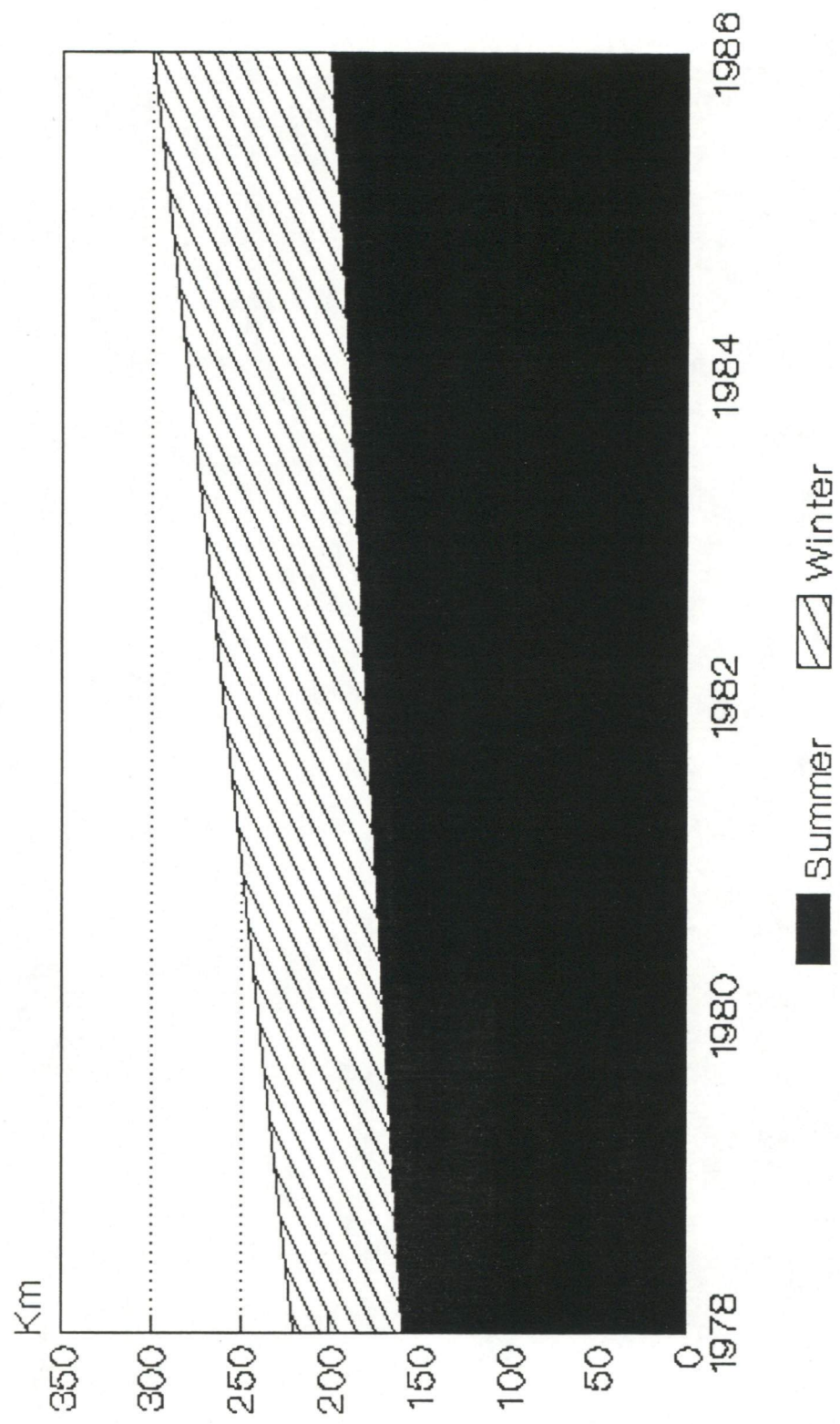
MTPY - millions of tons/year

45

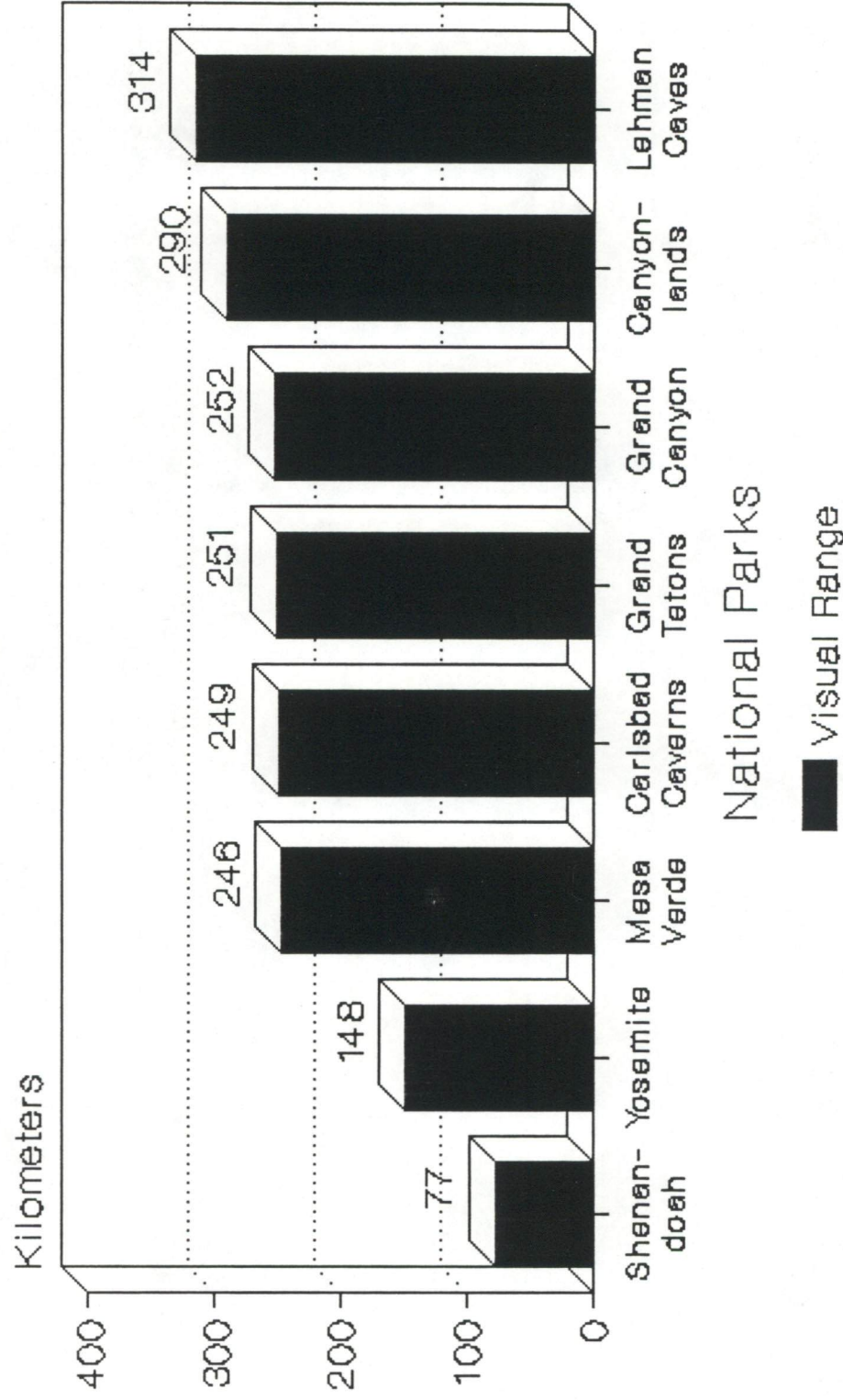
Sulfur Dioxide Emissions in the Southwest are less than half what they were before the CAA.

They have declined to 25% of what they were in 1970.

The visual range in the Grand Canyon is increasing



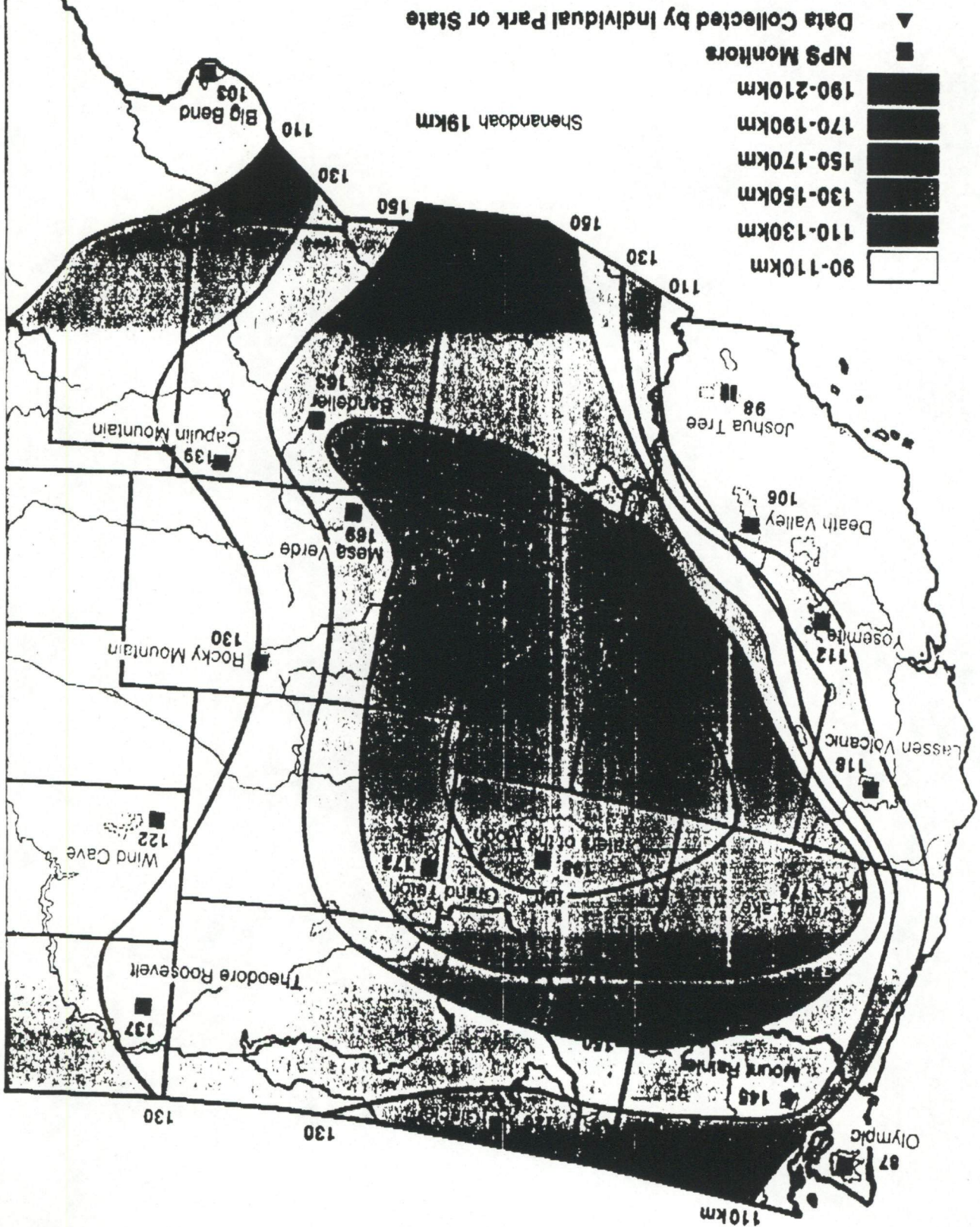
Visibility in the Grand Canyon is Better than in most other Parks



NPS data (1988)

Isopleths of Median Visual Range over the Western United States, Summer 1983

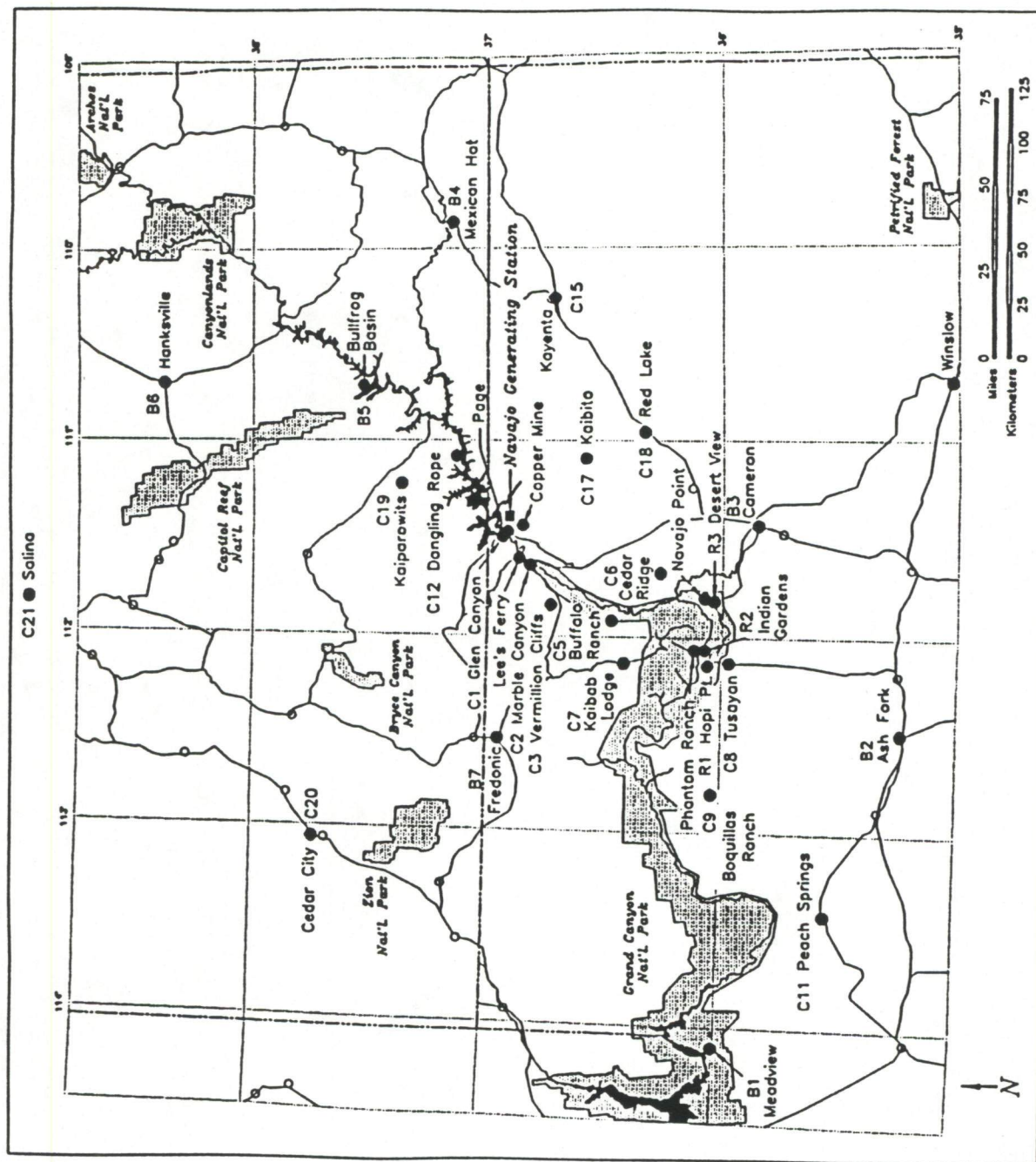
FIGURE 2-4



The Navajo Generating Station

The Navajo Generating Station

- The NGS became operational in stages from 1974-76.
- Construction costs were \$659 million.
- \$200 was spent on emission controls.
NGS is owned jointly by the Salt River Project, the Bureau of Reclamation of the Department of Interior, Arizona Public Service, Tucson Gas and Electric, Nevada Power Company, and the Los Angeles Department of Water and Power.
- The NGS is operated by the SRP on behalf of the other participants.
- NGS is located on the Navajo Indian Reservation and provides jobs for Navajo Indians.



March 1991

Figure 1. Study Region and Monitoring Sites.

Emissions at the Navajo Generating Station

- NGS burns very low sulfur coal.
- NGS uses hot-sided electrostatic precipitators that remove 99.5% of particulate matter
- The SO₂ emission rate at NGS is 1.0 lbs./mBtu
- Before construction, NGS agreed to comply with all Federal and State emissions limits. It has.
- In fact, without further controls, NGS already meets even the most stringent emissions limits in the 1990 Clean Air Act Amendments (1.2 lbs./mBtu).
- For most days of the year, the NGS is downwind of the Grand Canyon National Park. The plant is located northeast of the Park and the prevailing west-to-east winds blow NGS emissions away from the Park, i.e., to the east.

EPA Visibility Regulation under the Clean Air Act

EPA's Phase I and Phase II Regulation

- In December 1980, the Carter Administration EPA issued a "midnight" Phase I regulation for sources whose plume impacts a National Park.
- EPA has never issued Phase II regulations for "regional haze".
- Even after suits by the environmentalists, neither EPA nor any state has regulated a source under the Phase I regulations.

The NGS Rulemaking

The Basis for the EPA Rulemaking The WHITEX Experiment

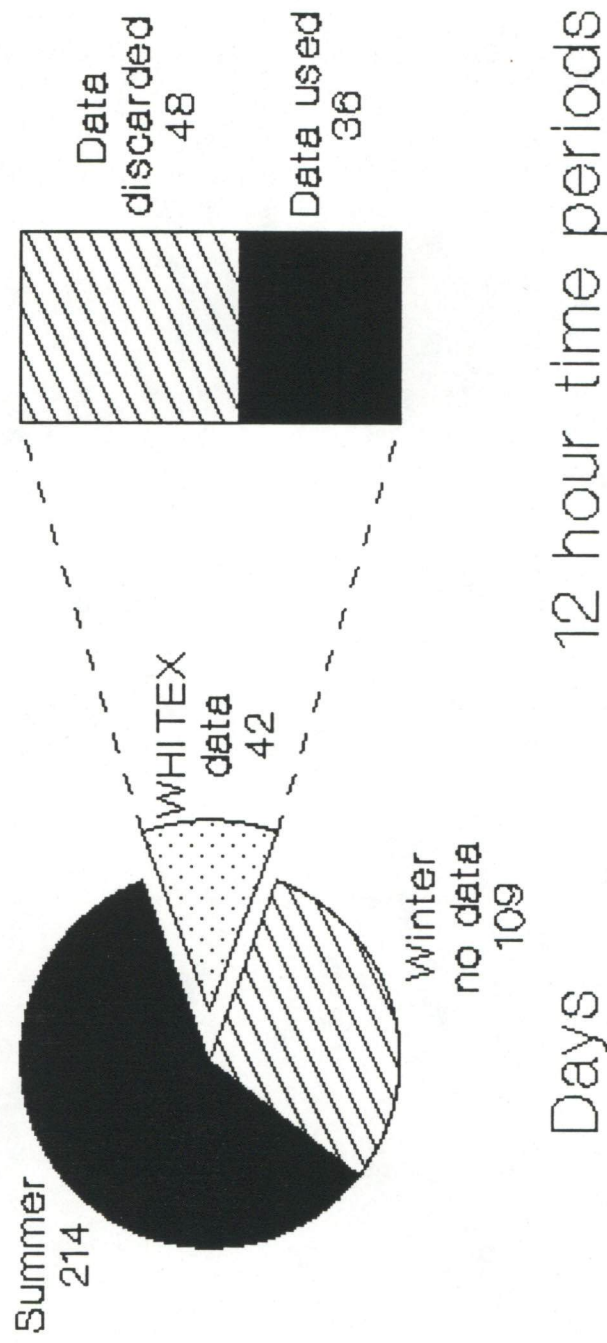
- The rulemaking is based almost entirely upon the WHITEX experiment conducted by the National Parks Service.
- WHITEX was designed to test whether tracers could be used to track emissions from particular sources.
- WHITEX was not designed to assess the amount of impairment caused by any source.

The Conclusions of WHITEX

- ■70% of the sulfates in the GCNP is due to NGS
- 40% of wintertime man-made visibility impairment is due to NGS
- 100 winter days could be perceptibly improved by a 90% scrubber
- visual range could be improved 14% on average during the winter and 77% on days of maximum i

as interpreted by the NPS

The Interpretation of the WHITEX Data by the NPS

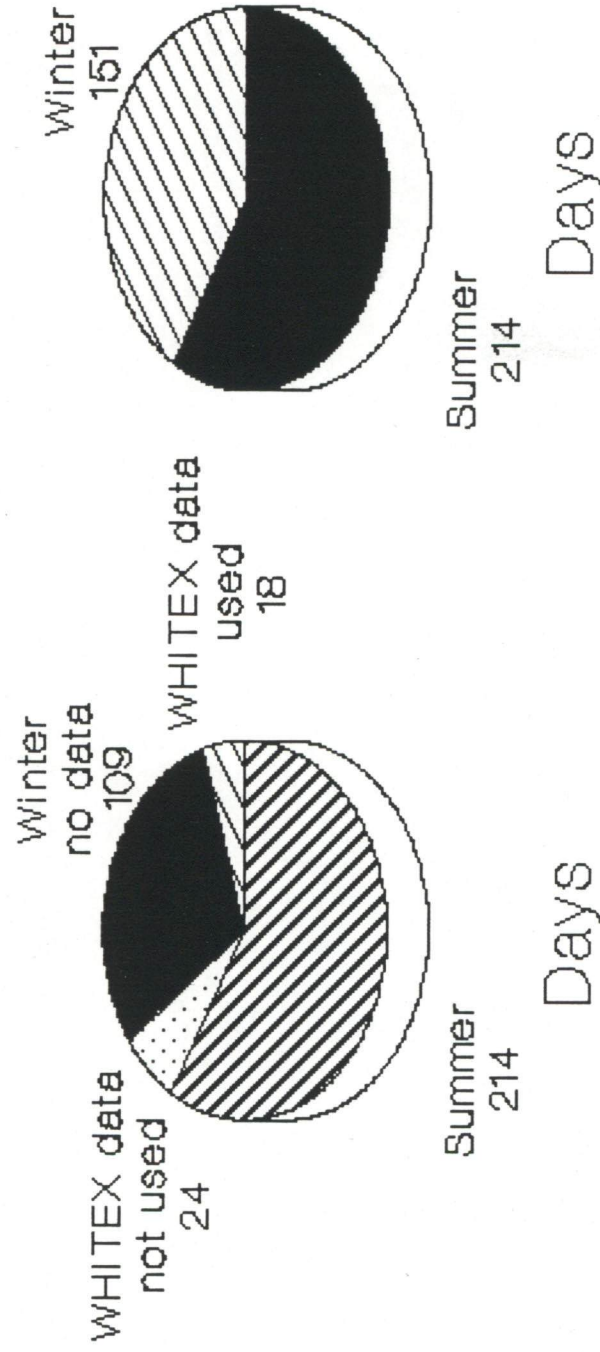


Data only from Hopi Point

NPS attributed haze to NGS from 36 selected 12 hour time periods by using a statistical regression technique (TMBR).

NPS then assumed that these calculations would apply to all 151 days it defined winter to be.

NPS then Assumed that these 18 days Were Representative of the Entire Winter



Interpreted by NPS; used by EPA

The Critical Failures of WHITEX And its interpretation by NPS

- The National Research Council of the National Academy of Sciences reviewed WHITEX and concluded that - -
- "WHITEX did not quantitatively determine the fraction of SO₄ aerosol and resultant haze in GCNP that is attributable to NGS emissions."

Haze in the Grand Canyon, NRC/NAS

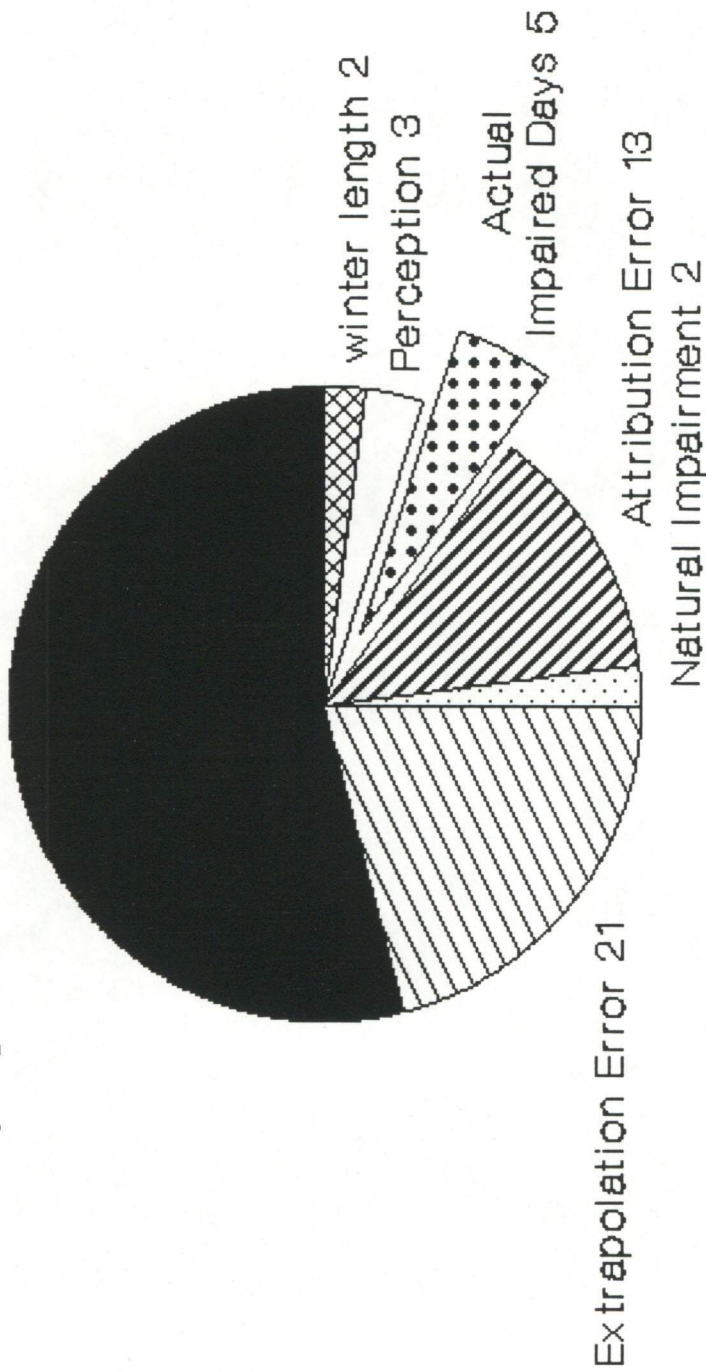
There are other Significant Errors in the NPS Interpretation of WHITEX

- ✓ The NPS calculations did not take into account the visibility impairment caused by air (the Rayleigh effect).
- ✓ NPS extrapolated impairment data from severe episodes into all winter periods.
- ✓ EPA's NPRM used excessive estimates of NGS SO₂ emissions.
- ✓ NPS counted days on which fog and cloud conditions obscured visibility as days on which visibility could be improved.
- ✓ EPA defined the winter to be 151 days instead of a more realistic number.

Correcting WHITEX Errors

The NPRM assumed 100 NGS impaired days

Rayleigh/Contrast 54



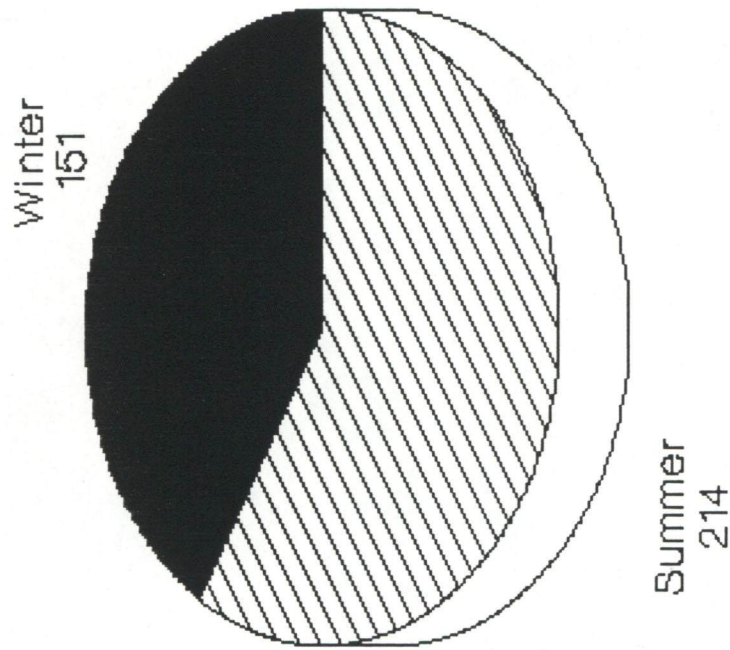
100 Days

EPA NPRM dated

"The Committee (the NRC) cautions that its conclusions do not resolve whether EPA should require NGS to install...(BART)."

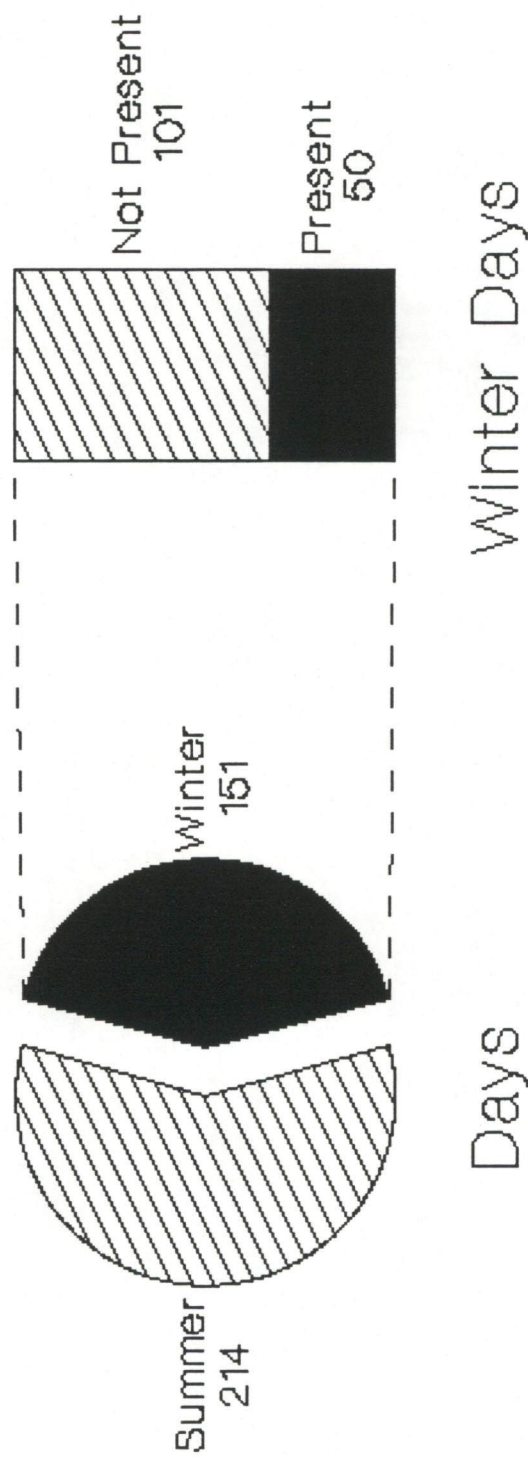
The Results of the NGS Study

Seasons at the Grand Canyon Nat'l Park (Assuming EPA's Definition of Winter)

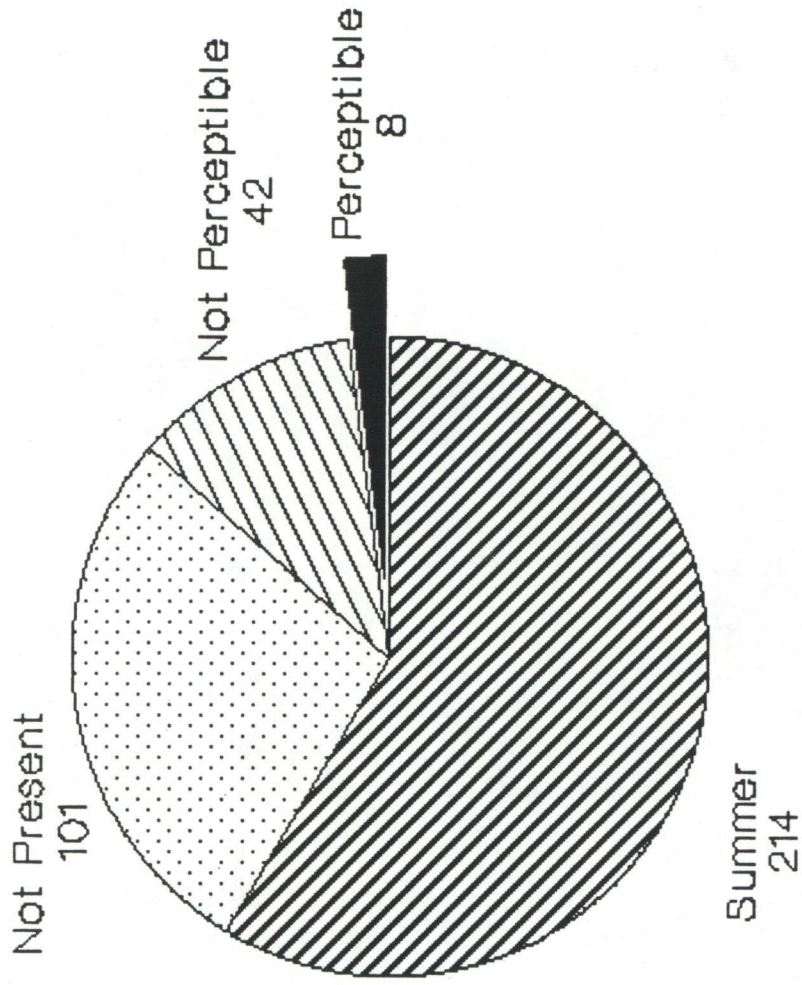


EPA's NPRM dated

Days when NGS emissions are present (and the days when they are not)



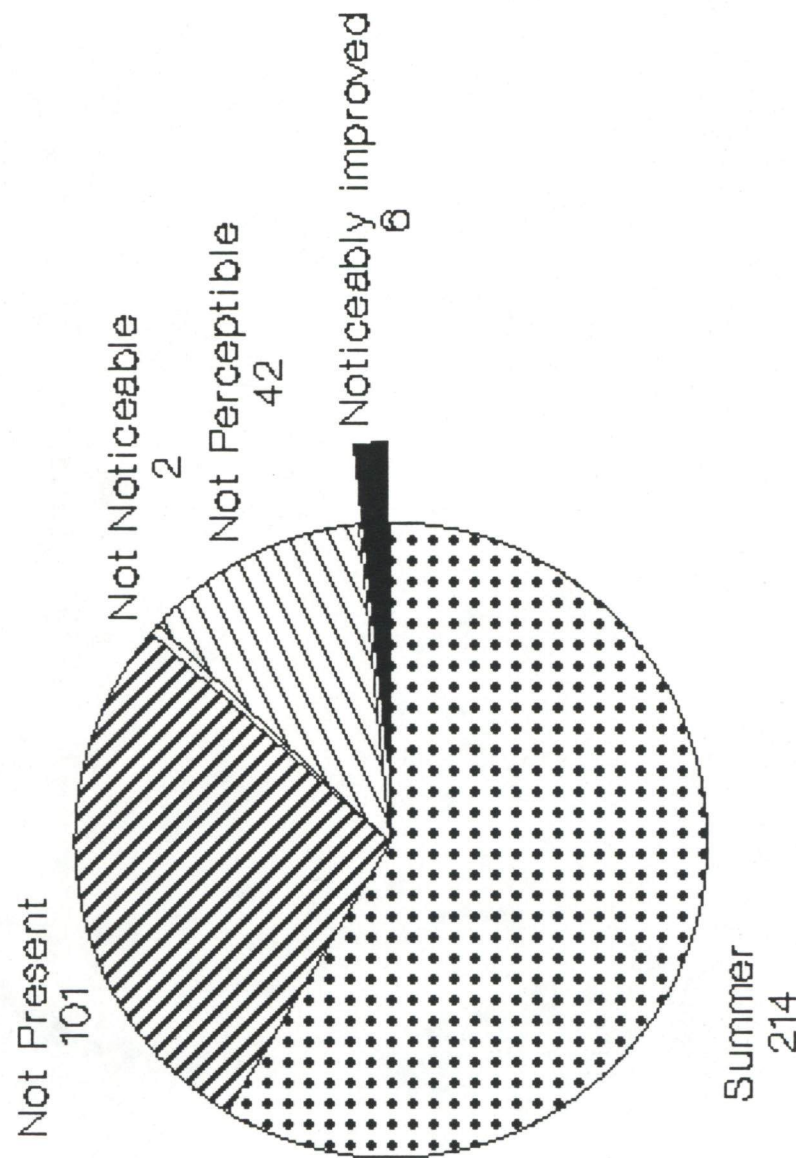
Days when NGS emissions are perceptible



NGS Study dated

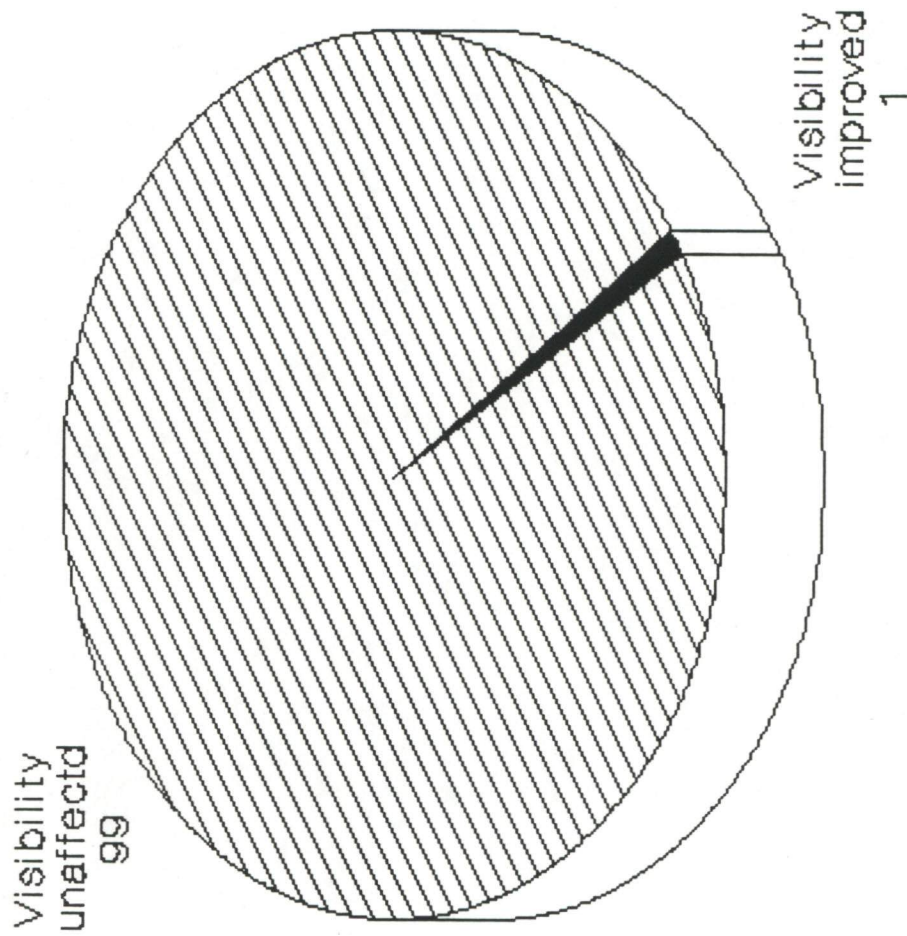
5/11/17

Days when a 90% reduction would matter (and the days when it would not)



NGS Study dated

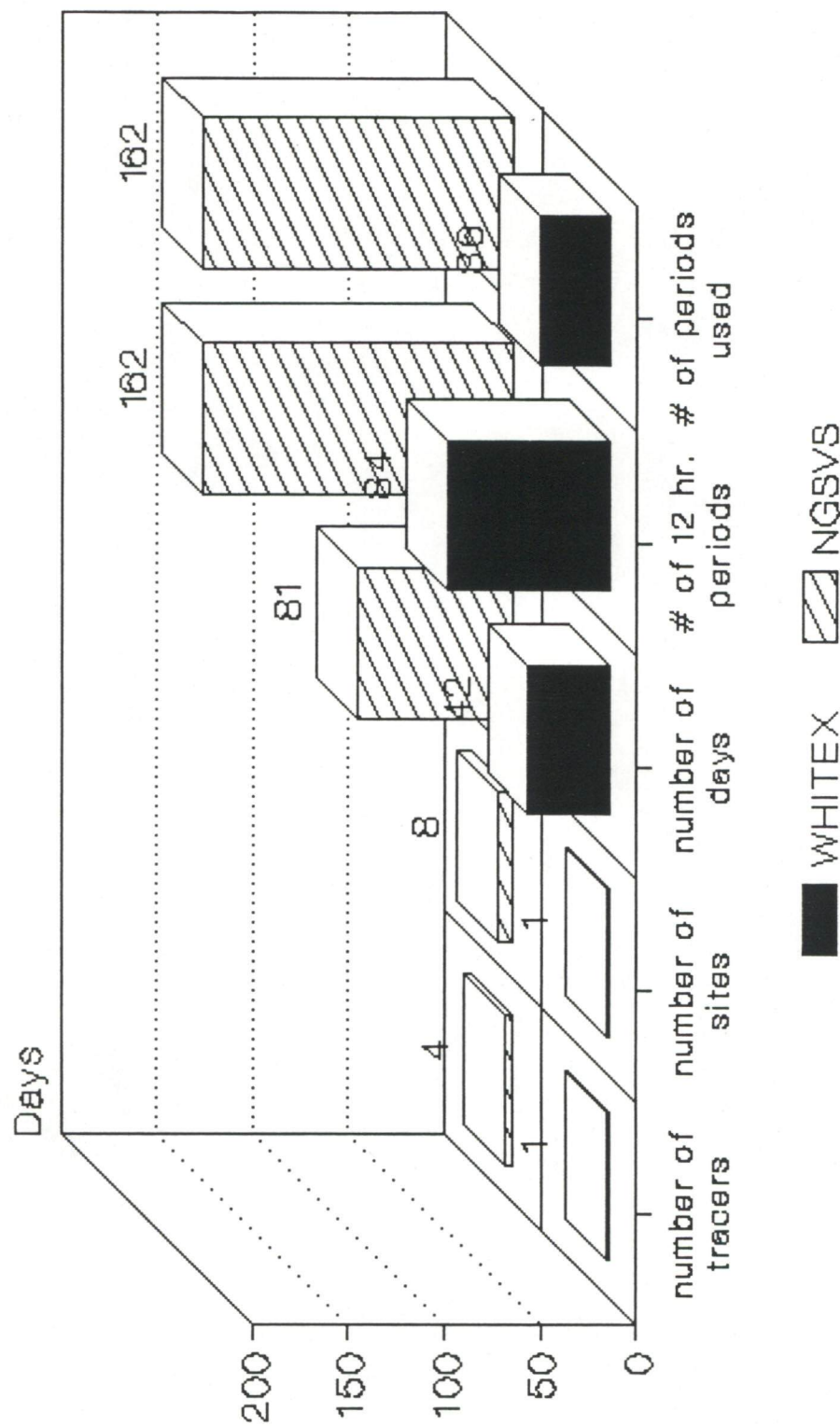
Visibility improvement Reducing NGS Emissions 90%



NGS Study dated

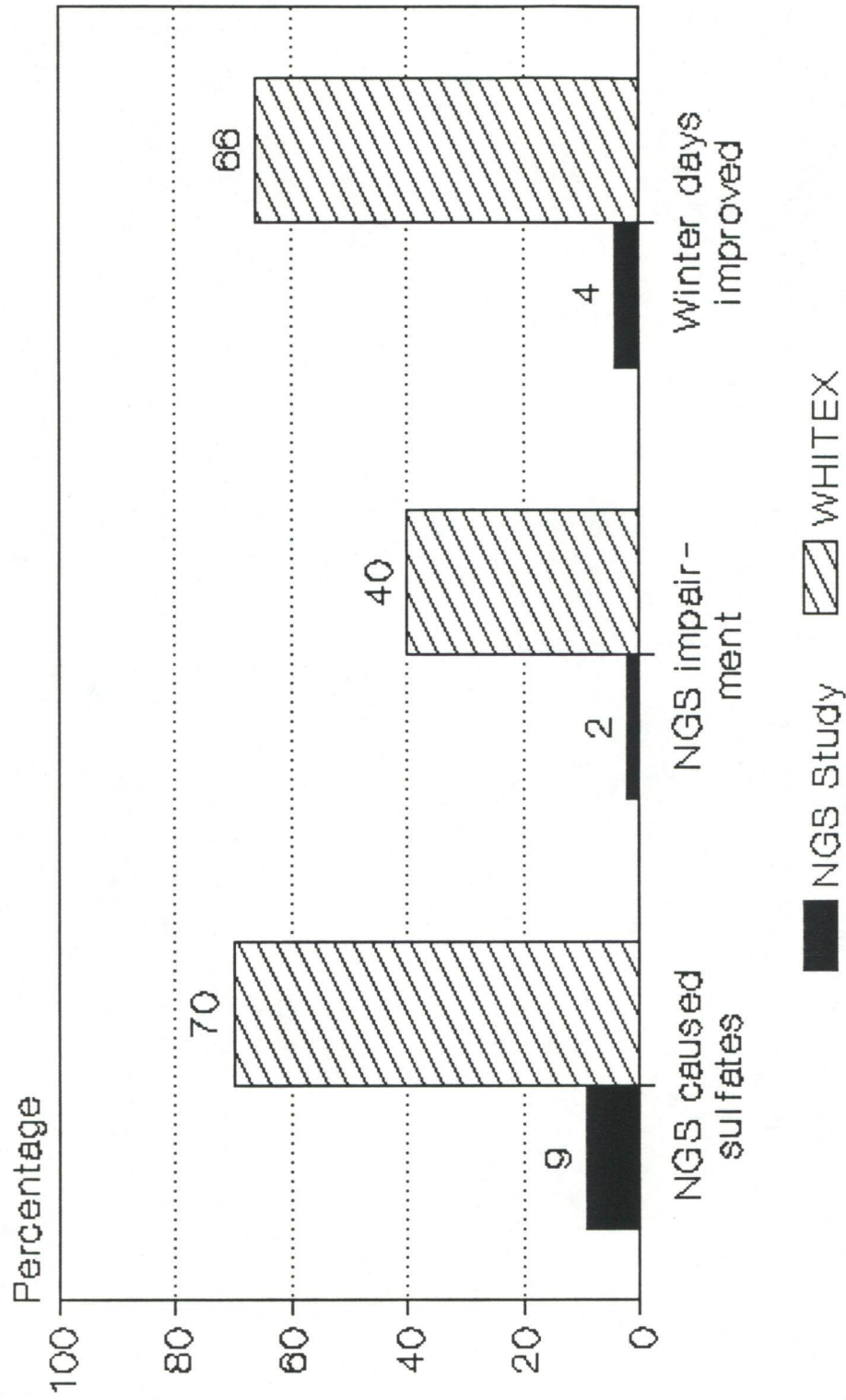
NGS Visibility Study vs. WHITEX

Study Features



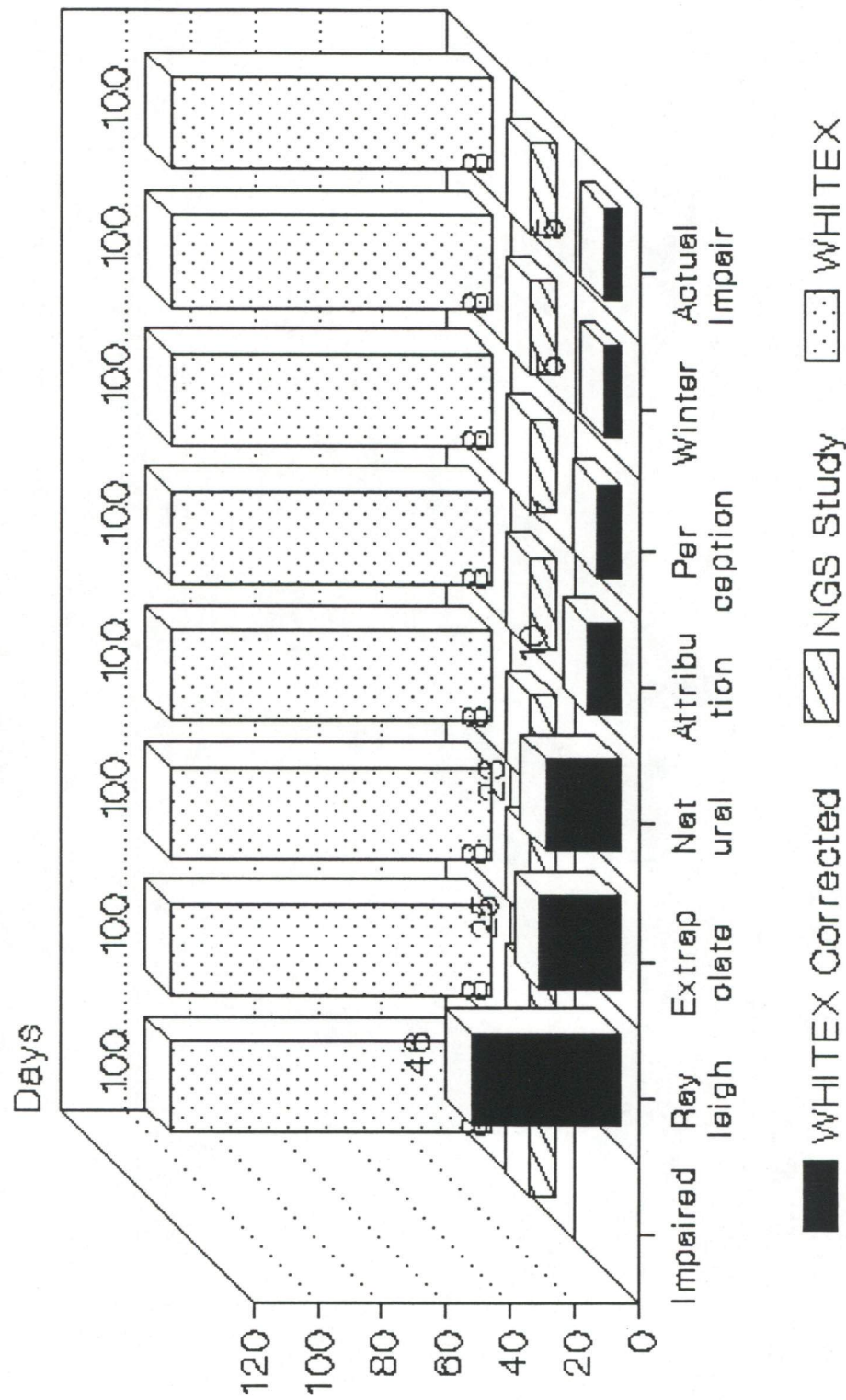
5pp43

NPS's Conclusions from WHITEX Compared to those of the NGS Study



wintertime

Comparing NGS with WHITEX Corrected



There is not much Debate
over the Costs of Regulating

SRP — UE&C NGS Emissions

Control and Cost Study

Flue Gas Desulfurization (FGD) System Costs per Compliance Averaging Time†

Compliance Average Time	Nominal % SO ₂ Removal Required	FGD Type and Number of Absorbers	Capital Cost \$ Millions	1st Year O&M \$ Millions**	Present Worth \$ Millions	Annual Cost			Total ††† Escalated Capital and O&M \$ Millions
						\$ per Year \$ Millions	\$ per Ton SO ₂	90% vs. 70% vs. 50% Incremental \$ per Ton SO ₂	
3 Hour	90	LSFO, 3 + 1	406 - 586	47.3	950 - 1,138	110 - 131	1,280 - 1,533	1,690 - 1,723	3,085 - 3,409
	70	LSFO, 3 + 1	316 - 491	32.0	686 - 869	79 - 100	1,171 - 1,483		2,161 - 2,477
30 Day	90*	LSFO, 3 + 1	357 - 513	43.2	853 - 1,016	99 - 117	1,213 - 1,446	1,232 - 1,164	2,792 - 3,073
	70*	LSFO, 3 + 1	300 - 466	31.2	661 - 834	76 - 96	1,208 - 1,526		2,095 - 2,394
	70	LSFO, 2 + 1	288 - 447	29.8	630 - 798	73 - 92	1,152 - 1,460		1,991 - 2,288
	50	LSFO, 2 + 1	248 - 384	27.4	564 - 706	65 - 82	1,443 - 1,807		1,810 - 2,055
	50	SI/Add ESP	95 - 109	48.3	632 - 646	73 - 75	1,618 - 1,654		2,569 - 2,594
	90	Trimex††	33	44.0	522	60	742		2,245
	70	Trimex††	30	35.6	426	49	778		1,824
Annual (No Reheat)	90	LSFO, 2 + 0	263 - 378	32.4	635 - 755	73 - 87	903 - 1,074	649 - 562	2,086 - 2,293
	70	LSFO, 2 + 0	233 - 361	26.1	533 - 667	62 - 77	976 - 1,220		1,718 - 1,949
	50	LSFO, 2 + 0	201 - 313	23.9	476 - 593	55 - 68	1,218 - 1,517		1,551 - 1,753
Seasonal (4 Months per Year Operation and Compliance)	90	LSFO, 1 + 0	218 - 313	30.3	564 - 664	65 - 77	803 - 944	517 - 424	1,900 - 2,071
	70	LSFO, 1 + 0	197 - 306	25.0	484 - 598	56 - 69	885 - 1,093		1,599 - 1,795
	70	LSFO, 2 + 0	233 - 361	22.2	490 - 624	57 - 72	2,689 - 3,423		1,524 - 1,755
	50	SI/Add ESP	95 - 109	20.6	325 - 339	38 - 39	2,494 - 2,602		1,195 - 1,220
	90	Trimex††	33	18.8	242	28	1,034	654	994
	70	Trimex††	30	16.0	208	24	1,142		850

† The range in the capital figures is due to the option of alloy construction materials and/or a 15% CAAA market penalty. All costs are presented in 1990 dollars, based on 80% station capacity factor and 20-year FGD System Operation, starting last quarter of 1996.

†† Trimex is an experimental process

††† "As spent" dollars

* The accuracy of these figures is $\pm 20\%$ for capital and $\pm 15\%$ O&M, all other figures on this sheet have an accuracy of $\pm 40\%$ for capital and $\pm 30\%$ O&M.

** These figures include energy requirement costs based on actual NGS busbar production costs, not replacement energy costs.

LSFO = Limestone Forced Oxidation

SI = Sodium injection, sodium injection SO₂ removal efficiency is unproven with NGS coal

Valuing the Benefits of SO₂ Reduction

EPA's Valuation Study vs. the NGS Valuation Study

The Preservation Values (EPA)

- ✓mail survey--600 mailed
- ✓pictures of GC and other Parks
- ✓summer days vs. winter days
- ✓interpolated to smaller differences
- ✓extrapolated to \$100-190 M/year

The Grand Canyon VS (NGS)

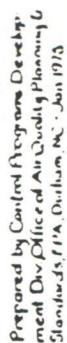
- ✓in person interviews
- ✓GCNP pictures
- ✓winter days vs. winter days
- ✓extrapolated to

Table S-3
SENSITIVITY OF NGS COST-BENEFIT ANALYSIS FOR 70% EMISSION LIMITATION*

ANALYSIS	Baseline	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7
Visibility Study	NGSVS	WHITEX	WHITEX (Corrected Rayleigh)	WHITEX (Corrected Partition/ Extrapol.)	WHITEX	WHITEX (Corrected Rayleigh)	WHITEX (Corrected Partition/ Extrapol.)	NGSVS
Valuation Study	GCVB	PV Study	PV Study	PV Study	GCVB	GCVB	GCVB	PV Study
Days of Perceptible Improvement	4	88	37	17	88	37	17	4
Economic Benefit	\$1M/yr	\$100-190M/yr	\$69-103M/yr	\$36-43M/yr	\$33M/yr	\$14M/yr	\$6M/yr	\$6-12M/yr
EPA Cost Estimate	\$110M/yr	\$110M/yr	\$110M/yr	\$110M/yr	\$110M/yr	\$110M/yr	\$110M/yr	\$110M/yr
Net Benefit	<\$109M/yr>	<\$10>-\$80M/yr	<\$7-41M/yr>	<\$67-74M/yr>	<\$77M/yr>	<\$96M/yr>	<\$104M/yr>	<\$98-100M/yr>

* < > indicates a negative net benefit.

EPA's Decision on NGS will be Precedential

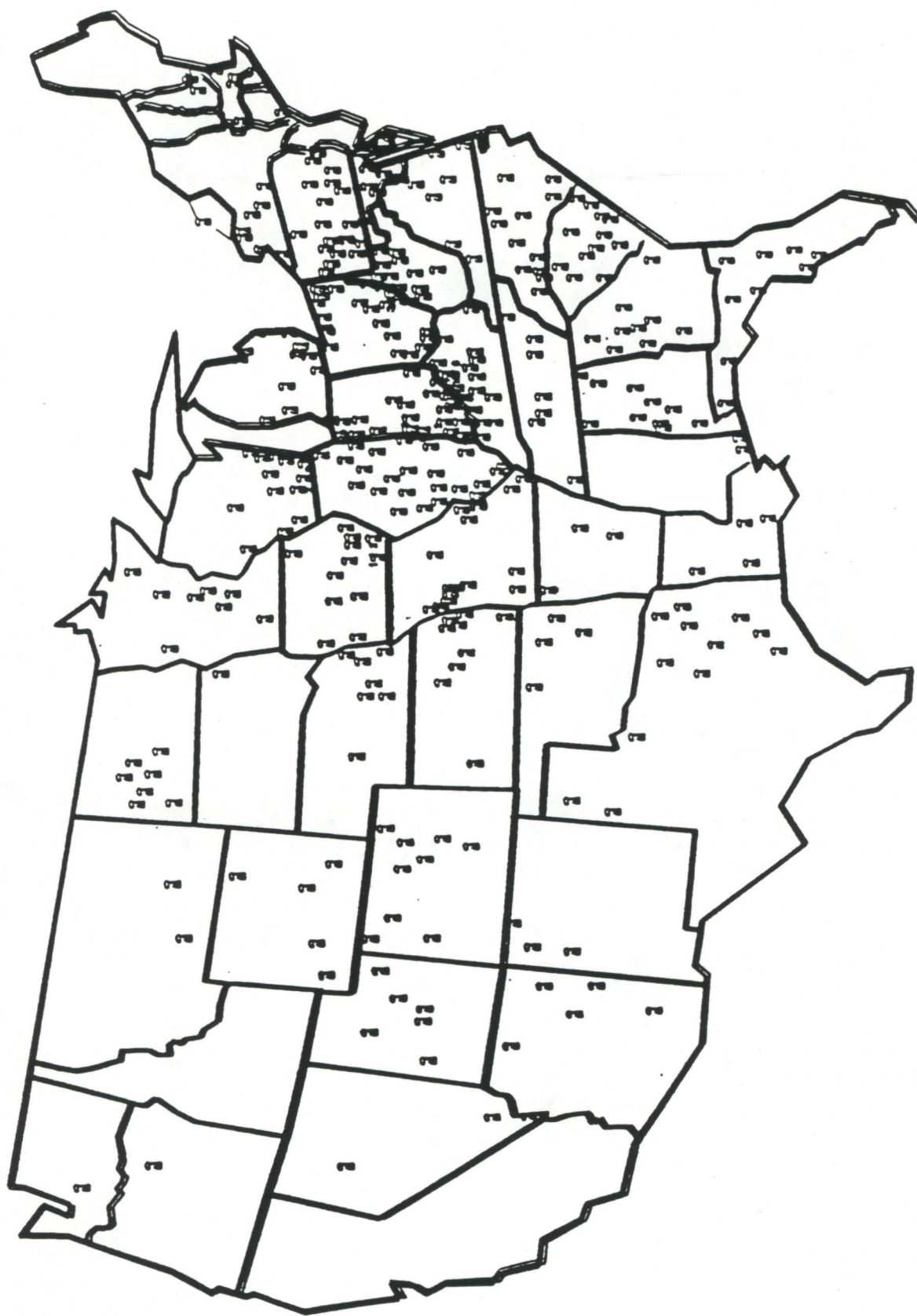


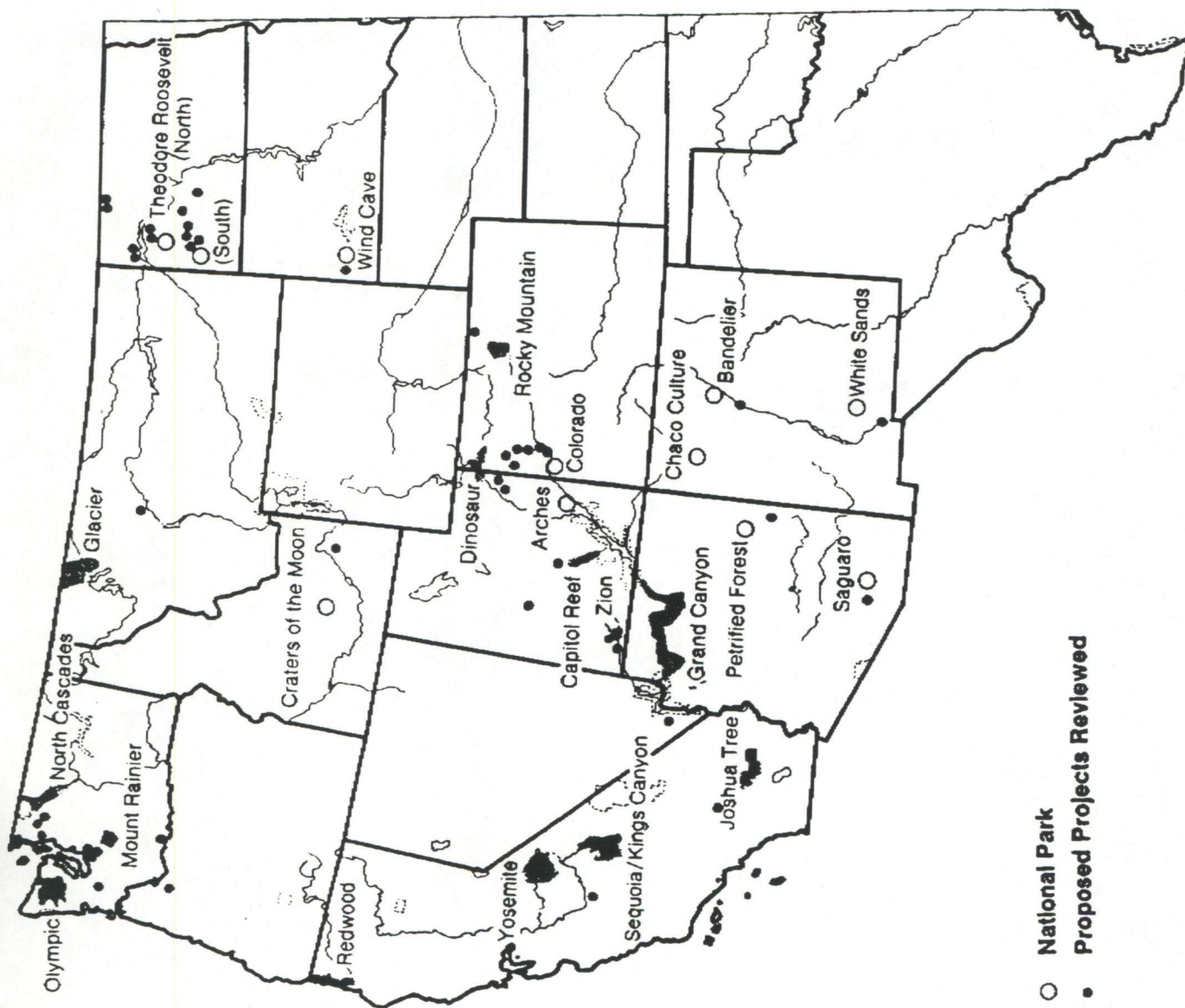
1

Prepared by Control Programs Development
Division, Office of Air Quality Planning &
Standards, EPA, Durham, NC - June 1973

There are 1131 coal-fired power plant
boilers within 250 miles of National Parks

COAL-FIRED POWER PLANTS

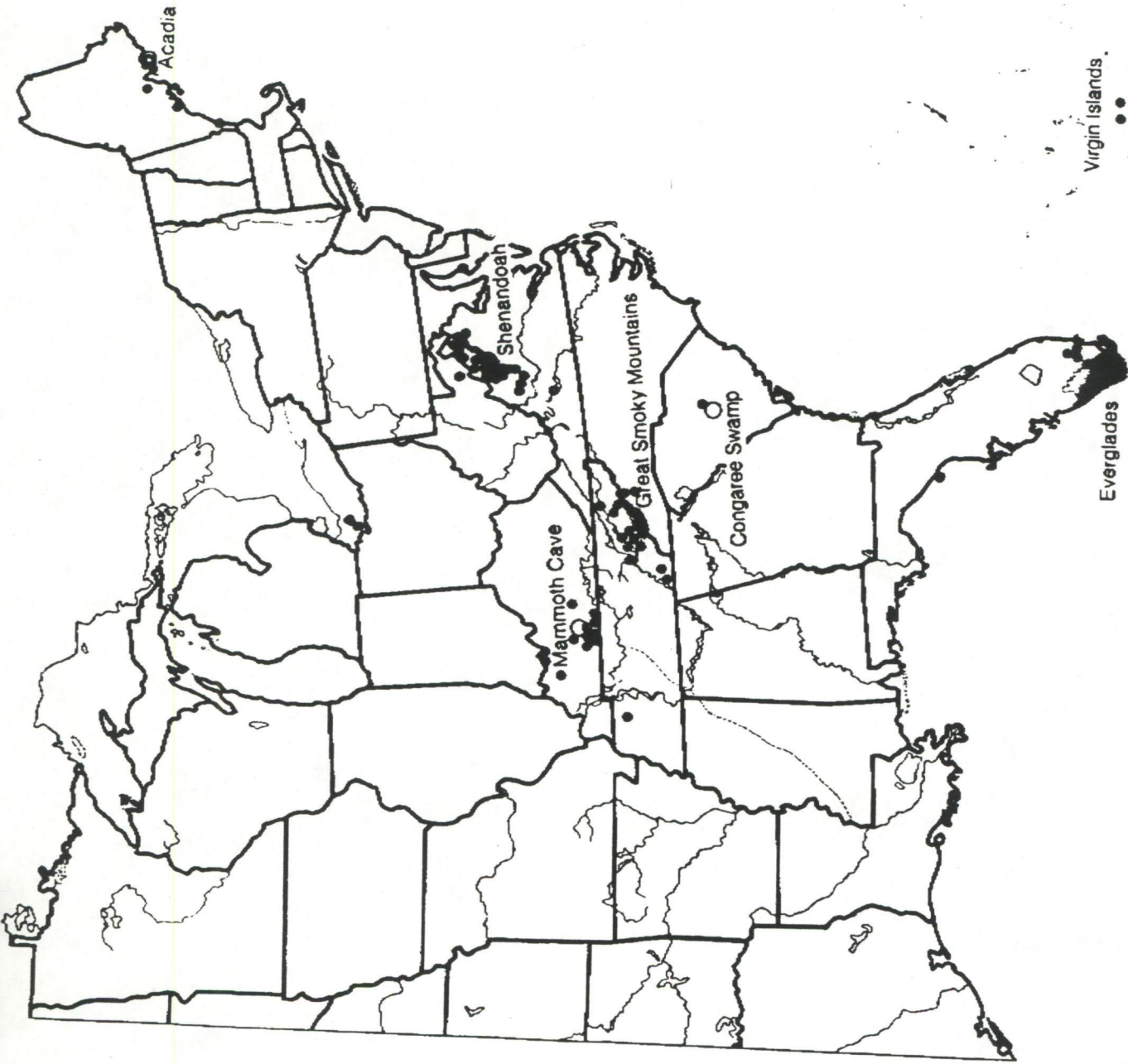




- National Park
- Proposed Projects Reviewed

FIGURE 6-1

**Locations of Proposed Projects Reviewed by
the National Park Service Since 1979**



NGS would be the First Phase I Regulation

- It would--
 - ✓ratify the use of tracer studies for future Phase I regulations;
 - ✓establish the floor for SO₂ contribution from a source to justify regulation;
 - ✓set the cost/benefit requirement for regulation;
 - ✓because every other Park (except one) has worse visibility, lead to the Phase I regulation of more plants;
 - ✓enable NPS to trigger EPA Phase I decisions at any time, using NGS as the standard;
 - ✓require EPA to face the NGS precedent when it reviews all state SIPs every three years; and
 - ✓encourage environmental groups to litigate.

Next Plants to be Regulated

- In the west, there are four target plants identified in the House Synar Hearings:
 - ✓ Centralia 1-2 (Washington)
 - ✓ Mohave 1-2 (Nevada)
 - ✓ Pawnee 1 (Colorado)
 - ✓ Hayden 2 (Colorado)(These were also identified in an analysis commissioned by EPA).
- Funds are now available for tracer studies at Mohave, and EPA has proposed to Mohave that it voluntarily reduce its emissions by 50% to avoid visibility regulation.
- In the east, Shenandoah and Lye Brook Wilderness are already an issue. Offsets not required by the CAAAs have already been exacted from two Companies and requested from a third

The Alternatives