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OUTLINE

- I. The draft EPA NPRM that would require a BART determination for NGS is a bad proposal. The costs are enormous; the benefits are insignificant; and visibility would not be improved in the Grand Canyon, because the proposal does not attack the real cause of the problem - regional haze.
 - A. The draft NPRM is legally defective. Attached as Tab 11 is a comprehensive Memorandum criticizing the EPA BART proposal and describing the environmental, economic and energy policy implications of this proposal.
 1. The attribution/contribution analysis is inadequate.
 - a. The proposed attribution determination was based exclusively upon the now discredited WHITEX experiment. WHITEX concluded that NGS accounted for an average of 40% and up to 70% of the visibility impairment in the GCNP during the winter.
 - b. The NAS/NRC critique of WHITEX concluded that while NGS emissions were present in the GCNP on some days, the WHITEX data did not enable a conclusion as to how much was present or whether it resulted in visibility impairment.
 - c. The far more sophisticated \$13 million SRP study concluded that during the winter, NGS emissions are present in conditions where haze could form only 4-7% of the time and that in only one-half of these times could visibility be impaired. (Half of the times were at night or during winter storms).
 - d. There is no data that shows that NGS emissions directly impair visibility. In fact, the presence of NGS emissions in the GCNP was only detected by experimental tracing studies, not by visual observation.
 - e. The visibility problems in the GCNP are caused by many other sources.
 - (1) The recent Washington University study confirms other studies that show that pollution from Los Angeles reaches the GCNP, especially in summer, when urban sources are the major cause of haze. (See the December 12, 1990, article in the Arizona Republic, Tab 10). The study showed a picture of "a summertime desert awash in urban effluents."
 - (2) The NAS/NRC criticized WHITEX for failure to study these other points and urban sources of haze.

- f. Emissions reductions from the NGS proposed in the draft NPRM will have no perceptible effect on visibility in the GCNP. (See the Memorandum dated January 15, 1991 accompanying relevant photographs of the Grand Canyon, at Tab 13).
- (1) On all but a few days each year, NGS emissions are not present in the GCNP.
 - (2) On average, NGS emissions could cause visibility impairment on less than 2-3.5% of the time during the 90 days of winter.
 - (3) During the winter, when the NGS emissions are present, visibility is at its yearly best.
 - (4) When shown pictures of significant visibility changes in the GCNP (substantially greater than those associated with the controls proposed by the draft NPRM) depicting the few days when NGS emissions are present and days when they would not be, 85% of those surveyed said they would not pay anything for the difference.
2. The cost-benefit requirements of BART and Executive Order No. 12291 cannot be met under any circumstances. (See the Warren Brooks article at Tab 9).
- a. The costs of an effective 95% reduction in emissions with a 3 hour averaging time for compliance determinations would be enormous. (See Tab 2).
- (1) EPA estimates that these costs would be over \$4 billion, and that the cost per ton of SO₂ removed would be \$1626 to \$2280.
 - (2) SRP estimates that the annual costs would average between \$110-131,000,000; that capital costs would be between \$406-586,000,000; and that the cost/ton of SO₂ removed would be \$1,690-1,723.
 - (3) Emission reduction required by the EPA draft proposal would require scrubbers.
- b. The benefits are very small.
- (1) There are no health or welfare benefits. Visibility is exclusively concerned with

aesthetic criteria, and all other effects are outside the rulemaking.

- (2) The aesthetic benefits claimed by EPA depend upon a flawed "willingness-to-pay" survey. (See the Memorandum on Benefits dated January 13, 1991, Tab 3).

- (a) The EPA survey alleged annual benefits of \$230-400,000,000. EPA did not attempt to measure the value of the visibility improvements to be expected from its draft BART proposal.

- (b) The contrasting pictures used in the EPA analysis compared severe summer haze -- when NGS emissions are not present -- to clear wintertime pictures.

- (3) According to a more sophisticated survey conducted by Decision Focus, Inc., the more realistic benefit using this methodology is \$1-16 million. 85% of those surveyed would not pay anything for the expected visibility improvement.

B. Proceeding with the draft BART NPRM will establish a very poor and expensive precedent.

1. This would be the first source regulated under the Phase I, or "plume-blight" rulemaking program.

- a. The regional haze program is a separate program and contribution to regional haze does not authorize the regulation EPA is pursuing here.

- b. Because this would be the first rulemaking under the non-regional haze visibility program, the poor science and cost-benefit imbalance would establish the worst possible precedent.

2. EPA and the National Park Service are already moving to extend this program to other areas of the country. (See the Memorandum on the Precedential Effect of the rulemaking dated January 13, 1991, Tab 6).

- a. Other western plants -- notably Mohave and Centralia -- would be subject to BART controls under the same rationale.

- b. Shenandoah National Park -- the National Park Service is shifting emphasis east.
 - 3. This rulemaking will undercut the Clean Air Act Amendments of 1990 and its trading program.
 - a. This rulemaking would require SO₂ emission reductions in addition to the reductions required by the Acid Rain provisions. The Shenandoah matter shows that the Park Service has targeted for visibility studies plants in the midwestern states that are required to undertake the maximum reductions under the Acid Rain provisions. (See the Memorandum dated January 13, 1991, on the Effects on Allowance Trading at Tab 7).
 - b. Any such reductions must be less cost-effective than the reductions required under the Amendments.
 - c. The cost of reductions in SO₂ emissions for NGS under these visibility rules will not be able to be offset by the trading system which does not become operational for NGS until 2000.
 - d. Unlike the Acid Rain provisions, a source controlled under the visibility program could not purchase allowances to meet its limits, it must reduce emissions.
 - e. For several reasons, including that EPA rules to implement the trading system have not been issued, it is not clear that NGS will be able to sell its allowances for reductions, or that those allowances will have any value.
 - 4. This expensive rulemaking to reduce visibility impairment in the GCNP will have no perceptible effect on visibility. (See section I,A,1,f above). (See also photographs at Attachment II to Tab 13.)
- II. There are better alternatives. (See the letter dated January 10, 1991, from Henry Nickel to William G. Rosenberg at Tab 4).
- A. The proper approach here would include:
 - 1. Conduct of regional haze studies required by the 1990 CAA Amendments;
 - 2. Study of the regional problem by the Grand Canyon Visibility Transport Commission created by the 1990 CAA Amendments and composed of the Governors of the affected States; and

3. A study of alternative clean coal technologies at NGS. (See the Memorandum dated January 13, 1991, providing an Assessment of Alternative Technologies at NGS at Tab 5).
 - B. If one of the clean coal technologies is successfully demonstrated, it will be installed by NGS and operated on a seasonal basis to address wintertime haze. (Attached at Tab 12 is a Memorandum dated January 14, 1991 from Henry Nickel to EPA demonstrating the validity of seasonal emission controls.)
- III. Several Members of Congress have written to the President criticizing the EPA BART proposal and recommending that the Administration seek a better resolution of this issue. (See Tab 8).
 - IV. The rulemaking cannot be salvaged by seeking comments on a greater range of options. (See the Memorandum on alternatives dated January 13, 1991, at Tab 1).

Additional Attachments

- Tab 14 - Section 169A of the Clean Air Act.
- Tab 15 - Section 169B of the Clean Air Act, added by the 1990 CAA Amendments.
- Tab 16 - Court order establishing EPA deadlines.

Withdrawal/Redaction Sheet

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Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
01. Paper	Alternatives Concerning the Draft NGS NPRM (3 pp.)	01/13/91	P-5	

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 (b)(9) Release would disclose geological or geophysical information

January 13, 1991

ALTERNATIVES CONCERNING THE DRAFT NGS NPRM

Unless additional time is allowed by the District Court, by February 1, 1991, EPA must decide whether to issue an NPRM that would initiate a BART rulemaking concerning the NGS (the "BART decision"). EPA also has outstanding a draft NPRM in which it has proposed, based almost entirely on the WHITEX study, to find that NGS may reasonably be considered to contribute to the haze problem in the Grand Canyon (the "attribution decision"). In deciding how to proceed on BART, EPA must decide what to do with the pending attribution NPRM in light of subsequent studies, e.g., the NRC critique of WHITEX and the NGS contribution study, that show that the WHITEX experiment is no longer sufficient to warrant such regulatory proceedings.

As you know, we believe that these subsequent studies virtually require that the proposed attribution finding based upon WHITEX be withdrawn, that the required quantitative BART analysis cannot be performed (since EPA has only qualitative data) and that, in any event, the costs of BART controls will vastly outweigh the possible benefits in all circumstances. But we appreciate the wisdom of undertaking cost effective measures to reduce emissions at the NGS regardless of the outcome of the EPA rulemaking since we are a (relatively minor) contributor to regional haze. That is why we have proposed a two point program in lieu of the draft NGS NPRM that we believe makes far more sense for NGS and for the visibility program.

Our alternative is to initiate a demonstration program to test one or more dry injection technologies to reduce SO₂ emissions at the NGS. If the test was successful, it would be made operational for NGS and reductions would begin sooner than under the draft EPA NGS NPRM. In any event, we would commit to a guaranteed level of reductions at NGS by 2000 when the allowance trading provisions under the CAA Amendments of 1990 will begin. (This still could be earlier than the emission reductions under the EPA rulemaking if the rule is challenged successfully in court because of the inadequacy of the attribution finding or failure to satisfy the cost-benefit requirement).

The second part of our proposal is to facilitate EPA's conduct of required regional haze studies and the formation and recommendations of the Grand Canyon Visibility Transport Commission that EPA is required by the CAA Amendments to establish within 12 months. We believe that this regional compact provides the best means of addressing the real visibility issue -- regional haze.

The essential legal and programmatic problem facing EPA is that the studies show that NGS emissions could only be a visibility concern for a few days during the entire year (since the prevailing winds take NGS emissions away from the GCNP on all other days) and that the few days on which NGS emissions could be a visibility factor (remember that climatic conditions still have to be unusual for emissions to result in impairment -- notably high humidity in a desert) are days when visibility is impaired by clouds, fog and/or precipitation characteristic of that climate, all in a season when visibility is otherwise at its best -- during the winter. Because of this problem, EPA faces significant legal difficulties; the cost-benefit requirements of BART cannot be made; and the effects of even a sizeable reduction in emissions at the NGS will have an undetectable effect on visibility.

The realities of rulemaking make unacceptable the approach EPA has informally suggested -- e.g., proposing for comment various levels of reduction, e.g., 50%, 70% and 90%, perhaps with various proposals about averaging times. This approach will simply delay the decision until after EPA and others have generated publicity and stacked the record in a way to favor their stated preference -- imposition of high cost scrubbers in all circumstances. Furthermore, a dangerous precedent also will have been established and with the worst possible standard set, so that in tomorrow's visibility rulemakings the science needs only to be as good as for the NGS rulemaking and the cost-benefit ratio needs only to be no worse. If scrubbers can be required at NGS on a record so flawed, they could thereafter be justified at virtually any coal fired plant located near a national park thereby frustrating the balances inherent in the Clean Air Act Amendments of 1990 and its trading system.

Therefore, the alternatives need to result in EPA not proceeding with a rulemaking that could impose additional emission restrictions on NGS. We see three such possibilities.

First, EPA could withdraw its proposed attribution finding, based on the National Research Council and SRP studies, and decide not to issue a BART proposal. We realize that EPA is extremely reluctant to take this step, both as a matter of politics and because the NRC study used the word "significant" in characterizing the presence of NGS emissions in the Canyon. (We understand that NRC meant that NGS was only a non-trivial contributor).

Second, EPA could avoid reversing itself on attribution but conclude that it will not proceed with a BART rulemaking. The studies show that while on some days NGS emissions are present in

the GCNP and probably contribute to a minor extent to visibility impairment on some of those days, the extent of the NGS contribution to impairment must be small as demonstrated by the NRC and SRP studies. Rather, they show that the impairment must be largely due to other point sources and regional haze. Under this approach, EPA would conclude that it is not proceeding with the BART rulemaking on this minor contributor because regional haze is beyond the scope of these visibility rules, such an action would preempt the CAA Amendments visibility program, and the high costs exceed the minor benefits from the small incremental improvement in visibility that would result.

Third, EPA could issue an NPRM that decides, based on the imbalance of costs and benefits, not to propose additional emission controls on NGS, but asks for comment on a proposal that the current SIP requirements for SO₂ emissions be declared to be BART. (Unlike the draft BART NPRM, current SIP NOx and particulate controls should not be repropose as BART, because there is no evidence that they contribute to haze in the Canyon.) This proposal would be based on the same basic facts emphasizing that because the costs are enormous and the visibility improvement benefits quite small, that the cost-benefit requirements of BART for additional reductions cannot be met. It would, however, propose that the SIP SO₂ controls do have some effect in reducing haze, and would propose that they be made mandatory under Section 169A to avoid the (hypothetical) risk that these controls would not be required to satisfy the NAAQS at some point in the future.

Under any of these situations, EPA would also conclude that the demonstration programs that SRP has proposed offer the best opportunity for emission reductions. Because of the cost-benefit requirements of Section 169A, only reduction efforts that are far less expensive than scrubbers could meet the test, and the SRP financed demonstration program is the best chance for a real-world test that could become BART and could result in a viable and cost-effective visibility program.

If the alternative technology demonstration program were not legally binding on NGS, but simply had the status of a commitment by the owner, the alternative technology program could be part of a policy and political defense of this outcome, but would not be part of the defense of in the (inevitable) EDF litigation challenging this result. If the alternative could be made legally binding through some mechanism other than BART, however, the test program could be part of the legal defense as well, under the Moosehorn precedent, and would bolster confidence in the policy outcome. Therefore, it would be useful if you could explore with the General Counsel of EPA means by which the test program could be made legally binding as well.

SRP-UE&C NGS Emissions

Control and Cost Study

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

Compliance Average Time	% SO ₂ Removal Required	FGD Type and Number of Absorbers	Annual Cost					Total*** Escalated Capital and O&M \$ Millions
			Capital Cost \$ Millions	1st Year O&M \$ Millions	Present Worth \$ Millions	\$/Year \$ Millions	\$/Ton SO ₂	90% vs. 50% Incremental \$/Ton SO ₂
3 Hour	95	LSFO, 3+1	406 - 586	47.3	950 - 1,138	110 - 131	1,280 - 1,533	1,690 - 1,723
	75	LSFO, 3+1	316 - 491	32.0	686 - 869	79 - 100	1,171 - 1,483	3,085 - 3,409
30 Day	90	LSFO, 3+1	357 - 513	43.2	818 - 966	95 - 112	1,164 - 1,374	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
Annual (no reheat)	70	Trimex **	30	35.6	426	49	778	1,824
	90	LSFO, 2+0	263 - 378	32.4	635 - 755	73 - 87	903 - 1,074	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
Seasonal (4 Months/Year Operation and Compliance)	70	LSFO, 1+0	197 - 306	25.0	484 - 598	56 - 69	885 - 1,093	1,504 - 1,795
	70	LSFO, 2+1	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	994
	70	Trimex **	30	16.0	208	24	1,142	850

* 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

January 13, 1991

Benefits of Visibility Improvements

This Memorandum compares the assessment of benefits from visibility improvements in the Grand Canyon, as estimated by EPA and by the Salt River Project. This comparison shows that EPA systematically overstates the benefits of the visibility improvements to be expected from retrofitting NGS with scrubbers. The studies conducted by the Salt River Project's experts conclude that the benefits are far smaller than those projected by EPA; they cannot under any circumstances justify imposition of scrubbers on a cost/benefit basis.

I. EPA Approach to Benefits. EPA principally relies on a controversial "contingent valuation" study performed by a Park Service contractor (Chestnut & Rowe) that attempted to measure how much Americans theoretically would be willing to pay for substantial visibility improvements in the Grand Canyon.

Critically, in attempting to justify the 90% BART proposal, EPA did not conduct a specific study to measure the value of the visibility improvements to be expected from its draft BART proposal. Rather, its consultants extrapolated from data they had gathered in prior studies, in which respondents were asked different questions intended to evaluate different -- and much greater -- kinds of visibility improvements than those presented by the NPRM.

There were at least two major flaws in the Chestnut and Rowe visibility studies that biased their conclusions:

--First, the most egregious error occurred when respondents were asked to compare photographs of "good" and "poor" visibility, for purposes of quantifying the amount they were willing to pay for improvements. The "good" visibility photo was taken during the winter, when the sun angle produces vibrant colors, while the "poor" visibility photo was taken during the summer, when the higher sun angle produces muted tones.

Chestnut and Rowe thus essentially asked the respondents to place a monetary value on transforming a summer haze day into a winter clear day. This error alone -- and there were many other

significant design errors -- renders the EPA analysis meaningless for this rulemaking, where the issue involves at best small incremental changes in the winter visual range. (We are obtaining a copy of these two photographs from the Salt River Project, so that people in the affected agencies may judge the prejudicial effect for themselves).

--Second, the questions asked by Chestnut and Rowe did not ask respondents specifically to value the benefits of an increase in the visual range. Rather, their questions allowed respondents to assume that a reduction in emissions affecting visibility would simultaneously produce improvements in human health, animal and plant welfare, and protection of rock formations in the Grand Canyon.¹ Thus, the EPA benefit numbers include, in substantial part, amounts that lie outside the scope of this rulemaking and cannot be considered in the BART cost/benefit comparison.

Despite these flaws, EPA relies on these studies to assert that Americans would be willing to spend in excess of \$100 million annually for the next 30 years to obtain marginal improvements in visibility in the Grand Canyon during the winter. These figures, derived under this controversial economic theory that has never previously been the basis for a major regulatory action, constitute the sole "benefits" claimed by EPA's staff. The Chestnut and Rowe studies have obvious flaws and have been heavily criticized in the recent draft report of the National Acid Precipitation Assessment Project (Question 1, pp. 6-29 to 6-35).²

II. Salt River Project Benefit Study. The SRP asked Decision Focus, Inc. to conduct a contingent valuation study for the specific purpose of evaluating the willingness of households to pay for the specific degree of visibility improvement called for by the draft BART proposal -- i.e., a change in wintertime visibility. The DFI study corrected the major flaws in the Chestnut and Rowe study. For example, it used photographs taken

¹ The SRP contingent valuation contractor worked extensively with focus groups prior to designing the questions in its study. The focus group work revealed that a failure to distinguish explicitly between visibility benefits and other benefits from reduced pollution was a critical factor affecting the size of the estimates provided by respondents.

² NAPAP concluded that it was inappropriate to rely on contingent valuation estimates as stating accurate estimates of visibility values, in part because of unresolved theoretical questions about the validity and reliability of any contingent valuation estimates, and in part because of problems with specific studies, including the Chestnut and Rowe studies. See Question 1, page 6-33.

in winter, and the questions asked explicitly excluded consideration of other benefits from reduced pollution (i.e., effects on human and animal health, and impacts on plant and rock formations) and focused exclusively on the visibility effects.

The results from the preliminary studies conducted by DFI were lower by an order of magnitude than those derived by Chestnut and Rowe.

III. Comparison of Benefit Data from the Two Studies.

There are two possible arithmetic measures of willingness to pay -- the median response (the point above and below which there are an equal number of responses) and the mean response (arithmetic average). The comparison between the EPA and the DFI study is presented in both cases.

There are substantial reasons for believing that the median is a better measure than the mean.

--It is more stable statistically, in that it is resistant to the distortion caused by outliers (individuals who state an extreme preference far out of line with the vast majority of other people interviewed).

--The median reflects what would happen in a referendum-type contest to decide whether to take a specific regulatory decision. In this regard, it is important that 85% of the respondents in the Grand Canyon Visibility Benefits study stated that they would assign no value to the incremental visibility benefits to be obtained from the proposed BART NPRM.

MEDIAN HOUSEHOLD WILLINGNESS TO PAY

Chestnut & Rowe estimate of annual payment (for perpetuity) ³	\$43 - 125 million
Grand Canyon Visibility Benefit estimate of payment for 20 years	\$ 0

³ Based on an assumption of 100 million households.

MEAN HOUSEHOLD WILLINGNESS TO PAY

Chestnut & Rowe estimate of annual payment for perpetuity \$130 - 250 million

DFI estimates for annual payments for 20 years, correcting for:

1. The shift from the artificial winter average to real episode days \$33 - 67 million
2. The GCVB estimate of willingness to pay \$14 - 24 million
3. The days on which natural conditions obscure the benefit of controlling NGS emissions⁴ \$ 2 - 16 million

To provide perspective on this data, the Chestnut and Rowe mean number suggests that the United States population as a whole would be willing to pay as much as \$4,000 per visitor to the Grand Canyon in return for a slight improvement, for a few days each winter, in an already large visual range.

⁴ These figure reflect a change in the method of adjustment of the raw data in response to a comment made by EPA staff at a meeting at Research Triangle Park in early December 1990. The range of values reported presents the most conservative result of the five alternative adjustment mechanisms tried and reports higher amounts than the values submitted to EPA in December. Use of the other adjustment mechanisms would reduce the range of willingness to pay to \$0 to \$8 million per year.

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	\$2-24¹
	the days on which natural conditions prevent controls at NGS from having a perceptible effect	\$1-16²

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 ²
Household value reported in RIA for a 14% winter average VR improvement ¹ (average VR improves from 186km to 213km) ³	\$1.30-2.50	—
Household value that results from combining C&R with the RIA estimate of episode improvement (25 days improve from 136 km to 169 km) ³	\$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) ³	—	\$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.		

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January 10, 1991

The Honorable William G. Rosenberg
Assistant Administrator for Air
& Radiation
United States Environmental Protection
Agency
401 M Street, S.W.
Room 937 West Tower
Washington, D.C. 20460

Dear Mr. Rosenberg:

Under the court-imposed deadline, the Environmental Protection Agency must decide by February 1 whether or not to propose BART limitations for the Navajo Generating Station. The February 1990 EPA staff draft proposal would require Navajo to install a 90 percent (3 hour averaging time) scrubber that would have to achieve sulfur dioxide emission reductions in excess of 95 percent on a long term basis. That draft proposal was based upon the National Park Service's WHITEX analyses which concluded that NGS was responsible for 40 percent of the average winter time haze in the Canyon and 60 to 70 percent during episodes.

Following release of the staff proposal last February, the National Research Council issued a report highly critical of the NPS's WHITEX quantifications. Also, the Salt River Project (SRP) completed a comprehensive study of winter visibility in Grand Canyon. Preliminary results from SRP's study refute the WHITEX conclusions that Navajo was a dominant contributor to winter haze in the Canyon.

As we have explained in earlier letters, SRP believes that the NRC Report on WHITEX and the preliminary results from the SRP study require reconsideration of the staff draft scrubbing proposal. SRP also believes that there are legal barriers under EPA's 1980 visibility rules to the Agency's regulating a source that is at most only a contributor to regional haze.

While it is clear that the Agency does not share our view as to the scope of its legal authority to impose BART limits, SRP believes that the Agency should consider alternatives to its 90

HUNTON & WILLIAMS

The Honorable William G. Rosenberg

January 10, 1991

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percent scrubbing proposal in view of its extremely high cost and the marginal visibility improvements that would result from installing and operating scrubbers at this time. SRP management has developed an alternative to the Staff scrubber proposal which we believe is fully consistent with the Agency's legal position that Navajo's emissions can be regulated under current rules and is responsive to SRP's concerns regarding the disparity between control costs and visibility benefits.

The alternative being proposed by SRP management, discussed below, would assure that any emission reductions would cost much less than the staff draft proposal and would take place no later than the earliest time that major contributors to haze in the Canyon (e.g., other major stationary sources in the region and urban sources) would be reducing emissions. The SRP alternative would be integrated into the comprehensive program to evaluate visibility called for by the 1990 Amendments, a research program that SRP would support. The following discussion outlines the SRP proposal.

If you are interested in pursuing this approach, we would recommend that we and your counsel seek a 60 day extension in the February 1 court deadline. This 60 day extension will allow SRP and your staff to develop a detailed proposal and will provide necessary time to have that proposal reviewed and approved by you and the Administrator, by the SRP Board, and by the other Navajo participants.

DISCUSSION

SRP's alternative has the following elements:

--SRP would agree to help fund, and otherwise to cooperate fully with, the regional haze studies that EPA is required to conduct under the 1990 Amendments, to assure that EPA can collect the scientific and technical data necessary to permit a full assessment and evaluation of all sources of haze in the Grand Canyon.

--EPA would expedite establishment of the Grand Canyon Visibility Transport Commission. SRP would cooperate with the Governors of the affected States and the Commission in the conduct of its inquiry.

--SRP would agree to undertake tests to try to demonstrate the feasibility of several promising clean coal technologies that may provide much lower cost alternatives to conventional scrubbers on plants fired by low sulfur western coal. If one of the technologies were demonstrated to achieve an agreed upon

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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 the NGS on wintertime visibility.

--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% of uncontrolled SO2 emissions measured on an annual basis. This technology would not have to be operational before January 1, 2000, the date upon which the first allowances would be issued to the plant under the 1990 Amendments.

This alternative approach has several distinct advantages. First, it avoids very costly controls that will at best only marginally improve visibility a few hours in the winter. Second, it assures that any haze program will be based upon reliable science and sufficient data, rather than the flawed WHITEX experiment, which has driven the EPA Staff draft. Third, it allows coordination of the NGS program with the regional haze studies to be undertaken by the EPA and the recommendations of the Grand Canyon Visibility Transport Commission. This assures maximum input of the States into the ultimate solution.

In terms of ultimate emissions reductions, the alternative technological test program offers the potential for immediate, local pollution reductions at much lower cost than scrubbers. New low cost technologies, if demonstrated, can make a major contribution to long-term pollution reduction efforts at plants burning low sulfur coal that are potential targets for cost benefit based visibility regulation. Finally, if alternatives cannot be demonstrated, this approach will assure that there will be long-term, large-scale reductions in SO2 emissions from the NGS, with controls installed under deadlines that will permit the market for allowances to help finance the substantial capital and operating costs that otherwise would have to be absorbed by the Arizona economy and Federal taxpayers.

Regional Visibility Studies. Administrator Reilly has repeatedly acknowledged the critical importance of basing EPA rules on solid scientific work. He also has recognized the dangers of the "ready, fire, aim" type of regulation, when rules are based on emotional reactions to an environmental issue rather than considered policy analysis. The draft NPRM reflects both flaws, particularly its proposed reliance on the WHITEX experiment as the basis for regulation.

The SRP alternative will provide a far more reliable scientific and technical basis for considering a response to haze

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in the Grand Canyon. The 1990 Salt River Project study of NGS represents a quantum leap forward in the sophistication and reliability of region-wide atmospheric studies. That experience will be invaluable in conducting proper studies to cure one of the NRC's principal criticisms of WHITEX, its failure to consider the other point and regional sources that obviously contribute to haze in the Grand Canyon.

SRP is prepared to help improve those studies by assisting with their funding, design, and implementation. Especially with the strain on EPA resources caused by implementation of the 1990 Amendments and the fiscal constraint caused by Federal budget issues, such financial contributions are of substantial value in accelerating the timetable and permitting more thorough studies.

Coordination with the Visibility Transport Commission. This feature offsets one of the principal flaws in the EPA Staff draft proposal, the likelihood that a piecemeal approach of source-by-source regulation would not actually result in significantly improved visibility in the Grand Canyon.

While the haze is clearly regional, little is now known of the contributions made by its sources, or at what cost they could be controlled. Permitting the Governors to study the problem on a regional basis and devise a comprehensive solution offers the best opportunity for a cost effective approach to the problem. In particular, this approach will allow coordination of the regional haze program with other programs required by the 1990 Amendments, notably the urban nonattainment and air toxic programs. Under this approach, in the event that the clean coal demonstration program is unsuccessful, the year 2000 deadline to install other control technology would tie in directly with the emission reductions that the urban areas are achieving, and would correspond with any regional reductions arising out of the visibility studies conducted under the 1990 Amendments.

Administrator Reilly recently has written the Governors emphasizing their critical role in implementation of the 1990 Amendments. The Commission, as a forum for direct study and planning by the Governors of all affected States, thus is an ideal forum for consideration of the visibility problem from both a Federalism and an environmental perspective.

Clean Coal Technology Program. The centerpiece of the SRP proposal is the commitment to conduct a test of promising clean coal technologies as an alternative to scrubbers. This program offers the prospect of both immediate local emissions reductions and a long-term advance in the state-of-the-art of control

HUNTON & WILLIAMS

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Page 5

technologies for low sulfur coal plants that could produce environmental benefits throughout the west. This approach is consistent with the clean-coal technology incentives incorporated in the Senate passed version of the 1990 Amendments.

The Salt River Project has preliminarily explored the feasibility of a significant number of alternative technologies that might substantially reduce SO₂ emissions without requiring the enormous expense and loss of electricity capacity imposed by scrubbers. Based on that initial review, it believes that several approaches, including a sodium injection technology and a novel clay injection technique developed by TRIMEX warrant further testing.

SRP is willing to develop and implement a full-scale experimental project for promising technologies. Precise identification of technologies to be tested and test conditions would be devised in consultation with EPA staff.

SRP is further willing to commit that, if one of these technologies were demonstrated to reduce SO₂ emissions efficiently and cost effectively, SRP would install it and operate it in the winter time. As part of the design of the program, the NGS and EPA would agree upon the minimum removal efficiency, cost and other criteria that must be satisfied by the alternatives to be tested.

Control Technology Underwritten by the Allowance Market.
SRP would commit that, if none of the clean coal technologies satisfied the test criteria, it would then select and install pollution control equipment that would remove at least 70% of the uncontrolled SO₂ emissions measured on an annual basis. This technology would be operational on January 1, 2000, the date when the first allowances will be issued to the plant.

Deferring selection of a 70% control system until after completion of the test, that is until the mid-1990's, offers several advantages. First, it would allow the NGS to take advantage of any other developments in pollution control technology in the interim, as long as the ultimate performance standard was met. Second, coordinating the receipt of allowances with the installation of higher cost controls will allow the market to underwrite part of the capital and operating costs of controls. Accordingly, the net costs to the ratepayers of Arizona and the Federal budget will be significantly less than they would be if control costs had to be incurred at an earlier time.

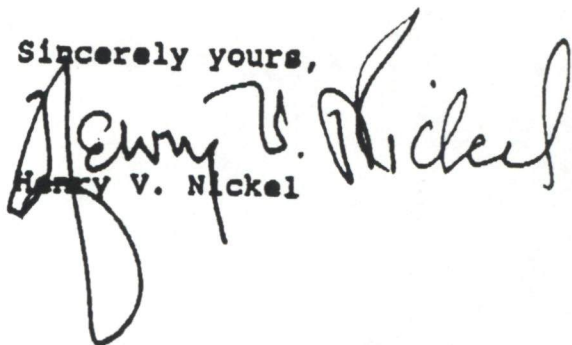
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CONCLUSION

We appreciate your consideration of this proposed alternative to the current staff position. SRP would be pleased to answer any questions you or your assistants may have about this proposal. In this regard, two SRP senior management representatives who are responsible for this proposal -- John McNamara and Richard Silverman -- will be in Washington this Thursday and Friday and would be available to meet with you personally if your schedule would permit. Please call John McNamara or Richard Silverman at SRP (602/236-5900) or me in Washington (202/944-1561) if you or your staff have any questions.

Sincerely yours,


Henry V. Nickel

cc: Mr. Michael Shapiro
Mr. John S. Seitz
Ms. Lydia Wegman
Mr. Gregory B. Foote

January 13, 1991

Assessment of Alternative Technologies at NGS

Attached are documents that describe the work performed to date by Salt River Project to analyze the two most promising clean coal technologies for an alternative technology test program at NGS.

1.) Sodium Injection Technology. NaTec Resources has completed a final proposal for test of a dry sorbent, sodium-based SO₂ control technology project at NGS. (Attachment A). SRP engineering personnel have concluded that the NaTec proposal is complete and could be implemented in its current form. Subject to further discussions on commercial considerations (i.e., price, start dates, support to be provided by the NGS) that could be completed within 30 days, work could begin immediately to begin implementing this proposal and testing the sodium injection technology.

2.) Trimex Clay Injection Technology. At SRP's request, Bechtel Power Corporation has completed an initial assessment of the feasibility of the Trimex clay injection process for an alternative technology test at NGS. (Attachment B). Bechtel has concluded that "the technology has not progressed to the point where it could be considered a fully developed commercial alternative to 'scrubbers'". However, Bechtel believes that "the potential simplicity of the process along with the very substantial savings in capital and operating cost justified further development by SRP." (See page 3 of attached letter).

Bechtel has outlined the component parts of a development and test program, to be developed over a two year period, at an estimated cost of \$3-5 million for the first two phases (that is, up to the start of the full-scale demonstration test). If approved, SRP and Bechtel could begin to work immediately with Trimex personnel to flesh out a full development program.

1. The distribution of flue gases and fly ash across the precipitators is proportional.
2. Injection of the sodium bicarbonate can be accomplished at or near the common plenum to provide 1-1.5 seconds of retention time prior to the collection plates.
3. The injection equipment can be located to accommodate pneumatic truck deliveries of sodium bicarbonate.
4. The ash handling system can accommodate the additional load of sodium sulfate collected by the precipitator.

C. NaTec Capabilities

NaTec Resources, Inc. is a public company whose common stock is traded on the over-the-counter market under the symbol "NATC" (see Appendix).

The current NaTec organization was originally formed through the merger and acquisition of three companies; CRSS Nahcolite, GUS Inc., and Industrial Resources Inc.

On October 30, 1989, the companies agreed to change the name to NaTec Resources Inc., install a new management team and elected a new Board of Directors.

The company possesses certain engineering and technical skills related to the processing, storage, and injection of both liquid and powdered chemicals for industrial and utility applications. The company holds federal leases for over 8,200 acres that contain more than 85 million tons of proven reserves of nahcolite, a naturally occurring sodium bicarbonate located in western Colorado.

Since its inception in 1988, NaTec's sole business objective has been to be the leader in dry sorbent, sodium-based SO₂ control technology. To achieve this goal, the company has committed in excess of \$15 million to the development of its nahcolite reserves in western Colorado. This mine will enable the company to offer long term contracts for sorbent supply at costs well below other commercial sources of sodium bicarbonate.

The company currently has in inventory three (3) full scale demonstration systems capable of full scale demonstrations on utility boilers ranging in size from 50 MW to 800 MW. In addition, the company has received

orders for two (2) commercial systems; one system is installed and operating in western Colorado and one is ready for shipment to a coal-fired power plant in central Alaska.

All engineering, erection and system service is performed internally. A list of key personnel who will be responsible for the conduct of the SRP demonstration can be found in the Appendix.

II. OBJECTIVES

The prime reason to conduct a demonstration of the dry sodium technology is to permit SRP to determine the applicability of this alternative as a possible resource to meet more stringent SO₂ removal criteria. To meet this prime requirement, the demonstration has been structured to produce the following objectives.

- Determine the maximum SO₂ removal threshold within the collection capabilities of the existing precipitators.
- Develop confidence level in threshold value by replication of results.
- Confirm previous experience that long term use of sodium bicarbonate for SO₂ removal has no adverse affect on precipitator performance at threshold level.
- Produce sufficient engineering criteria to develop the full scale design parameters.

The demonstration can accomplish the four objectives by targeting the objectives in two distinct phases.

III. PHASE I DEMONSTRATION

This phase was developed to determine both the threshold and confidence levels of the "objectives" within a two week period, using one precipitator cell.

During the two weeks, NaTec will conduct ten (10), eight hour tests with the boiler operating at full load.

Each test day will consist of eight hours of data acquisition and four hours of calibration and data resolution. Results of the previous day's operation will be reviewed with the SRP engineering representative prior to commencing the next day's operation. Test days are considered to be Monday through Friday, excluding legal holidays.

NaTec will supply all personnel necessary to operate the equipment and the mobile emission laboratory. SRP will supply the necessary personnel and equipment to conduct particulate testing at the outlet of the precipitator throughout the tests.

The following table represents the tests scheduled for Phase I.

TABLE I TEST SCHEDULE		
Day	Boiler Load	Test
1	Full	Baseline
2	Full	Baseline
3	Full	50% SO ₂
4	Full	60% SO ₂
5	Full	70% SO ₂
6	Full	80% SO ₂
7	Full	90% SO ₂
8	Full	Threshold repeat
9	Full	Threshold repeat
10	Full	Threshold repeat

Throughout the tests, NaTec's mobile emissions laboratory (re: Appendix) will monitor the following physical and chemical parameters continuously:

- CO₂
- O₂
- SO₂
- NO_x
- Temperature at injection location

It is suggested that the boiler be removed from automatic dispatch load control during the testing period to permit direct comparison of results.

Measurement of gas concentrations without sorbent injection (baseline) will be conducted at full load conditions. This will provide a substantial data base to characterize the SO₂ removal associated with any reaction/adsorption by the ash in the precipitator.

IV. PHASE II DEMONSTRATION

Upon successful completion of Phase I and with the agreement of SRP personnel on the threshold value of SO_2 removal, NaTec will initiate the Phase II demonstrations.

NaTec will again provide all necessary personnel to operate the equipment and mobile emission laboratory. SRP will provide all testing of the outlet emission loading from the precipitator.

Phase II is designed to demonstrate both the capabilities of the control system to automatically control either outlet SO_2 concentration or maintain a constant SO_2 removal rate during periods of load changes, without adverse effect on the precipitator performance.

Each of the tests in Phase II will be in fact a contiguous series of tests, resulting in a period of continuous operation for five (5) days. The tests will be conducted Monday through Friday without interruption, if possible. Table II represents the daily test program for Phase II.

TABLE II*			
Day	Duration	Boiler Load	Data Collected
1	24 Hours	Dispatched	SO_2 in, SO_2 out, outlet particulate
2	24 Hours	Dispatched	SO_2 in, SO_2 out, outlet particulate
3	24 Hours	Dispatched	SO_2 in, SO_2 out, outlet particulate
4	24 Hours	Dispatched	SO_2 in, SO_2 out, outlet particulate
5	24 Hours	Dispatched	SO_2 in, SO_2 out, outlet particulate
6	24 Hours	Dispatched	SO_2 in, SO_2 out, outlet particulate
7	24 Hours	Dispatched	SO_2 in, SO_2 out, outlet particulate
8	24 Hours	Dispatched	SO_2 in, SO_2 out, outlet particulate
9	24 Hours	Dispatched	SO_2 in, SO_2 out, outlet particulate
10	24 Hours	Dispatched	SO_2 in, SO_2 out, outlet particulate

* All tests in Phase II will be conducted at threshold SO_2 removal rate with feed controls on automatic.

Bechtel

Southern California
12440 East Imperial Highway
Norwalk, CA 90650-3134

January 7, 1990

Mr. Dan Hawkins, Manager
Schedule Support Services
Salt River Project
P. O. Box 52025
Phoenix, AZ 85072-2025

Subject: Bechtel Job 21255-001
Assessment of "In-boiler" Treatment Technology
for SO₂ Removal for Navajo Generating Station

Dear Mr. Hawkins:

In accordance with requests from SRP, we have completed an initial assessment of a potential alternate technology for emissions control at Navajo station. The results of this brief investigation are contained in this letter and accompanying attachments. The objective of our investigations was to review certain dry absorbent technologies with high SO₂ removal potential, and to develop the framework of a Research and Development program focusing on confirming the technical viability of these processes. This program will lead to the detailing of engineering, construction, and operations requirements and develop cost estimates to evaluate the possible commercial application of this process.

In performing our investigations, we met and discussed these emerging technologies with several industry representatives, including EPRI, and one manufacturer TRIMEX Corporation. A summary of the significant findings from these discussion is provided below.

Dr. Norman Chigier, Carnegie Mellon University

Dr. Chigier is currently involved in limited work with an emerging technology product, TRIMEX. This substance is a proprietary mixture of Tri-sodium Phosphate (TSP), and Bentonite clay. Through discussion with Dr. Chigier, results of limited field work using this compound have shown promise as a potential SO₂ removal technology. Dr. Chigier noted that recent testing with which he was directly involved indicated that SO₂ removal up to 95% may be practical. In addition to SO₂ removal, TRIMEX has potential for NO_x reduction as well. The amounts of product that have been reported to achieve these levels of reduction, are in the range of 1lb. TRIMEX for removal of 8-10lbs of sulphur in the flue gas.



Bechtel Power Corporation A unit of Bechtel Corporation

Dr. Chigier did indicate that there is much still to be understood about the chemistry of the process, and potential impacts on other operating equipment. Initial work should be performed in the laboratory, where test conditions can be highly controlled and monitored. Subsequent work could then proceed on a pilot plant basis using the results of this work.

Dr. Chigier expressed interest in supporting whatever research work might be required in this area.

TRIMEX Corporation

Mr. Macklin Milner, President of TRIMEX Corporation, is the primary inventor of the TRIMEX compound. Mr. Milner has been developing this product over the past 15-20 years, which was first developed for use in the pulp and paper industry. To date only sketchy and limited testing has been performed by Mr. Milner. Although the test program was not tightly documented, one test of note, supported and witnessed in part by Dr. Chigier and Dr. Stull of the National Science Foundation appear to show great potential for SO₂ reductions. Definitive testing needs to be performed to characterize the capabilities of the product.

Mr. Milner did indicate that more definitive testing is now underway in this regard that might help to better demonstrate the capabilities of TRIMEX. Some results of this full scale testing might be available as early as the end of January 1991.

Even given the results of this testing, a comprehensive testing program will be needed to understand what the significant variables are in this technology.

EPRI

EPRI is currently very active in SO₂ emission control, and they were also contacted to assess interest in potential "teaming" in a research type program. Mr. Rudy of EPRI was familiar with "in-boiler" technologies, and is in general open to discussions on teaming or other forms of collaboration. EPRI expressed some concern of these type technologies, as they were not well developed, packaged, or believable.

Mr. D. Hawkins
Salt River Project
Page -3-

Xytel-Bechtel Inc. (XBI)

XBI is a joint stock company incorporated in 1987 to develop, design and manufacture medium and large scale pilot plants for new and emerging technologies. Based on the very preliminary data available on the Trimex SO₂ removal process XBI feels confident that it can design and construct a skid mounted modularized pilot plant at the Navajo Station, to gather the engineering data necessary for full scale implementation of the process.

From the preliminary data it appears that the primary objective of the pilot plant will be to demonstrate an injection, dispersion, and collection method for the Trimex compound that will achieve required removal efficiencies. Once this method has been selected the pilot plant will then be utilized to confirm that the selected design is compatible with plant operation over time and will not impact plant adversely availability. Excerpts from a recent XBI qualifications package have been enclosed for your information.

In summary from our limited investigations, we believe that the technology has not progressed to the point where it could be considered a fully developed commercial alternative to "scrubbers". However, the potential simplicity of the process along with the very substantial savings in capital and operating cost, justifies further development by SRP. The component parts of such a development project have been considered in general and our first thoughts on these are included as Attachment 1, R&D Conceptual Program Plan. The program will be developed over a two year duration (see Attachment 2) and will cost approximately \$3-5 million dollars for Phases I and II (see Attachment 3). Depending on the financial arrangements made with certain of the partners, some of these costs could be defrayed. Program costs were developed considering evaluation of only one additive such as TRIMEX, and consideration of additional products will increase program costs.

We trust that you find this package insightful and of use in considering available alternatives to SRP, and look forward to being of service. Should you have any questions or comments on this topic, do not hesitate to contact either myself at (213) 807-2560, or Mr. Jeff Statton at (213) 807-2452.

Very truly yours,
BECHTEL POWER CORPORATION



S. H. Freid
Project Manager

SHF/jas
Enclosures
cc: J. Shapiro
K. Gardner (SRP)

SALT RIVER PROJECT

SO₂ REMOVAL PROJECT

RESEARCH AND DEVELOPMENT

CONCEPTUAL PROGRAM PLAN

The goals of the Research and Development program are;

1. Define dry sorbent processes that exhibit significant potential for reductions of SO₂ in flue gases from low sulphur coals such as is used at Navajo,
2. Perform laboratory investigations to understand the major chemical and physical parameters and processes involved in reducing SO₂ emissions with these sorbents and additives, by-product analysis.
3. Effects of Na and Phosphate on the boiler and boiler external components.
4. Perform basic engineering and limited pilot plant testing aimed towards confirming applicability of these processes to Navajo, select the preferred process, and define optimum location for sorbent addition to the flue gas stream.
5. Use testing results to identify full scale system design parameters and cost estimates.
6. Full scale demonstration of the selected process at the three units at the Navajo station.

To meet these goals, a three phase program has been envisioned. The first phase of the program is aimed towards defining the chemistry and science associated with the process. Most of this work is laboratory oriented and will result in establishing the performance parameters. The second phase of the program will establish the basic engineering requirements to meet the performance requirements and goals. It is envisioned that in this phase of the project, pilot plant testing will be performed at the Navajo plant. The third and last phase of the program performs the detailed engineering for construction of a full scale unit at the Navajo facility. The scope of each of these phases is discussed in more detail below, along with milestone schedules and order of magnitude cost estimates.

SO₂ REMOVAL PROJECT RESEARCH AND DEVELOPMENT- PROGRAM PLAN

Basic Program Scope

Prior to implementation, review of candidate products and chemical additives should be made. Trimex is one such product that has been identified as a candidate product to be reviewed in the program. In addition to this other "in-boiler" processes are in various stages of development. A sample listing of these includes those discussed in a recent "Power"

SALT RIVER PROJECT
SO₂ REMOVAL PROJECT
RESEARCH AND DEVELOPMENT
CONCEPTUAL PROGRAM PLAN
(continued)

article (see attached). Additional candidates will no doubt be considered in the industry review. The candidates will be limited to the single most promising. The selected candidate product will be the subject of the follow-on testing.

Phase I

In this phase of the investigation consideration should be given to pursuing certain aspects of the program with equipment suppliers such as Combustion Engineering and Joy-Niro. Their insights into ash characteristics and impacts of changes on component operation and life will be valuable additions to the program.

This phase of the program is aimed towards defining the chemistry and science associated with the process. Much of this work will be performed in a laboratory. Some of the key objectives of Phase I are listed below.

The laboratory work will consist of:

- o Determine the fundamental physical and chemical mechanisms of adsorption and chemical reaction between the proposed additives and SO₂ in post combustion flue gases. Determine optimum additive parameters (i.e. thermal conductivity, surface area, degree of hydration etc.).
- o Establish optimum conditions for maximum reductions of SO₂ concentrations as functions of gas temperature, gas concentrations, ash particle properties and concentrations, proposed additive flow rate and residence time.
- o Establish the impact of the proposed additive on the fly ash, and provide initial assessments of whether the proposed additive/fly ash combination has adverse potential on critical boiler components (e.g. waterwalls pendant sections, economizers, precipitators etc). Characterize the resulting compound.
- o Evaluate mechanisms for solid additives to furnace as a function of material properties.
- o Define any processing requirements for stabilization of resultant ash compound for disposal or subsequent use.
- o Document the findings of the laboratory work, providing recommendations for the Scope of the Phase II Pilot Plant testing program.

SALT RIVER PROJECT
SO₂ REMOVAL PROJECT
RESEARCH AND DEVELOPMENT
CONCEPTUAL PROGRAM PLAN
(continued)

Phase II

This phase of the program will establish the basic engineering requirements to meet the performance requirements and goals. The following are some of the significant goals of Phase II.

- o Conduct pilot plant test at Navajo, with duct dimensions larger than laboratory scale apparatus, to examine effects of "scale up" and "wall" effects on SO₂ reductions as a result of the proposed additive. Information from the laboratory scale and pilot plant scale test will be used to predict results and prepare the preliminary design of a full scale demonstration unit on the utility plant with cost estimates for full scale installation on all units.
- o Included in the pilot plant program are specific investigations of precipitator performance, to study the effects of ash plus additive (after reaction with SO₂ on precipitator performance. Included in this study are:
 - a) Effects of acid concentrations, H₂SO₄ and HNO₃, induced by the additive
 - b) Changes in resistivity of particles
 - c) Increases in particle size and concentration
 - d) Erosion/corrosion potentials
 - e) Effects on precipitator

Phase III

This phase of the program attends to the detailed implementation and full scale demonstration of the process at Navajo. This phase will include permitting design engineering and construction and verification of the implementation technology.

SALT RIVER PROJECT
SO, REMOVAL PROJECT
RESEARCH AND DEVELOPMENT
CONCEPTUAL PROGRAM PLAN

COST ESTIMATE

PHASE I

	<u>Cost (\$)</u>
Laboratory Costs -	\$ 700,000
Equipment Supplier participation	200,000

PHASE II

Engineering	400,000
Construction	1,500,000
Testing/Evaluation	700,000

Program Management - Contractor Costs	<u>400,000</u>
	\$ <u>3,900,000</u> ⁽¹⁾

Note ⁽¹⁾

Cost estimates are order-of-magnitude with an accuracy of +/- 25%, for the scope described in attachment 1. The anticipated costs will range from \$3 to \$5 million.

**SRP SO2 REMOVAL PROJECT
RESEARCH AND DEVELOPMENT PROGRAM
MILESTONE SCHEDULE**

1991 1992 1993

FINALIZE PROGRAM SCOPE

PHASE I

LABORATORY TESTING

PHASE II

PILOT PLANT TESTING

- ENGINEERING
- CONSTRUCTION
- TESTING/EVALUATION

PHASE III

- PERMITTING/APPROVALS
- ENGINEERING
- CONSTRUCTION

- - Schedule subject to the results of Phases I & II

RFP OUTLINE FOR FGD
DEVELOPMENT PROGRAMS AT NGS

Section Description

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 - Equipment List
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 - Work Plans for Engineering and Procurement
 - Preliminary Plant & Skid Layouts
 - Waste Treatment and Disposal Plans
 - Input for Environmental Permitting
 - Selection of Site Interface Points
 - Detailed Project Schedule

- o Engineering
 - Formal Calculations - Sizing and Performance
 - Material/Energy Balances
 - Operating Conditions
 - Subsystem Interface Specifications
 - Preparation of Equipment Specifications
 - Piping System Design
 - Materials Handling System Design
 - Civil/Structural Design
 - Electrical Design
 - Process Control
 - Data Acquisition
 - Miscellaneous Interfaces
 - Water
 - Steam (if required)
 - Flue Gas Takeoff
 - Flue Gas Return
 - Condensate Return (if required)
 - Chemical and Waste Storage and Handling
 - Miscellaneous
 - Fire Protection
 - Solid Waste Handling
 - Safety Shower and Eyewash
 - Siding and HVAC for Enclosure
 - Environmental Permits
 - Safety Engineering and Safety Procedures

Task 4 - Procurement, Assembly, Erection and Shakedown of Test Facility

- o Define Local Contractor for Site Work
- o Shakedown Test Program to Verify System Operability, Operating Procedures, Equipment Calibrations, Instrumentation, Data Acquisition and Reduction

Task 5 - Equipment Test Program and Data Reduction

- o Operating Conditions
- o Data to be Collected
- o Detailed Testing Procedures
- o Data Acquisition System Specification
- o Step-by-Step Plant Operation

- o Parametric Effects on System Performance
 - Gas Temperature
 - Plant Load
 - Injection Rate
 - Etc.

Task 6 - Long Term Duration Test

- o Six Month Continuous Program at Selected Operating Conditions
- o Mid-term Evaluation of Performance and Correction of Deficiencies, If Necessary
- o Performance Criteria
 - ESP and Boiler Impacts
 - SO2 Removal Efficiency
 - Sorbent Utilization
 - Reliability

Task 7 - Conceptual Design of Full-Scale Facility

- o Evaluate Proof-of-Concept Test Results
- o Conceptual Design for NGS
 - PFD
 - Revised Material and Energy Balances
 - Control Safety
 - Major Equipment List (sized and duties)
 - Other Supporting Documentation
- o Preliminary Cost Estimate for NGS Facility

D. Schedule

Milestone Schedule Plan

Working Schedule

Project Summary Schedule

E. Budget

Man-Hour Plan

Cost Plan (see attached examples)

F. Management

Project Organization - key personnel

Cost and Schedule Control

Reporting Requirements

- o Work Plan
- o Monthly Reports
- o Topical Reports
- o Final Reports

G. Appendix

COST SUMMARY

Fiscal Period:

COST ELEMENTS

1. Direct Material
 - A. Purchased Parts
 - B. Subcontracted Items
 - C. Other
 - 1) Raw MaterialsTotal Direct Materials
2. Material Overhead
3. Direct Labor
4. Labor Overhead
5. Special Testing
6. Special Equipment
7. Travel
8. Consultants
9. Other Direct Costs
10. Total Direct Cost & Overhead
11. General & Admin. Expense
12. Total Estimated Cost

Labor
Categories

Proposed
Hours

Hourly
Rate

Cost

January 13, 1991

Precedential Effect of BART Visibility Rule

I have attempted a quick analysis of the precedential impact of a BART decision to scrub the Navajo Generating Station. In the time available, I have had more success in identifying the power plants (especially in the west) that might be the next targets for retrofitting under a BART/visibility rationale if EPA succeeds in imposing scrubbers on NGS on this record. I have not had time to analyze the potential energy impacts of a BART decision nationwide, but I can quantify the effect on the NGS itself.

Potential National Park Service/EPA Implementation Strategy.

Western States. After the NGS, the most likely immediate targets in the west for scrubbing under the BART rationale are:

<u>Plant Name</u>	<u>Capacity</u>	<u>Distance to Class I Area</u>
Centralia 1-2 (Washington)	1,330 mw	Mt. Ranier (80 km) Olympic (100 km)
Mohave 1-2 (Nevada)	1,580 mw	Grand Canyon (100 km)
Pawnee 1 (Colorado)	550 mw	
Hayden 2 (Colorado)	444 mw	Flattops (60 km) Mt. Zirkel (60 km) Rocky Mountain (110 km)

I derive this list from two sources (attached):

(1) A list of western power plants with uncontrolled SO₂ emissions located within 150 km of a Class I area, which was introduced as an exhibit in Congressman Synar's March 9, 1990 oversight hearing on the visibility program. In the long-term, each of these plants likely is a potential candidate for scrubbing under the visibility rationale; and

(2) An analysis prepared for EPA by ICF, identifying the plants in the west which would have been required to scrub under the Wyden provision in the House bill. (Centralia was exempt under Wyden, because it emitted in excess of 1.2 lb. per million BTU).

Eastern States. On September 18, 1990, the National Park Service published a notice of preliminary determination that visibility in the Shenandoah National Park was impaired and recommending that Virginia not issue permits for future power plants unless steps were taken to ensure that new sources would not contribute to adverse visibility in the Park. 55 Fed. Reg. 38403. The NPS identified 15 recently proposed or permitted electric plants in Virginia, located within 200 km of the Park, which could contribute to future growth in haze.

In noting that the chronic visibility impairment at Shenandoah takes the form of a homogeneous haze, the NPS stated that its research (supervised by the same personnel who supervised the Grand Canyon research) indicated that "both local (e.g., within 200 km) and long-distant sources contribute to such visibility impairment at Shenandoah NP". Id. at 38407. Sources in Ohio, Kentucky, West Virginia, Indiana, Michigan and Illinois were identified as contributing to the haze under some conditions. Id.

This document suggests that the NPS is beginning to switch part of its visibility resources to the east, and that Shenandoah will be the initial focus of its work. The sources potentially subject to visibility control for their effects on Shenandoah include many of the midwestern power plants that are required under the Acid Rain provision to reduce their emissions to no more than 1.2 lbs over the next 15 years. As noted in my previous Memorandum on EPA's legal authorities, the Acid Rain provision complements, but does not supersede EPA's authority to compel reductions under other parts of the CAA -- including the NAAQS and visibility programs.

Thus, it is possible that, after these midwestern utilities have struggled to reduce their emissions down to the levels required by the Acid Rain provision, they might be required to add another level of controls due to subsequent EPA regulatory decisions under the visibility program (or a short-term average value of the SO₂ NAAQS). They surely will be exposed to this liability if the "rule" implicit in the draft NGS BART rule is adopted -- i.e., that plants may be ordered to control further if their emissions are present in the Park for 4-7% of the time during some discrete season of the year. If EPA were to implement this strategy by the mid-1990s, it clearly would disrupt the allowance trading program established by the CAA Amendments by reducing the demand (more plants would be required to use scrubbers, and could not rely on allowances) and

increasing the supply (more reductions than those required by the Acid Rain provisions) of allowances.

Paradoxically, as plants in the midwest reduce emissions to the level required by the Acid Rain provisions, they will become more susceptible to BART controls under the visibility program. This is because, as visibility improves in absolute terms, due to the reduction in overall SO₂ loadings, a small incremental amount of sulfate emissions has a much greater (and more detectable) effect on visibility than the same amount of emissions when overall visibility is poor. Thus, as the midwest and south generally clean up emissions, plants located upwind of Shenandoah will become more vulnerable to claims that detectable amounts of their emissions can be traced into the Park.

Economic and Energy Impacts

I have attempted to quantify the economic and energy impacts of a BART retrofit by taking the numbers included in EPA's Draft Regulatory Impact Analysis for the BART proposal, dated February 5, 1990. These figures were generated under the Integrated Air Pollution Control System computer model (IACPS).

--EPA calculated the capital cost of the NGS retrofit at between \$275-452 million (1988 dollars); the total levelized annual operations and maintenance costs at between \$56-68 million; and the total levelized capital and O & M at between \$103-145 million per year.

--EPA calculated that the annualized control costs for scrubbers at NGS could, on the low estimate of costs, increase the cost of power generation at NGS 24%, 24%, and 27% respectively for 70%, 80%, and 90% controls. EPA estimated that this would translate into direct consumer price increases of 3.1% for SRP customers and 4.4% for Nevada Power customers.

--EPA calculated the "Energy Penalty" (energy from the system required to power scrubbers and other effects) at 28.8 mw per year, and the replacement cost of this energy at \$3.7 million per year for each of the three units (a total of \$11.1 million).

**TABLE E-1
Required Scrubbing
House Bill**

State	Plant/Unit	Generating Capacity (Mw)	Phase I Affected	Phase II Affected
Ohio	Kyger Creek 1-5*	1031	X	X
Indiana	Clifty Creek 1-6*	1215	X	X
Illinois	Joppa Steam 1-6*	1002	X	X
Arizona	Navajo 1-3**	2250		X
Colorado	Hayden 2**	444		X
	Pawnee 1**	550		X
Nevada	Mohave 1-2**	1580		X
Utah	Huntington Canyon 2*	400		X
Texas	Harrington 1-3*	972		X
TOTAL		9444		

* "DOE units" required to scrub in Phase I.

** Western unscrubbed coal plants within 100 miles of Class I areas which emitted more than 7 thousand tons per year (in 1985) are assumed to be required to scrub by Phase II due to the Visibility Amendment in the bill.



WESTERN UNITED STATES POWER PLANTS (■)
WITH HIGH SULFUR DIOXIDE EMISSIONS
WITHIN 150 KILOMETERS OF CLASS I AREAS (▲)



Table 1: Data on Uncontrolled Power Plants West of the 100th Meridian

<u>Plant Name & Location</u>	<u>Nameplate⁽¹⁾ Rating MW</u>	<u>SO₂ Emis. Tons/Year</u>	<u>Percent Control</u>	<u>Capacity mm Btu/hr</u>	<u>Primary Energy Source</u>	<u>Distance to Class I Area(s)</u>	
Navajo (Page, AZ)							
#1	803	21.793	0	6999	.49% S Coal (bituminous)	Grand Canyon (15 km)	
#2	803	20.844	0	6999			
#3	803	22.957	0	6999			
		65.594					
Cholla (Joseph City, AZ)							
#1	114	2.232	51.4	1100	.46% S Coal (bituminous)	Petrified Forest (40 km)	
#2	289	5.925	0	2706			
#3	289	4.546	51.4	2527			
#4	414	11.842	51.4	3514			
		24.545					
Coronado (St. Johns, AZ)							
#1	411	5.704	70	4000	#3-.60% S Coal (bituminous)	Petrified Forest (50 km)	
#2	411	4.643	70	4000			
#3	(350)	14.000	64	3500			
		24.347					
Hayden (Hayden, CO)							
#1	190	5.167	0	1693	.47% S Coal (bituminous)	Flattops (60 km) Mt. Zirkel (60 km) Rocky Mtn. (110 km)	
#2	275	7.583	0	2596			
		12.750					
Comanche (Pueblo, CO)							
#1	383	4.935	0	3500	.30% S Coal (bituminous)	Great Sand Dunes (100 km)	
#2	396	6.226	0	3500			
		11.161					

<u>Plant Name & Location</u>	<u>Nameplate⁽¹⁾ Rating MW</u>	<u>SO₂ Emiss. Tons/Year</u>	<u>Percent Control</u>	<u>Capacity mm Btu/hr</u>	<u>Primary Energy Source</u>	<u>Distance to Class I Area(s)</u>
Cherokee (Denver, CO)						
#1	125	1.853	0	1140		
#2	125	2.055	0	1140		
#3	171	3.313	0	1460		
#4	381	6.839	0	3400	.45% S Coal (bituminous)	Rocky Mtn. (60 km)
		<u>14.060</u>				
Mohave (Clark County, NV)						
#1	818	8.675	0	7900	.55% S Coal	Grand Canyon
#2	818	8.079	0	7900	(bituminous)	(100 km)
		<u>16.754</u>				
San Juan (Waterflow, NM)						
#1	347	8.535	60	3492		
#2	329	5.617	60	3492		
#3	517	10.378	60	5292		
#4	517	11.398	59.8	5295	.81% S Coal (bituminous)	Mesa Verde (40 km)
		<u>35.928</u>				
Leland Olds (Stanton, ND)						
#1	216	6.100	0	2310	.86% S Coal	Theodore
#2	440	28.286	0	4556	(lignite)	Roosevelt
		<u>34.386</u>				S. Unit (150 km)
Coal Creek (Underwood, ND)						
#1	550	20.245	56	5280	.74% S Coal	Lostwood
#2	550	18.048	56	5280	(lignite)	(150 km)
		<u>38.293</u>				
UPA Stanton (Stanton, ND)						
#1	172	12.225	0	1800	.75% S Coal	Theodore
#2	()	1.553	70	642	(lignite)	Roosevelt
		<u>13.778</u>				S. Unit (150 km)

<u>Plant Name & Location</u>	<u>Nameplate⁽¹⁾ Rating MW</u>	<u>SO₂ Emiss. Tons/Year</u>	<u>Percent Control</u>	<u>Capacity mm Btu/hr</u>	<u>Primary Energy Source</u>	<u>Distance to Class I Area(s)</u>
Minnkota (Center, ND)						
#1	257	18.894	0	2500	.75% S Coal (lignite)	Theodore Roosevelt S. Unit (150 km)
Square Butte (Center, ND)						
#1	416	18.577	33.3	4696	.75% S Coal (lignite)	Theodore Roosevelt S. Unit (150 km)
ANG Coal Gasification (Mercer County, ND)						
#1	47	5.917	0	472	.24% S Process Gas	
#2	47	5.917	0	472	.24% S Process Gas	
#3	47	5.917	0	472	.24% S Process Gas	
#4	13	230	0	136	.43% S Liquid Waste	
#5	13	230	0	136	.43% S Liquid Waste	
#6	28	578	0	287	.50% S Process Gas	
#7	166	690	0	1667	Natural Gas	Theodore Roosevelt
#8	93	9,502	0	932	.40% Process Gas	S. Unit (150 km)
		28.981				
Huntington (Huntington, UT)						
#1	446	2,532	80	4220	.44% S Coal	Capitol Reef
#2	446	9,748	0	4220	(bituminous)	(100 km)
		12,280				Arches (120 km)

<u>Plant Name & Location</u>	<u>Nameplate Rating MW</u> ⁽¹⁾	<u>SO₂ Emis. Tons/Year</u>	<u>Percent Control</u>	<u>Capacity mm Btu/hr</u>	<u>Primary Energy Source</u>	<u>Distance to Class I Area(s)</u>
Centralia (Centralia, WA)						
#1	665	58,900	0	6764	.91% S Coal (bituminous)	Mt. Rainier (80 km) Olympic (100 km)
#2	665	58,900	0	6764		
		117,800				
Bridger (Rock Springs, WY)						
#1	508	21,253	0	5020	.55% S Coal (bituminous)	Bridger (90 km)
#2	508	20,458	0	5020		
#3	508	19,325	0	5020		
#4	508	3,585	80	5020		
		64,621				
Naughton (Kemmerer, WY)						
#1	163	6,671	0	1625	.71% S Coal (bituminous)	Bridger (130 km)
#2	218	9,957	0	2147		
#3	330	2,376	80	3420		
		19,004				

(1) Unit nameplate ratings were obtained from the U.S. Department of Energy annual report entitled, "Inventory of Power Plants in the United States". The rest of the information contained in this report was obtained from PEI Associates, Inc. report entitled, "Technical Feasibility and Cost of Obtaining Further Reductions in SO₂ and NO_x Emissions From Existing and New Sources." February 1988, prepared for the Western Governors Association.

The procedure used for determining disability for widows is contained in 20 CFR 404.1577 and 404.1578. These regulatory sections indicate that only the claimant's physical and mental impairment(s) are considered. Section 404.1578 states:

(a) We will find that you are disabled and pay you widow's or widower's benefits as a widow, widower, or surviving divorced spouse if—

(1) Your impairment(s) has specific clinical findings that are the same as those for any impairment in the Listing of Impairments in appendix 1 or are medically equivalent to those for any impairment shown there;

(2) Your impairment(s) meets the duration requirement.

(b) However, even if you meet the requirements in paragraphs (a) (1) and (2) of this section, we will not find you disabled if you are doing substantial gainful activity.

As noted above, the Court of Appeals for the Ninth Circuit held in *Ruff* that, in adjudicating a claim for widow's benefits based on disability, the Secretary must consider the claimant's residual functional capacity in determining whether she is capable of performing any gainful activity.

Explanation of How SSA Will Apply This Decision Within the Circuit

This Ruling applies only to cases involving claimants seeking widows' or widowers' benefits based on disability who reside in Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, Northern Mariana Islands, Oregon, or Washington at the time of the determination or decision at any administrative level, i.e., initial, reconsideration, Administrative Law Judge hearing or Appeals Council.

As required by the court in *Ruff*, in cases where an adjudicator determines that a widow's impairment(s) does not meet the requirements of, or is not equal in medical severity to, an impairment found in the listing of impairments, appendix 1, subpart P, Social Security Administration Regulations part 404, the adjudicator will determine whether the claimant's residual functional capacity prevents her from engaging in any gainful activity.

Although the court required the Secretary to assess a widow's residual functional capacity, it did not specify the procedure by which a benefit entitlement determination could be made. The court found objectionable SSA's sole reliance on the medical aspects of the listings, without regard to resulting functional limitations, as the comparison point for determining equivalency, because the listings do not comprise the entire universe of medical conditions but only establish the level of

severity deemed sufficient to preclude a claimant from engaging in any gainful activity.

The court of appeals in *Ruff* recognized that the Secretary is authorized under the Social Security Act to promulgate listings which establish the level of severity deemed sufficient to preclude any gainful activity. Thus, the listings are the standard against which determinations of inability to perform gainful work are made. For purposes of following the *Ruff* decision, any widow with an impairment(s) that causes disabling functional consequences comparable to those caused by a listed impairment will be found disabled.

The widow's impairment(s) first is to be compared to the regulatory standard. In contrast to the procedures that were at issue in *Ruff*, if the widow's impairment(s) is not of comparable medical severity to a listed impairment, the adjudicator must go beyond the medical evaluation and must compare the functional consequences of the widow's impairment(s)—not the medical findings associated with the impairment(s)—with the disabling functional consequences of the impairments in the listings. The adjudicator shall consider all relevant evidence, including the functional effects of the widow's physical and mental symptoms and any side effect of medication on her functioning. If function is affected in a manner set forth in, or comparable to, any listed impairment, even if the listed impairment is not medically related to any of the impairment(s) the widow has, she shall be deemed unable to do any gainful activity. For example, if a widow has a combination of physical impairments which would result in the same disabling functional limitations as are specified in the mental listing as being sufficient to preclude any gainful activity, such physical impairments will be considered disabling even if no mental impairment is present.

Finally, although we believe that the approach outlined above is sufficient to encompass all functional limitations that preclude any gainful activity, in order to fully comply with *Ruff*, under this ruling, any widow who can demonstrate that she has a disabling functional limitation not covered by the listings may still show that her residual functional capacity precludes any gainful activity without use of the listings. A widow making such a showing shall be deemed to have an impairment(s) of disabling severity.

SSA intends to clarify the regulations at issue in this case through the rulemaking process. SSA will continue to apply this Ruling until such

clarification is made. At that time, pursuant to 20 CFR 404.985(e)(4), SSA may rescind this Ruling.

[FR Doc. 90-23082 Filed 9-17-90; 8:45 am]

BILLING CODE 4790-11-87

DEPARTMENT OF THE INTERIOR

Office of the Secretary

Preliminary Notice of Adverse Impact on Shenandoah National Park

AGENCY: Office of the Secretary, Interior.

ACTION: Notice of preliminary determination under section 165(d)(2)(C)(ii) of the Clean Air Act.

SUMMARY: This notice announces the preliminary determination by the Assistant Secretary for Fish and Wildlife and Parks, Department of the Interior, as the Federal Land Manager of Shenandoah National Park (NP) that, in accordance with the Prevention of Significant Deterioration (PSD) air quality requirements of the Clean Air Act, the air pollution emissions from a proposed major emitting facility (Multitrade Limited) in the vicinity of the park will contribute to the exacerbate adverse impacts on the air quality related values of this PSD class I area. This notice also announces the Federal Land Manager's intent to examine the individual and cumulative impacts on park resources of the other proposed electric generating facilities in the vicinity of Shenandoah NP. At this time, the Federal Land Manager is recommending that the Virginia Department of Air Pollution Control not issue a permit to Multitrade Limited unless measures are taken to ensure that this proposed source would not contribute to adverse impacts on park resources. In addition, the Federal Land Manager is considering making this same recommendation with regard to the other pending sources. By this notice, the Department of the Interior invites public discussion of these decisions during a 30-day comment period, after which time the Federal Land Manager will make a final determination on the basis of the best available information. The intent of this notice is to solicit comments on the preliminary determination and to alert interested parties to the availability of supporting documentation.

DATE: Comments must be received on or before October 18, 1990.

ADDRESSES:**Comments**

Comments should be submitted (in duplicate, if possible) to: Chief, Policy, Planning, and Permit Review Branch, National Park Service-Air, P.O. Box 25287, Denver, Colorado 80225.

Supporting Documentation

Copies of the technical support document entitled, "Technical Support Document Regarding Adverse Impact Determination for Shenandoah National Park", including references, are available for public inspection and copying between the hours of 8 a.m. and 4 p.m., Monday through Friday, at the following locations: National Park Service, Main Interior Building, room 3229, 18th and C Streets, NW., Washington, DC; Air Quality Division, 12795 West Alameda Parkway, Lakewood, Colorado, Room 215; and Shenandoah National Park Headquarters, Luray, Virginia. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Christine L. Shaver, Policy, Planning, and Permit Review Branch, National Park Service-Air, P.O. Box 25287, Denver, Colorado 80225, telephone number (303) 969-2071.

SUPPLEMENTARY INFORMATION:**Background***Purposes and Values of Shenandoah National Park*

Shenandoah NP, established in 1926, consists of 195,382 acres that lie along the crest of the Blue Ridge Mountains in northern Virginia. As a unit of the National Park System, Shenandoah NP is managed consistent with the general mandates of the Organic Act of 1916 which states that the National Park Service (NPS) shall:

Promote and regulate the use of . . . national parks . . . by such means and measures as conform to the fundamental purpose of the said parks, . . . which purpose is to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. 16 U.S.C. 1.

The 1978 amendments to the Organic Act further clarify the importance Congress placed on protection of park resources, as follows:

The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may

have been or shall be directly and specifically provided by the Congress. 16 U.S.C. 1a-1.

In addition to the mandates of the Organic Act, the protection of Shenandoah NP is guided by the Wilderness Act of 1964 with respect to over 80,000 acres of the park designated as wilderness, the largest concentration of such land in the eastern United States. The Wilderness Act defines wilderness as:

An area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain . . . an area of undeveloped Federal Land retaining its primeval character and influence . . . which is protected and managed so as to preserve its natural conditions. 16 U.S.C. 1131(c).

The Wilderness Act also states that wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.

In addition to the general mandates of the NPS Organic Act and Wilderness Act, the legislative history specific to Shenandoah NP indicates that Congress intended the park to be a natural place, existing as an example of the Southern Appalachian portion of primitive America. It also intended for the park's natural, scenic, and historic resources to be used and enjoyed, without degradation, by great numbers of visitors each year. In underscoring this latter point, Congress appropriated funds in 1931 to begin construction of Shenandoah NP's most famous visitor facility, the Skyline Drive, which provides spectacular views of the Shenandoah Valley and the Piedmont.

In furtherance of the foregoing park purposes, resource management objectives for Shenandoah NP include the following: (1) Vistas from the Skyline Drive, developed areas, and trails will provide clear views of natural and cultural environments; and (2) native, rare, endangered, and relict species, habitats, and communities will be protected and perpetuated.

Clean Air Act Requirements

In 1970, Congress passed the Clean Air Act (the Act), establishing national policy toward protecting and enhancing air quality. In 1977, Congress enacted the Clean Air Act Amendments that designate all national parks, established as of August 7, 1977, that exceeded 6,000 acres in size, as mandatory class I areas to receive the greatest degree of air quality protection. There are 48 national parks, including Shenandoah, designated as class I. The Clean Air Act Amendments also contain a section that specifically requires visibility protection

for mandatory Federal class I areas. Section 169A sets, as a national goal, the prevention of any future, and remedying of any existing, manmade visibility impairment in mandatory class I areas. The Act requires that reasonable progress be made toward this national goal.

Under the Prevention of Significant Deterioration (PSD) program of the Act, major sources of air pollution that propose to build new or significantly modify existing facilities in relatively unpolluted areas of the country ("clean air regions"), are subject to certain requirements generally designed to minimize air quality deterioration. Where emissions from new or modified facilities might affect class I areas, like Shenandoah NP, set aside by Congress for their pristine air quality or other natural, scenic, recreational, or historic values potentially vulnerable to air pollution, the Act imposes special requirements to ensure that the pollution will not adversely affect such values. In addition, the Act gives the Federal Land Manager and the Federal official charged with direct responsibility for management of class I areas an affirmative responsibility to protect air quality related values, and to consider in consultation with the permitting authority whether a proposed major emitting facility will have an adverse impact on such values.

The Clean Air Act establishes several tests for judging a proposed facility's impact on the clean air regions in general, and on the class I areas in particular. One such test is the "class I increment" test. The class I increments represent the extremely small amount of additional pollution that Congress thought, as a general rule, should be allowed in class I areas.

Congress realized, however, that in certain instances sensitive air quality related resources could be adversely affected at air pollution levels below the class I increments. Therefore, the Act establishes the "adverse impact" test, which requires a determination of whether proposed emissions will have an "adverse impact" on the air quality related values, including visibility, of the class I area. If the Federal Land Manager demonstrates to the satisfaction of the permitting authority that proposed emissions will adversely affect the air quality related values of the class I area, even though they will not cause or contribute to concentrations which exceed the class I increments, then the permitting authority may not authorize the proposed project. Thus, the adverse impact test is critical for proposed

facilities with the potential to affect a class I area.

Adverse Impact Considerations

The legislative history of the Clean Air Act provides direction to the Federal Land Manager on how to comply with the affirmative responsibility to protect air quality related values in class I areas:

The Federal land manager holds a powerful tool. He is required to protect Federal lands from deterioration of an established value, even when class I numbers are not exceeded. . . . While the general scope of the Federal Government's activities in preventing significant deterioration has been carefully limited, the Federal land manager should assume an aggressive role in protecting the air quality values of land areas under this jurisdiction. . . . In cases of doubt the land manager should err on the side of protecting the air quality-related values for future generations. Sen. Report No. 95-127, 95th Cong., 1st Sess. (1977).

The Assistant Secretary for Fish and Wildlife and Parks, as Federal Land Manager for class I areas managed by the National Park Service and U.S. Fish and Wildlife Service, has stated that air pollution effects on resources in class I areas constitute an unacceptable adverse impact if such effects:

1. Diminish the national significance of the resource; and/or
2. Impair the quality of the visitor experience; and/or
3. Impair the structure and functioning of ecosystems. (See, e.g., 47 FR 30223, July 12, 1982).

Factors that are considered in the determination of whether an effect is unacceptable, and therefore adverse, include the projected frequency, magnitude, duration, location, and reversibility of the impact. In addition, the Federal visibility protection regulations, 40 CFR 51.300, *et seq.*, 52.27, define "adverse impact on visibility" as:

. . . visibility impairment which interferes with the management, protection, preservation or enjoyment of the visitor's visual experience of the Federal class I area. This determination must be made on a case-by-case basis taking into account the geographic extent, intensity, duration, frequency and time of visibility impairment, and how these factors correlate with: (1) Times of visitor use of the Federal class I area, and (2) the frequency and timing of natural conditions that reduce visibility. Id. 51.301(a).

Summary of Proposed Action

The action which is the subject of this notice concerns the Federal Land Manager's preliminary determination that the increase in emissions resulting from Multitrade Limited and other proposed PSD facilities in the Commonwealth of Virginia will, together with current and permitted emissions, have an unacceptable, adverse impact on visibility and other air quality related values in Shenandoah NP. Therefore, the Federal Land Manager would recommend that the Virginia Department of Air Pollution Control not issue a permit for this proposed facility unless measures are taken to ensure that the proposed source would not contribute to adverse impacts on park resources.

Prevention of Significant Deterioration New Source Applications

Fifteen permit applications for the construction and operation of electric generating facilities in the Commonwealth of Virginia have been submitted recently, and more are expected. The Virginia Department of Air Pollution Control has granted construction permits for four of these facilities, while the other projects are at various stages in the permit review process. These proposed and permitted emitters of sulfur dioxide (SO₂), nitrogen oxides (NO_x), and volatile organic

compounds (VOC). These projects, their estimated emissions, and their current status are listed in Table 1.

Because many of the listed projects are still under review, the actual emissions allowed in the final permit for any one facility may be lower than those in the permit application. However, since additional facilities will be seeking permits in the near future, the figures used here for total amounts of the various types of air pollutants are conservative and reasonable for the purposes of this analysis.

The Commonwealth's comment period on one of the listed facilities, Multitrade Limited, has just ended. The Department of the Interior has notified the Commonwealth of its preliminary determination that emissions from Multitrade Limited will contribute to the adverse impacts on resources at Shenandoah NP. The comment periods on certain additional sources will end soon.

Table 1 shows that emissions in the vicinity of Shenandoah NP would increase significantly if the pending permit applications are approved by the Commonwealth of Virginia. Moreover, the Environmental Protection Agency (EPA) projects future growth in sulfur dioxide and nitrogen oxides in the Commonwealth of Virginia regardless of whether acid deposition legislation is enacted by Congress. (ICF, 1990).

Potential Impacts of Proposed New Air Pollution Sources

In order to assess the potential impacts of these proposed emissions, the Federal Land Manager first performed a comprehensive assessment of the current air quality conditions at Shenandoah NP. As summarized below and discussed in detail in the Technical Support Document, this assessment shows that the air quality related values at Shenandoah NP are currently being adversely affected by air pollution.

TABLE 1.—RECENTLY PROPOSED/PERMITTED ELECTRIC GENERATING STATIONS IN VIRGINIA

Source name	Distance/direction from Shenandoah NP (mi)	SO ₂ emissions (TPY)*	NO _x emissions (TPY)*	VOC emissions (TPY)*	Project status
Hudson Power (Altavista)	103 S	599	961	97	Permitted.
Hudson Power (Hopewell)	156 SE	519	956	97	Under review.
Hudson Power (Southampton)	200 SE	799	1,602	97	Permitted.
Hudson Power (Buena Vista)	82 SW	358	957	97	Under review.
Virginia Turbo Power (Orange County)	35 E	841	1,130	27	Under review.
Dorwell Limited	110 SE	2,600	2,389	231	Permitted.
Old Dominion Electric	115 SE	4,479	10,764	360	Under review.
Mecklenburg Cogen	135 SE	1,980	4,580	50	Permitted.
Multitrade Limited	110 SW	937	866	344	Under review.
Cogenix Inc. (Dinwiddie)	150 SE	2,102	3,942	39	Under review.
VA Power (Gravel Neck)	190 SE	1,200	1,204	20	Under review.
Cogenix Inc. (Richmond)	110 SE	1,708	3,942	39	Under review.
Island	130 SE	675	155	0	Under review.
de Hundred Energy	150 SE	387	612	110	Under review.
Commonwealth Cogen	120 SW	985	2,280	25	Under review.

TABLE 1.—RECENTLY PROPOSED/PERMITTED ELECTRIC GENERATING STATIONS IN VIRGINIA—Continued

Source name	Distance/direction from Shenandoah NP(km)	SO ₂ emissions (TPY)*	NO _x emissions (TPY)*	VOC emissions (TPY)*	Project status
Total		20,088	38,304	1,633	

*Tons per year.

Visibility Is Currently Seriously Degraded at Shenandoah NP

Through a 1979 Federal Register process, the Department of the Interior found, and the Environmental Protection Agency (EPA) agreed, that visibility is an important value in Shenandoah NP. See 44 FR 69122 (November 30, 1979). In a November 14, 1985, letter, the Department of the Interior informed the EPA that, with respect to uniform haze, the NPS visibility monitoring program has shown that scenic views at Shenandoah NP (and other class I areas) are impaired by anthropogenic pollution more than 90 percent of the time.

The Department of the Interior's finding of significant existing visibility impairment at Shenandoah NP is substantially supported by studies of historic and current visibility conditions. Under natural conditions, without the influence of air pollution, the State-of-Science/Technology report published by the National Acid Precipitation and Assessment Program (NAPAP),

Visibility: Existing and Historical Conditions—Causes and Effects, states that visual range in the eastern United States is estimated to be 150 km (+/- 45 km). (Trijonis, *et al.*, 1990). Visibility is strongly affected by light scattering and absorption by fine particulate matter (< 2.5 microns in diameter). The NAPAP report estimates that under natural conditions, fine particulate matter concentrations in the eastern U.S. would be about 3.3 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). As explained further below, among the constituents of the fine particulate matter, fine sulfate particles (which result from the atmospheric conversion of gaseous sulfur dioxide emissions) are currently responsible for most of the visibility impairment throughout the East. Natural levels of sulfate have been estimated to be about $0.2 \mu\text{g}/\text{m}^3$.

Studies examining historic visibility trends in the East show that annual average visibility in the southeastern United States declined 80 percent between 1948 and 1983, with an 80 percent decrease in summer months and a 40 percent decrease in winter months. Visual range in rural areas of the East currently averages 20–35 km, substantially lower than the estimated

150 km natural condition. Many of the constituents of the haze that degrades visibility are not emitted directly but are formed by chemical reactions in the atmosphere. Gaseous "precursor" emissions from a source are converted through very complex reactions into "secondary" aerosols. Sulfur oxides convert into sulfuric acid and ammonium sulfate, nitrogen oxides convert to nitric acid and ammonium nitrate, and hydrocarbons become organic aerosols (Malm *et al.*, 1989). Haze over the eastern U.S. since the late 1940's has been dominated by sulfur. Declining visibility is well correlated with increasing emissions of sulfur dioxide. (Husar, 1989).

The National Park Service of the Department of the Interior has been monitoring visibility at Shenandoah NP since 1980. The analysis of fine particle data collected at Shenandoah NP in 1988 and 1989 indicate that monthly average fine particle concentrations have ranged from $19.5\text{--}28.9 \mu\text{g}/\text{m}^3$ during the summer (*i.e.*, June–September), or six to nine times higher than the estimated annual average natural background concentration. The summer average of fine particle mass concentrations measured at Shenandoah NP during the period June 1982 to May 1986 was $16 \mu\text{g}/\text{m}^3$, whereas the average for the entire sampling period was $10 \mu\text{g}/\text{m}^3$. Thus, from 1982 to 1986 summer and annual average fine particle mass concentrations were 5 and 3 times, respectively, the estimated natural background.

Recent analyses of data collected at Shenandoah NP have shown that sulfates are responsible for 70–85 percent of the visibility impairment (Malm, *et al.* 1987; Trijonis, *et al.*, 1990). The summer average sulfate concentration between 1982 and 1984 ranged from $8.5\text{--}10.2 \mu\text{g}/\text{m}^3$, a forty to fifty-fold increase from natural background. Similarly, the annual average sulfate concentration of $5.8 \mu\text{g}/\text{m}^3$ during the 1982–1986 time period has constitutes an almost thirty-fold increase from natural background. The most recent data available show a summer 1989 average sulfate of $11.2 \mu\text{g}/\text{m}^3$ and a 12-month average (Dec. 1988–Nov 1989) of $6.4 \mu\text{g}/\text{m}^3$.

On the average, organics are responsible for most of the remaining visibility impairment. (Malm, *et al.*, 1987). Nitrate aerosols (resulting from atmospheric conversion of nitrogen oxide emissions) are generally responsible for only one percent of the visibility impairment and average less than $2 \mu\text{g}/\text{m}^3$. However, at times, nitrates comprise 10–20 percent of the fine mass and could significantly affect visibility during some episodes. Based on the above information, one can reasonably conclude that the existing poor visibility conditions at Shenandoah NP are likely a result of the dramatic increases in sulfate concentrations, primarily the result of increases in man-made sulfur oxide emissions in the region.

From the data collected at Shenandoah NP using both teleradiometer (1980–1987) and transmissometer (1989–Present), one can describe the effect of the increased fine particulate and sulfate concentration on visibility at Shenandoah NP. Median visual range at Shenandoah NP ranges from 10–113 km, with an annual geometric mean (1987) of 65 km. In other words, the "average" visibility day at Shenandoah NP has experienced a degradation through time to one-tenth to three-fourths of estimated natural conditions, averaging approximately 40% of natural conditions on an annual basis. This degradation is likely attributable to increases in man-made sulfur oxide emissions. Visibility conditions at the park show a strong seasonal pattern, with the worst visibility occurring during the summer when visitation at Shenandoah NP is highest. During summer months the average visibility ranges from 10–36 km, or less than one-quarter the estimated natural visual range.

The chronic visibility impairment at Shenandoah NP typically manifests itself as a uniform haze. Such impairment is a homogeneous haze that reduces visibility in every direction from an observer. It appears as though the observer were peering through a grey or white transparent curtain placed in front of the scene. Colors appear washed out and less vivid, and geologic features

become less discernible or may disappear.

Estimated Impact of New Air Pollution Sources on Visibility

As noted in the Introduction, the Federal visibility protection regulations, 40 CFR 51.301(a), 52.27(b), define "adverse impact on visibility" as visibility impairment which interferes with the management, protection, preservation or enjoyment of the visitor's visual experience of the Federal class I area. This determination must be made on a case-by-case basis taking into account the geographic extent, intensity, duration, frequency and time of visibility impairment, and how these factors correlate with: (1) Times of visitor use of the Federal class I area, and (2) the frequency and timing of natural conditions that reduce visibility. Based on this general definition and the data summarized above, manmade pollution clearly causes adverse impacts on visibility at Shenandoah NP. Although the extent of the problem varies in magnitude, visibility at Shenandoah NP is substantially impaired most of the time.

In a recent study conducted by the National Park Service and the EPA, over 1,800 citizens across the country responded to a questionnaire in which they were asked to rate the importance of visibility in national parks. Between 70 and 80 percent of the respondents stated that they were concerned about decreasing visibility; and 70 percent said that they were willing to pay a significant amount to prevent further degradation. Based on visitor surveys, poor visibility is the single most frequent complaint made by visitors to Shenandoah NP.

Given the specific distances of the proposed air pollution sources from Shenandoah NP, it is unlikely that the proposed emissions would be visible in the park as distinct, coherent plumes. These sources are likely, however, to contribute to uniform haze, the more pervasive visibility problem in Shenandoah NP. In fact, NPS research has shown that both local (*e.g.*, within 200 km) and long-distant sources contribute to such visibility impairment at Shenandoah NP (Gebhart and Malm, 1989). In addition to Virginia, source areas in the states of Ohio, Kentucky, West Virginia, Indiana, Michigan, and Illinois were estimated to contribute to the park's haze under some conditions.

Given the existing impacts on the visibility at Shenandoah NP, any significant increase in emissions which contributes to visibility impairment at Shenandoah NP would adversely affect this class I resource. In addition, the

cumulative impact of the emissions from the fifteen sources listed in Table 1 will cause a further perceptible degradation in visibility from existing conditions. More specifically, based on research on human perception of visual air quality, the NPS believes that a five percent change in extinction (or standard visual range) constitutes a lower-bound threshold which should be noticeable by a sensitive observer. A fifteen percent change in extinction represents an upper-bound threshold, *i.e.*, the change would be noticeable to a casual observer. (Pitchford, *et al.*, 1990; EPA, 1979; Trijonis, *et al.*, 1990).

As indicated above, sulfur dioxide and nitrogen oxide emissions in the vicinity of Shenandoah NP will increase significantly if the proposed new sources listed in Table 1 are constructed and operated. On a Statewide basis, the SO₂ and NO_x emission levels would increase by 7 and 22%, respectively, and the percentage increase in emissions in the vicinity of Shenandoah NP would be even greater. Based on emissions totals provided by the Virginia Department of Air Pollution Control, the proposed increases would represent a 37% and 113% increase in SO₂ and NO_x emissions, respectively, for all point sources located within approximately 100 km of the park boundary. The Federal Land Manager believes it is reasonable to assume that the relationship between sulfur dioxide emissions and sulfate levels is linear (*i.e.*, 1:1). In fact, models used by EPA in past visibility studies have assumed such linearity (*see, e.g.*, EPA (1985)). Even if the relationship were not entirely linear, the percentage increase in areawide sulfur dioxide and nitrogen oxide emissions can reasonably be assumed to perceptibly further degrade visibility at Shenandoah NP and would severely hinder any future efforts in making reasonable progress towards the elimination of this existing impairment.

In sum with respect to visibility, the Federal Land Manager believes that the cumulative increase in emissions from the proposed sources will contribute to existing adverse impacts on visibility at Shenandoah NP, and is likely to cause additional perceptible visibility degradation from current conditions at the park. The Federal Land Manager further believes that the significant sulfur and nitrogen oxide emission increases proposed for each listed source individually would contribute to existing adverse visibility impacts at the park. For both these reasons, allowing such significant increase in visibility-impairing pollutants would frustrate—rather than promote—achievement of the national visibility goal and the need

to make reasonable progress toward that goal.

The EPA estimates that by the year 2010, sulfur dioxide emissions in the Commonwealth of Virginia will more than double. If pending amendments to the Clean Air Act are enacted, EPA estimates that sulfur dioxide emissions in the eastern United States will be reduced by almost 50 percent; however, EPA also estimates that, despite the overall reduction in the East, the emissions within the Commonwealth of Virginia will increase, particularly between now and 2005 (ICF, 1990). Thus, additional efforts are needed to limit projected and proposed increases in atmospheric loadings of emissions likely to contribute to visibility degradation at Shenandoah NP, where visibility is such an important value.

Sensitive Streams and Watersheds Are Being Acidified

The same sulfates and nitrates that are responsible for visibility impairment also contribute to acidic deposition. Over a decade of scientific research clearly shows that serious impacts are occurring on aquatic ecosystems in Shenandoah NP. Deep Run is one of several streams in the park which has been intensively monitored since 1980, and in which chronic acidification has been documented. The Shenandoah NP research indicates a poor prognosis for aquatic ecosystems in large areas of the park due to a combination of watershed sensitivity and elevated acidic deposition. Even assuming no change in the present-day level of acidic deposition, large changes in both the chemical and biological composition of Shenandoah NP streams are expected.

Ozone and Sulfur Dioxide Levels Are High Enough To Cause Injury to Park Vegetation

The Federal Land Manager is also concerned with existing ozone effects on sensitive park resources. Anthropogenic ozone (O₃) is formed in the atmosphere as a result of chemical reactions of precursor compounds such as nitrogen dioxide and volatile organic compounds. Since 1983, the National Park Service has monitored ambient O₃ levels at three different locations in Shenandoah NP. During 1988, an exceptionally bad year for O₃ in the eastern United States, all three stations recorded exceedance of the ozone National Ambient Air Quality Standard. It has been found that foliar injury and significant growth and yield reductions in sensitive species results from ozone concentrations below the national standard. Studies conducted at Shenandoah NP show that

foliar injury to sensitive species exists at the park.

Sulfur loadings currently occurring at Shenandoah NP (2000 ppm) are well above background levels (1000 ppm) and in a range known to cause morphological changes in some species of lichens. Ambient SO_2 levels being recorded at the Dickey Ridge monitoring station in Shenandoah NP (13–21 $\mu\text{g}/\text{m}^3$ annual average) are within the range known to have contributed to the absence of the lichen species *Ramalina americana* in Canada. A literature search conducted by NPS biologists found that of the 1136 vascular plant species known to exist in Shenandoah NP, ozone sensitivity studies had been done on 79 species and sulfur dioxide sensitivity studies had been done on 96 species. Twenty-three vascular plant species were shown to be ozone sensitive, and 21 were shown to be sulfur dioxide sensitive.

Impacts of Proposed Emission Increase on AQRVs

The Federal Land Manager believes that, because of the significant and widespread existing air pollution effects occurring within Shenandoah NP, any significant increases in SO_2 , NO_x , or VOC emissions could potentially cause or contribute to adverse impacts. Indeed, the proposed substantial increase in SO_2 and NO_x emissions associated with the pending permit applications is highly likely to: (1) Exacerbate existing adverse visibility conditions at Shenandoah NP and cause a perceptible further degradation in park visibility; (2) hasten the acidification of sensitive streams within the park with resulting effects on aquatic life; and (3) threaten sensitive park vegetation. The proposed increases in VOC and NO_x emissions will contribute to already high ozone levels, at times already higher than the national standard, and impacts on ozone sensitive vegetation.

Proposed Finding and Recommendation

Based on the above information, the Federal Land Manager preliminarily finds that existing air pollution effects interfere with the management, protection, and preservation of park resources and values, and diminish visitor enjoyment, and, therefore, are adverse. The Federal Land Manager also preliminarily finds that the effects of the additional SO_2 , NO_x , and VOC emissions associated with the electric generating station proposed for the area by Multitrade Limited would contribute to and exacerbate the existing adverse effects and is, therefore, unacceptable. Based on these findings and the Department's legal responsibilities and

management objectives for Shenandoah NP, the Federal Land Manager would recommend that the Virginia Department of Air Pollution Control not permit additional major air pollution sources with the potential to affect Shenandoah NP's resources (e.g., Multitrade Limited) unless the State can ensure that such sources would not contribute adverse impacts. The Federal Land Manager would further suggest that the State develop a Statewide emissions control strategy to protect the air quality related values of Shenandoah NP. This strategy might include: (1) An offset program requiring a greater than one-for-one emission reduction elsewhere in the State to offset proposed emission increases associated with major new or modified sources; and (2) a provision setting a timeframe for determining maximum allowable levels of air pollutants in the State (e.g., Statewide emission caps). The Federal Land Manager would further suggest that the Statewide emissions control strategy reflect a level of allowable pollution that will provide long term protection for critical natural resources throughout the Commonwealth of Virginia.

Public Comments

Interested parties are invited to comment on this preliminary determination. Comments should specifically address the following issues: (1) Whether the existing air quality effects at Shenandoah NP are adverse; and (2) given the Congressional mandates related to Shenandoah NP and the Federal Land Manager's responsibilities, whether it is reasonable to conclude that the proposed increases in emissions—as well as any further increases in emissions in the area without offsetting decreases—would contribute to adverse impacts on park resources. Finally, the Federal Land Manager would welcome comments and recommendations as to possible emission control strategies that would address the air quality concerns at Shenandoah NP. Comments on other permitting aspects of the proposed sources should be directed to the State when the State announces a public comment period on the approvability of these projects.

Dated: September 12, 1990.

Scott Sewell,

Deputy Assistant Secretary for Fish and Wildlife and Parks, and Federal Land Manager for Areas under the Jurisdiction of the National Park Service.

[FR Doc. 90-21903 Filed 9-17-90; 8:45 am]

BILLING CODE 4310-01-02

Availability of the 1990 State/Federal Natural Resource Damage Assessment and Restoration Plan for the Exxon Valdez Oil Spill

AGENCY: Department of the Interior.

ACTION: The 1990 State/Federal Natural Resource Damage Assessment and Restoration Plan for the Exxon Valdez Oil Spill; availability and establishment of comment period to November 1, 1990.

SUMMARY: This Notice announces the availability of the 1990 State/Federal Natural Resource Damage Assessment and Restoration Plan and establishes a comment period through November 1, 1990. This joint State/Federal plan has been prepared by the Trustee Council and will be made available to the public on September 15, 1990.

DATES: All comments concerning the plan must be written and submitted to the following address by November 1, 1990: Trustee Council, P.O. Box 20792, Juneau, Alaska 99802.

ADDRESSES: A copy of the 1990 assessment and restoration plan may be obtained by contacting the Trustee Council at one of the following addresses: Trustee Council, c/o U.S. Forest Service Public Affairs (telephone (907) 586-8806), P.O. Box 20792, Juneau, Alaska 99802 or Trustee Council, c/o Deputy Director, U.S. Fish and Wildlife Service, Room 3340, 1849 C Street, NW., Washington, DC 20240 (telephone (202) 208-8286).

FOR FURTHER INFORMATION CONTACT: U.S. Forest Service Public Affairs Office (907) 586-8806.

SUPPLEMENTARY INFORMATION: The March 24, 1989 grounding of the tanker *Exxon Valdez* resulted in the discharge of approximately 11 million gallons of North Slope crude oil into Alaska's Prince William Sound. The oil moved through the southwestern portion of the Sound and along the coast of the western Gulf of Alaska, affecting natural resources.

The natural resources Trustees (the State of Alaska, U.S. Departments of Agriculture and the Interior and the National Oceanic and Atmospheric Administration) instituted a natural resource damage assessment process to estimate the damages for injury, loss or destruction of trustee resources as a result of the tanker accident, as authorized under section 311 of the Clean Water Act (CWA) and section 107 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). To accomplish this task, the Trustees established a Trustee Council, based in Alaska, to manage the

January 13, 1991

Effect of BART Decision on Allowance Trading

I have analyzed the effect that a 1991 BART determination requiring the Navajo Generating Station to impose scrubbers will have on the operation of the allowance trading system created by the Acid Rain provision of the 1990 CAA Amendments.

I have concluded that a Navajo-specific scrubbing order will have a relatively minor effect on the emissions trading system because NGS will not receive its first allowances until the year 2000, and any effects would not be felt until after that date. However, a BART rule for NGS would establish a principle concerning when EPA may require other plants to reduce emissions under the visibility rationale. To the extent that EPA applies this rationale to other plants before the year 2000, and especially to plants in the midwest or east, then BART determinations for those other plants could have a significant effect on the emissions trading system.

1.) NGS is part of the so-called Class of 1985. In order to make certain that all power plants were included in the allowance trading system (and to keep them from increasing their capacity), the CAA was amended in Conference to give these western, low sulfur coal burning plants allowances for reductions below 1985 emission levels. But the first allowances do not become available to the Class of 1985 until the year 2000.

2.) A BART determination would require NGS to expend money immediately to purchase and install pollution control equipment. Since NGS will not receive allowances until the year 2000, it could not sell allowances now, based on the emission reductions expected from the installation of BART, to help finance the purchase of the equipment. (There is not currently a "futures" market in allowances available in the year 2000, because there are so many questions about their value in light of the technical, political, and regulatory uncertainties governing the Acid Rain program).

benefits may be offset against the costs of the equipment, in determining whether the BART order satisfies the cost/benefit balance required by Section 169A. This assertion assumes that inter-regional trading will have some value in the year 2000. As discussed below, there are substantial reasons to question whether this will be true. But there is no doubt that expenditures for pollution control equipment now are real. Thus, the EPA's BART analysis balances certain costs against speculative cost offsets.

3.) If NGS alone is ordered to install scrubbers under a visibility rationale, that determination would have a relatively minor effect on the emissions trading system. In effect, such an order would increase the supply of allowances available in the year 2000. (It would have no effect on the demand for allowances). Owners of other plants would have many years to anticipate the availability of these allowances, and the market would respond accordingly. The availability of additional allowances would reduce the price of all allowances after the year 2000. But given the doubts whether allowances will have any significant market value by that time, a BART order limited to NGS may have a relatively insignificant effect compared to these other factors.

4.) The principal concerns about the allowance trading system stem from other regulatory actions EPA is expected to undertake in the interim. EPA shows every inclination to go beyond the SO₂ reductions imposed by the Acid Rain provision and require individual facilities to reduce emissions further, on a plant-by-plant basis. These requirements will be imposed through other regulatory authority that complement the Acid Rain rules, such as a short-term averaging time under the SO₂ NAAQS; a strict interpretation of the WEPCO rule; and other programs that allow EPA to order individual plants to make reductions below the NAAQS (including the visibility program).

Such plant-by-plant decisions will affect the allowance trading system in two ways: by increasing the supply of allowances, while reducing the demand for them (that is, plants that are under a specific clean up order no longer have the option of choosing to retrofit or buy allowances).

To the extent that the NGS BART proceeding establishes a broad principle about when EPA can require plant-by-plant reductions under the visibility program, it will help undermine the allowance trading program by providing an additional mechanism through which EPA can reduce demand and increase supply. There are two potential types of targets for a more active visibility program: large, unscrubbed plants in the west (Mohave and Centralia first, other plants thereafter) and plants in the midwest that contribute to haze problems in eastern national parks.

As the National Park Service's strategy for Shenandoah National Park shows, that agency is beginning to shift its attention and resources to the eastern parks. The plants potentially targeted for reductions under an eastern visibility program are power plants in the midwestern States, specifically including plants in Ohio, Kentucky, West Virginia, Indiana, Michigan and Illinois. 55 Fed. Reg. 38407 (September 18, 1990). These plants include many of the "Big Dirty" plants that burn high sulfur coal and already are required to make the maximum pollution reductions under the Acid Rain provisions.

To the extent that these plants are subjected to more stringent, individual clean up orders under a visibility rationale, their owners will lose the flexibility, intended by the 1990 Amendments, to make a cost efficient choice between scrubbing and purchasing allowances as a means of emission reductions.

Congress of the United States
House of Representatives
Washington, DC 20515

January 4, 1991

The President
The White House
Washington, D.C. 20500

Dear Mr. President:

Recognizing the great importance of the Grand Canyon to the nation and our home state of Arizona, we have actively followed the Environmental Protection Agency's (EPA) efforts to improve visibility at the Grand Canyon and its subsequent proposal to install pollution control equipment at the Navajo Generating Station (NGS).

We have taken special note of Interior Secretary Manuel Lujan's request for the National Academy of Sciences (NAS) to review the scientific evidence serving as the basis for the EPA's regulatory proposal. As you can see from the attached clips, this NAS critique found that the EPA evidence failed to show how much or how often NGS emissions affect winter-time haze in the Grand Canyon.

In addition, we have examined the preliminary results from the independent Navajo Generating Station Visibility Study which suggest the plant has a de minimis impact on visibility in the Canyon.

We are concerned that the EPA appears to be minimizing the results of these two studies and plans to move forward with its original proposal to install 90 percent scrubbers at a three-hour rolling average at the NGS plant.

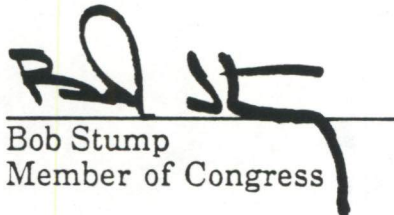
Some estimates of the potential long-term costs of implementing EPA plan could reach \$4 billion, including initial capital costs and operation and maintenance over 30 years. The fact is, the federal government (Department of the Interior) is a 24.3% partner in the ownership of NGS. Thus, the federal government and American taxpayers would be subject to nearly one-quarter of the costs of the EPA approach.

While we believe some action is imperative to protect visibility at the Grand Canyon, we also believe the evidence is inconclusive as to what action should be taken to address visibility impairment. We are not at all sure that the EPA proposal is the prudent or appropriate course of action. This proposed rule would not only have additional detrimental impact on our already-depressed state economy, but according to the studies, may do virtually nothing to improve what can be seen at the Grand Canyon.

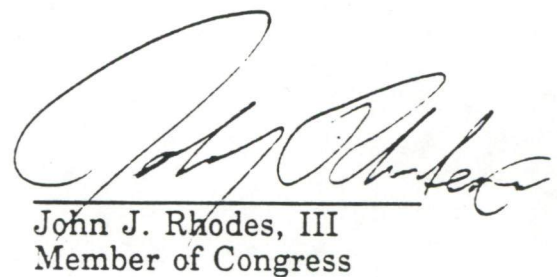
The President
January 4, 1991
Page Two

As your Administration undertakes implementation of this important regulatory program, it is crucial to proceed in a manner utilizing sound scientific analysis and exercising good judgment. We would appreciate your attention to this very important matter.

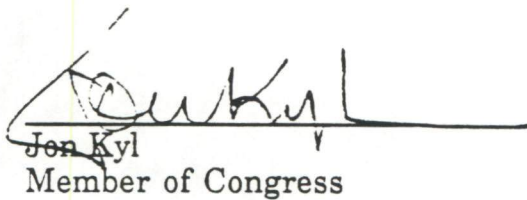
Sincerely,



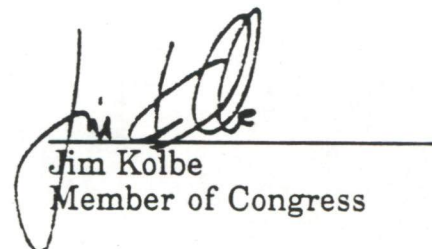
Bob Stump
Member of Congress



John J. Rhodes, III
Member of Congress



Jon Kyl
Member of Congress



Jim Kolbe
Member of Congress

COMMENTARY

WARREN BROOKS

Curbing haze at \$2 billion a mile

One of the weapons used by the Reagan administration against regulatory overkill was the Office of Information and Regulatory Affairs (OIRA), operating under the budget director.

Unfortunately, Democrats in Congress, particularly Sen. John Glenn of Ohio, have waged such effective guerrilla warfare against OIRA. Dick Darman has chosen to let the agency fade back into the shadows, rather than risk possible defunding.

But, under an executive order issued by President Reagan, OIRA

The vindictive tone of this indictment, with the prospect of a scalp on the EPA belt, shows it has nothing to do with improving Canyon visibility.

can still bring egregious issues to what is now known as the President's Council on Competitiveness. That council, directed by Vice President Dan Quayle, has been putting together a highly professional staff under Al Hubbard, who reportedly is being considered for OIRA director, where he would also sit as a council member and bring OIRA's worst cases to the council's attention.

We have another prime candi-

date. The midlevel bureaucrats in the Air Division of the Environmental Protection Agency plan one of the most outrageous insults to consumers in even its own illustrious history of misspent billions. They are pushing the EPA to rule this February that the Navajo Generating Station in Arizona, some 80 miles downwind of the Grand Canyon, is the main source of wintertime haze over the Canyon, and must spend up to \$4 billion (over a 20-year period) to cut its sulfur dioxide emissions by 90 percent.

This will cost its 1.2 million electricity customers about \$140 million a year in higher rates, and might raise total average visibility over the Canyon by two miles on a base of about 150 — or a haze reduction cost of about \$2 billion per mile.

To put it another way, since the haze reduction is limited to about 4 percent to 7 percent of the days within a three-month wintertime period, during which the Canyon has a net of about 350,000 visitors, the cost per visitor actually affected is about \$7,000. The cost per Arizona household is about \$110 per year.

It all started with a 1982 lawsuit by the Environmental Defense Fund under the Clean Air Act, charging EPA and the National Park Service (NPS) were not doing enough about Canyon visibility impairment.

In the eight years since, more than \$20 million has been spent not on haze reduction but just trying to find someone to blame it on and charge it to. That's not easy since the Canyon is a clear shot some 500 miles downwind of Los Angeles, the land of the Big Smog and home to 10 million car-driving, barbecuing fools.

So NPS and EPA looked around for a nice deep corporate pocket and landed on the Navajo Generating Station's power plant. There were several problems. First, the power plant burns the cleanest sulfur coal in the nation with emissions below those allowed by the new Clean Air Act.

Second, because of climate conditions, the Navajo Generating Station cannot contribute anything to summertime haze, when visitor numbers are greatest. The only time you get the right combination of humid-

ity and wind directions to push Navajo Generating Station smoke toward the Canyon is in the winter. And the only time that SO₂ can affect visibility is when the relative humidity is high enough to form aerosol sulfates (SO₄).

All of this explains why the efforts to blame the Canyon's haze problems on the Navajo Generating Station have been so costly and futile. More than \$15 million has been spent putting tracer gases in the Navajo Generating Station smokestack, and measuring their appearance at Canyon sites in two major studies.

The first study, done by NPS at a cost of \$2 million, was so full of holes it had to be reviewed by a special panel of experts appointed by the National Research Council of the National Academy of Sciences that after another half-million dollars or so of analysis concluded that even though NPS had proved the presence of some NGS gases at the Canyon "did not quantitatively determine the fraction of SO₄ aerosol and resultant haze ... attributable to NGS emissions." It thus had absolutely no basis to regulate!

Instead of retreating, EPA regulators seized on the slender thread from the National Research Council's conclusion "that at some times during the study period NGS contributed significantly to haze in [the Canyon]," but the National Research Council scorned the National Park Service claim that this was more than 70 percent.

That's why EPA was thrilled to discover that a really first-quality study commissioned by Navajo Generating Station and just completed at a cost of more than \$12 million under the supervision of the University of Minnesota also showed NGS tracer gases present during 21 percent of the measurement periods at Hopi Point.

What they ignored is that most of those times, relative humidity was well below 70 percent and visibility was thus above normal. On only 4 percent to 7 percent of the times were both high humidity and power station pollutants present and vision

(Continued on next page)

impaired, and half of those occasions came when it was either cloudy or at night.

That is to say that if *all* of the Navajo Generating Station sulfur emissions were scrubbed away, you would theoretically see only a tiny effect on, at most, about 2 percent to 3 percent of wintertime days, affecting less than 0.7 percent of all visitor days. Worse, the study showed that "The times of worst visibility in the Canyon occurred when NGS emittants were *not* in the vicinity of the Canyon and when hazy air was being transported into the region from southwest of the Canyon." In other words, from Los Angeles.

More important, "during the period when the NGS emittants were present at the canyon, the average light-scattering values were no greater than when the emittants were absent." So there is *no* evidence that spending \$4 billion to reduce emissions from the Navajo Generating Station will have *any* effect whatsoever on winter visibility.

You would never know this from an exultant report in the newsletter *Inside EPA*, which quoted an EPA source saying this study "has incriminated a power plant as a major polluter and will likely bolster EPA's proposed controls for the source." It rejoiced, "If the controls are imposed, it will mark the first time EPA

has regulated a single power plant based on its contribution to visibility impairment in a National Park."

The vindictive tone of this indictment, with the prospect of a scalp on the EPA belt, shows it has nothing to do with improving Canyon visibility, only with expanding EPA's turf.

No wonder top EPA management are reportedly trying to figure out how to avert this classic regulatory obscenity. Mr. Quayle should lend them a hand and save power consumers from the terminal yuppieism of William Reilly's EPA.

. Warren T. Brookes is a nationally syndicated economics columnist.

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Some Canyon haze tied to LA

Smog slips past mountains, taints region, study says

By Jonathan Sidener
The Arizona Republic

Los Angeles smog fouls desert skies over Arizona and Nevada, and it contributes to the haze in the Grand Canyon, a new air-pollution study says.

Not all of Los Angeles' notoriously nasty air remains trapped in the basin's stagnant atmosphere, according to a study by researchers from Washington University in St. Louis. Some slips past the mountain barrier east of the city and reaches neighboring states, the six-year study says.

Los Angeles air pollution travels at least 240 miles and reaches the Grand Canyon, contributing to a haze that limits visibility in the once-crystal-clear air of the natural wonder, university researcher Warren White said.

The smog was tracked from Los Angeles to Meadview, Ariz., 15 miles from the northwestern mouth of the Grand Canyon. The study does not show whether the city's pollution reaches Phoenix, White said.

"The significant result of the study is that Los Angeles air reaches an area where the air should be so clear," White said. "If it weren't for Los Angeles, the air in Meadview would still be clear."

Although the study implicates the California air as a source of Grand Canyon haze, it does little to clarify the debate over other sources of the haze, White said.

The Salt River Project is embroiled in a controversy with the National Park Service and U.S. Environmental Protection Agency over sulfur-dioxide emissions from its Navajo Generating station and the role they play in canyon haze. The SRP has argued that California haze reaches the canyon.

The Washington University researchers tracked a "tracer" chemical, methylchloroform, from Los Angeles to Meadview. Four tracking stations — two in California; one on Spirit Mountain, near Laughlin, Nev.; and one in Meadview — traced Los Angeles pollution farther downwind than any previous research. The continuing project next will check to see whether Los Angeles pollution is reaching Colorado, White said.

"There's a lot of excitement about the study because it lets you see direct evidence of Los Angeles pollutants in the desert," said Edward S. Macias, one of the authors of the study.

White said the study firmly establishes that one chemical comes from Los Angeles, but it also indicates that a whole range of air pollution reaches the desert states.

"We're interested in methylchloroform because it comes from the Los Angeles Basin, not because it's important in its own right," he said.

"It's an indication of how much Los Angeles air is reaching the area. If you have this one chemical, you have everything that comes from Los Angeles, all the compliments of Los Angeles smog."

Scientists from Desert Research Institute in Reno and the Scripps Institution of Oceanography in La Jolla, Calif., participated in the study.

January 10, 1991

EPA Draft Proposed Rule on Visibility in the Grand Canyon

Under a court-imposed deadline, the Environmental Protection Agency ("EPA") must decide by February 1st whether or not to initiate a rulemaking under Section 169A of the Clean Air Act ("CAA") to attempt to address visibility impairment in Grand Canyon National Park allegedly caused by sulfur dioxide emissions from the Navajo Generating Station ("NGS").

EPA staff's current draft proposal -- to require NGS to install scrubbers to reduce its SO₂ emissions by 90% (3-hour rolling average) -- would impose enormous economic costs and produce little improvement in visibility in the Grand Canyon. Further, this approach would ignore completely the sources of regional haze that are the major causes of visibility impairment in the Canyon, and would undermine the better policy approach, recently endorsed by Congress, of seeking a comprehensive regional response to haze in the Grand Canyon.

There is a better alternative -- an approach that could offer far more cost efficient emission reductions (if they are needed) than 90% scrubbers, and would allow coordination with the work of the Grand Canyon Visibility Transport Commission, created by the Clean Air Act Amendments to address the regional haze problem in the Grand Canyon. The centerpiece of this approach would be a test of promising clean coal technologies at the NGS, to be conducted at the same time as EPA's regional haze studies required by the CAA Amendments and the deliberations of the Visibility Transport Commission.

On behalf of the Salt River Project, the operator of the NGS, this Memorandum seeks your support for this alternative and your assistance in perfecting this alternative to be pursued in lieu of EPA's draft proposed rulemaking. If additional time is necessary, we are prepared to approach the district court jointly with EPA to seek a 60-day extension of the impending judicial deadline in order to work out the details of this approach.

I. LEGAL AND POLICY PROBLEMS WITH THE EPA PROPOSAL

In February 1990, EPA submitted to OMB for review a draft Notice of Proposed Rulemaking ("NPRM") that would institute a Best Available Retrofit Technology rulemaking for NGS. This precedent-setting rulemaking presents significant environmental, economic, and energy policy issues.

The draft NPRM would initiate a rulemaking to impose SO₂ emissions limits on the NGS of 0.1 lbs/MM Btu, computed on a three-hour rolling average basis. The emission control would not be intended to protect human health; its sole purpose would be aesthetic, to improve vistas for visitors to the Grand Canyon during a few short periods in winter, a season when tourism is at its lowest level and visibility is at its best.

The NGS is a modern plant, and it burns some of the lowest sulfur coal of any electric utility in the country. The Salt River Project estimates that the EPA draft NPRM amounts to a requirement to retrofit with scrubbers that remove over 95% of the SO₂ from the NGS on an annual basis. EPA estimates that the costs of attaining this emissions limit are \$145 million annually for 30 years, or \$4 billion.

EPA has never previously initiated a BART proceeding for visibility, and never required a power plant to install a 90% (3-hours average) scrubber, even for health reasons. In virtually every other case it has studied, EPA has determined that visibility problems are due to "regional haze", i.e., pollutants from many industrial and urban sources, both near and distant. Because regional haze cannot be attributed to any particular source, it is not redressable under EPA's current rules.

There are three major problems with the EPA staff's regulatory strategy, which make it unlikely that this approach can succeed.

A.) Air Quality Analyses for Characterizing Impairments and Performing BART Analyses. Section 169A of the Clean Air Act requires that before EPA may issue a BART proposal, it must first determine that a visibility problem in a Class I Federal area may be "reasonably attributed" to a single source or a small group of sources. Based on EPA's regulations, attribution decisions are to focus on visibility impairments (known as plume blights) that are traceable to their sources by simple visual observations. When adopting the final visibility rules in 1980, EPA expressly deferred the regulation of sources that were merely contributors to regionally homogenous hazes, the type of visibility problem found in the national parks like the Grand Canyon.

In September 1989, EPA proposed to attribute wintertime haze in the Grand Canyon to the NGS. 54 Fed. Reg. 36948. The attribution finding was based almost entirely on the National Park Service's WHITEX experiment. Once an attribution finding has been made, any BART proposal must be based on a quantitative comparison of the ability of new controls to improve visibility and the costs of achieving those improvements. Only those additional controls that are justified by visibility benefits are to be imposed on sources. In February 1990, EPA staff developed

its draft BART proposal, again based on the estimates of the effects of the NGS in the WHITEX study.

WHITEX asserted that the NGS was responsible for 40% of the average wintertime haze in the Grand Canyon and 60-70% during the worst impairment periods. These conclusions must be viewed in the context of the results of prior Park Service studies that found that visibility in the Grand Canyon had not deteriorated, and actually improved, since 1970. Prior studies also showed that the man-made portion of the visibility problem (especially during the summer) was due to regional haze, including sulfates transported from as far away as Los Angeles.

The WHITEX experiment originally was designed to assess the feasibility of an experimental methodology for tracing smokestack emissions to distant locations. Specifically, it was designed to test whether a tracer element injected into the NGS exhaust stream could be detected, not in the Grand Canyon, but in the Canyonlands National Park in Utah. After the data collection phase of this pilot effort had been completed, the Park Service changed the test and claimed that it provided a basis for regulating a specific source (the NGS) because of its effect on the Grand Canyon, which is in the opposite direction from Canyonlands.

The WHITEX experiment has been repeatedly criticized because of significant problems with its design, implementation, and analysis. Obvious problems were created when the purpose of the experiment was changed after data collection so that it now must support an attribution finding, not merely assess the methodology of using tracer elements, and must address visibility in a national park that was poorly monitored during WHITEX. To resolve these concerns, in 1989 the Secretary of the Interior requested that the National Academy of Sciences review the Park Service's work and comment on the reliability of the WHITEX experiment.

In October 1990, the National Research Council of the National Academy of Sciences released its study, which found that WHITEX was deeply flawed. The NRC concluded that there were several critical errors in WHITEX, including insufficient data, inadequate methods, inadequate analyses, and failure to study other sources of haze in the region. In particular, the NRC concluded (at 4) that "WHITEX did not quantitatively determine the fraction of SO₄ aerosol and resultant haze in [the Park] that is attributable to NGS emissions". This conclusion fatally undermines the draft NPRM's reliance on WHITEX for the indispensable "reasonable attribution" finding and the necessary comparison of cost and visibility benefits. This is the case because all WHITEX showed is that NGS contributes an unquantifiable amount to a regional haze visibility impairment, a type of impairment that is beyond the scope of EPA's current rules.

After the NRC study, all that is left of WHITEX is the NRC's conclusion (at 3) that it showed that "at some times during the study period, NGS contributed significantly to haze [in the Park]", without being able to quantify the size of that contribution. In the context of the NRC report, this statement means that the most that can be said is that NGS is a non-trivial contributor to haze in the Grand Canyon. Thus, despite the NRC's withering criticism of WHITEX, EPA may proceed with its original regulatory proposal, based solely on NRC's use of the adverb "significantly" in characterizing the NGS's contribution.

The question of the amount of the NGS contribution to haze in the Park was answered conclusively by the subsequent Salt River Project study conducted during the winter of 1990. The Salt River Project study of visibility in the Grand Canyon was the most comprehensive study on visibility ever conducted in the United States. The initial results from this \$12.5 million independent and peer-reviewed study are now available and have been provided to the EPA staff. The study confirms EPA's observation in its 1985 Inter-Agency Task Force Report on Visibility, the formation of haze is heavily dependent on the presence of substantial humidity. The Salt River Project study confirms that the necessary precursors of haze (humidity above 70% and substantial amounts of hydrogen peroxide) are rarely present in the Canyon at the same time as emissions from NGS.

The basic finding from the Salt River Project study is that NGS emissions make a (yet-to-be-quantified) contribution to Grand Canyon visibility impairment in only 4-7% of the test time periods. And in about half of these periods, it was either cloudy or nighttime, naturally limiting the ability of NGS emissions to affect a visitor's enjoyment of the Grand Canyon. EPA staff largely ignores this point, notwithstanding a regulatory obligation to take it into account. These results effectively refute what little was left of WHITEX and demonstrate, under its own precedents, that EPA has no current basis for a "reasonable attribution" finding or for the comparison of cost and visibility benefits needed for a BART determination.

B. Cost/Benefit Considerations. The costs of the draft NPRM substantially outweigh its benefits, contrary to Section 169A of the CAA and Executive Order No. 12291.

EPA's draft Regulatory Impact Analysis estimates the costs at \$1626-2280 per ton of SO₂ removed. Measured against other regulatory decisions, this is an enormous cost, especially since the SO₂ reductions are intended simply to improve visibility and then only for a few short periods in the winter. By contrast, President Bush encouraged adoption of acid rain provisions in the

CAA Amendments that would cost \$140 per ton in the first phase and \$620 per ton in the second phase.

The cost issues are particularly significant for the Federal government, because the United States Bureau of Reclamation owns 24% of the NGS, and thus will have to fund its share of capital and operating costs from scarce Federal budgetary resources. Furthermore, the additional costs for power and water ultimately would be imposed on the ratepayers of Arizona, where the economy has been stagnant for a substantial period of time. Finally, the capital and operating cost consequences have substantial implications for the Salt River Project and other owners of the plant. For example, in the last few months alone, the Salt River Project, Arizona Power and Tucson Electric have announced substantial cutbacks and layoffs, due to the decline in the Arizona economy.

The draft also systematically overstates the benefits of EPA's approach. EPA principally relies on a controversial "contingent valuation" study performed by a Park Service contractor that attempted to measure how much Americans theoretically would be willing to pay for substantial visibility improvements in the Grand Canyon. (EPA staff did not conduct a specific study to measure the benefits of its draft BART proposal). Rather, the consultants extrapolated from data they had gathered in prior studies, in which respondents were asked different questions intended to evaluate different kinds of visibility improvements than those presented by the NPRM (i.e., questions valuing improvements in human health, animal and plant welfare and protection of rock formations in the Grand Canyon, rather than questions about visibility improvements alone). On this basis, EPA staff contends that Americans would be willing to spend in excess of \$100 million annually for the next 30 years to obtain marginal improvements in visibility during the winter.

Furthermore, the study systematically overstated the value of visibility improvement in the Grand Canyon. Most egregious in this regard was the bias evident when respondents were asked to compare photographs of good and poor visibility. The "good" visibility photo was taken during the winter, when the sun angle produces vibrant colors, while the "poor" visibility photo was taken during the summer, when the higher sun angle produces muted tones. Respondents were asked to place a monetary value on transforming a summer haze day into a winter clear day. This error alone -- and there were many other significant design errors -- renders the EPA analysis meaningless for this rulemaking, where the issue involves marginal to no changes in winter visibility as a result of expensive controls on the NGS.

These figures, derived under this controversial economic theory that has never previously been the basis for a major regulatory action, constitute the sole "benefits" claimed by

EPA's staff. The studies relied upon by EPA have obvious flaws. Indeed, they have been heavily criticized in the recent draft report of the National Acid Precipitation Assessment Project (Question 1, pp. 6-29 to 6-35).

In short, visibility problems are greatest in the Grand Canyon during summer, but EPA staff does not allege that the NGS contributes to summertime pollution. Moreover, studies show that regional haze is the most significant cause of visibility problems in the Grand Canyon, but EPA's rules and its draft proposal do not even address this problem. EPA staff's claim that more strict emission limits for NGS will significantly improve wintertime visibility is based entirely on the unreliable findings of the misdirected WHITEX experiment. Thus, the "degree of improvement" analysis -- the heart of a BART assessment -- must fall because WHITEX is not an adequate basis for quantitative assessment. Finally, the EPA staff estimates of visibility benefits that might flow from emission reductions at NGS are seriously flawed.

C. The Proposed Emissions Limit Exceeds the NSPS. The New Source Performance Standard for coal-fueled powerplants that burn low sulfur coal requires a 70% reduction (30-day average) in SO₂ emissions. The draft NPRM would require the NGS to attain at least a 90% reduction (3-hour average). This level of control even exceeds the level required of new plants that burn high sulfur coal, which need only meet a 90% (30-day average) requirement. Prior to the draft NPRM, EPA policy stated that the NSPS level generally would be held to be the "best achievable retrofit technology". But the staff draft also proposes to alter that policy for this matter. While EPA staff claims the required emissions reduction is "only" 90% under the draft NPRM, even if that is true this plant would be required to attain a performance level far beyond that required even of new plants under the 1977 Clean Air Act Amendments.

The direct implication of EPA staff's proposal is that visibility-driven standards can supersede and exceed NSPS limits, and all others required under the CAA. This raises major policy issues concerning the burdens to be imposed on coal-burning power plants. This first BART proposal threatens to establish a precedent that will be especially troublesome in the west, where virtually every major utility plant is located near a Federal Class I area, but also will frustrate or supersede the provisions of the CAA Amendments concerning acid rain in the eastern States.

II. VISIBILITY SHOULD BE ADDRESSED ON A REGIONAL BASIS.

The staff draft NPRM, by singling out one potential source of haze for immediate regulation, also threatens to frustrate the more promising policy approach for visibility, specifically

endorsed by Congress in the 1990 Clean Air Act Amendments, of devising a comprehensive regional solution to the regional haze affecting Grand Canyon National Park.

Long-range transport of pollutants is clearly a major cause of haze in the Canyon and would defeat efforts to address the problem by regulating minor, local sources. The problem needs to be addressed comprehensively, through a coordinated and fiscally responsible approach that considers all sources of the problem during all seasons of the year. Recognizing the narrow scope of EPA's current visibility regulations, Congress recently established specific mechanisms and prompt deadlines to expand those rules to address regional impairments. Until that process has had a chance to work, EPA staff should not disrupt this process by attempting to regulate individual sources that are one of many possible contributors to haze.

--New Section 169B of the CAA requires EPA to establish within one year a Grand Canyon Visibility Transport Commission, to study and make recommendations concerning regional problems affecting visibility in the Park. The Governor of each affected State will be represented on the Commission. Haze in the Canyon is a regional problem, and a solution should be sought on a regional basis, and in a comprehensive fashion. The Commission is required to submit its report and recommendations within four years after its establishment.

The Commission, by involving the Governor of each State, provides an ideal mechanism to develop a comprehensive and coordinated response to visibility concerns, consistent with the principles of Federalism. Indeed, by requiring EPA to establish this Commission while merely authorizing it to create other regional transport bodies, Congress has indicated that the Commission is the preferred mechanism for addressing haze in the Canyon.

--Section 169B also earmarks appropriations for research on regional haze and requires EPA to conduct studies on an expedited basis and publish results before the Grand Canyon Visibility Transport Commission is due to report. In 13 years, EPA has never developed an effective regional haze program, due to budget constraints on research funds and the scientific complexities involved. Congress intended to break this deadlock by compelling EPA to conduct the studies necessary to devise an effective regional haze program. In particular, \$2.5 million have been appropriated for a tracer study at the Mohave power plant, which lies upwind of the Grand Canyon.

In sum, Congress has required EPA to conduct necessary regional haze studies and create a forum for the affected States to negotiate a regional solution to a regional visibility problem. This process arguably is mandatory, but in any event

offers a greater possibility of success than piecemeal regulation of local but minor sources during the interim period while the science is being gathered and the States are deliberating over priorities. Therefore, as a matter of sound policy, until the Visibility Transport Commission issues its report and recommendation under Section 169B(d)(2), EPA should not seek to regulate individual sources in an effort to address visibility in the Canyon.

III. AN ALTERNATIVE APPROACH FOR NAVAJO GENERATING STATION

The operator of the NGS has developed an alternative approach to the visibility question that is preferable to the EPA draft rule on environmental, energy and economic policy grounds. We believe that the Administration should decide to proceed with this proposal as its rulemaking for NGS.

The alternative approach has several principal elements:

--The utilities that participate in the NGS would agree to help fund, and otherwise to cooperate fully with, the regional haze studies that EPA is required to conduct under the CAA Amendments, to assure that EPA can collect the scientific and technical data necessary to permit a full assessment and evaluation of all sources of haze in the Grand Canyon.

--EPA would expedite establishment of the Grand Canyon Visibility Transport Commission. The owners of the NGS would cooperate fully with the Governors of the affected States and the Commission in the conduct of its inquiry.

--The NGS participants would agree to undertake tests to try to demonstrate the feasibility of several promising clean coal technologies that may provide alternatives to conventional scrubbers on plants fired by low sulfur western coal. If one of the technologies were demonstrated to achieve an agreed upon minimum removal efficiency at an agreed upon cost, the operator would commit to install that technology and operate it on a seasonal basis. to address the alleged effect of the NGS on wintertime visibility.

--The NGS participants would provide assurances that, if none of the technologies met the test criteria, they would then install pollution control devices that would remove at least 70% of uncontrolled SO₂ emissions measured on an annual basis. This technology would not have to be operational before January 1, 2000, the date upon which the first allowances would be issued to the plant under the CAA Amendments.

This alternative approach has several distinct advantages. First, it assures that any haze program will be based upon reliable science and sufficient data, rather than an emotional

response or the flawed WHITEX experiment, which are now driving the draft NPRM. Second, it allows coordination of the NGS program with the regional haze studies to be undertaken by the EPA and the recommendations of the Grand Canyon Visibility Transport Commission. This assures maximum input of the States into the ultimate solution.

Third, an alternative technological test program offers both immediate, local pollution reductions and a potentially major contribution to long-term pollution reduction efforts, not only at NGS but at many other plants that burn low sulfur coal. Finally, this approach will assure that there will be long-term, large-scale reductions in SO₂ emissions from the NGS, installed under deadlines that will permit the market for allowances to help finance the substantial capital and operating costs that otherwise would have to be absorbed by the Arizona economy and Federal taxpayers.

A. Regional Visibility Studies. Administrator Reilly has repeatedly acknowledged the critical importance of basing EPA rules on solid scientific work. He also has recognized the dangers of the "ready, fire, aim" type of regulation, when rules are based on emotional reactions to an environmental issue rather than considered policy analysis. The draft NPRM reflects both flaws, particularly its proposed reliance on the WHITEX experiment as the basis for regulation.

This alternative will provide a far more reliable scientific and technical basis for considering a response to the perceived haze problem in the Grand Canyon. The 1990 Salt River Project study of NGS represents a quantum leap forward in the sophistication and reliability of region-wide atmospheric studies. That experience will be invaluable in conducting proper studies to cure one of the NRC's principal criticisms of WHITEX, its failure to consider the other point and regional sources that obviously contribute to haze in the Grand Canyon.

The participants in the NGS are prepared to help improve those studies by assisting with their funding, design, and implementation. Especially with the strain on EPA resources caused by implementation of the 1990 CAA Amendments and the fiscal constraint caused by Federal budget issues, such financial contributions are of substantial value in accelerating the timetable and permitting more thorough studies.

B. Coordination with the Visibility Transport Commission.

This feature offsets one of the principal flaws in the draft NPRM, the likelihood that a piecemeal approach of source-by-source regulation would not actually result in significantly improved visibility in the Grand Canyon.

While the haze is clearly regional, little is now known of the contributions made by its sources, or at what cost they could be controlled. Permitting the Governors to study the problem on a regional basis and devise a comprehensive solution offers the best opportunity for a cost effective approach to the problem. In particular, this approach will allow coordination of the regional haze program with other programs required by the CAA Amendments, notably the urban nonattainment and air toxic programs. Under this approach, in the event that the clean coal demonstration program is unsuccessful, the year 2000 deadline for other control technology to adopt would tie in directly to the emission reductions that the urban areas are achieving, and would correspond with any regional reductions arising out of the visibility studies conducted under the 1990 Amendments.

Administrator Reilly recently has written the Governors emphasizing their critical role in implementation of the CAA Amendments. The Commission, as a forum for direct study and planning by the Governors of all affected States, thus is an ideal forum for consideration of the visibility problem from both a Federalism and an environmental perspective.

C. Clean Coal Technology Program. The centerpiece of this program is the commitment of NGS to conduct a test of promising clean coal technologies as an alternative to scrubbers. This program offers the prospect of both immediate local emissions reductions and a long-term advance in the state-of-the-art of control technologies for low sulfur coal plants that could produce environmental benefits throughout the west. This approach is consistent with the clean-coal technology incentives incorporated in the Senate passed version of the 1990 Amendments.

The Salt River Project has preliminarily explored the feasibility of a significant number of alternative technologies that might substantially reduce SO₂ emissions without requiring the enormous expense and loss of electricity capacity imposed by scrubbers. Based on that initial review, it believes that several approaches, including a sodium injection technology and a novel clay injection technique developed by TRIMEX -- warrant further testing.

NGS is willing to develop and implement a full-scale experimental project for several promising technologies at the NGS. Attached to this letter is a detailed outline of how such a plan could be developed and implemented. The precise list of technologies to be tested and other test conditions would be finally devised in consultation with EPA staff.

NGS is further willing to commit that, if one of these technologies were demonstrated to reduce SO₂ emissions efficiently and cost effectively, NGS would install it and operate it on a seasonal basis to address the apparent NGS

contribution to wintertime haze. As part of the design of the program, the NGS and EPA would agree upon the minimum removal efficiency, cost and other criteria that must be satisfied by the alternatives to be tested.

D. Control Technology. NGS would commit that, if none of the clean coal technologies satisfied the test criteria, it would then select and install pollution control equipment that would remove at least 70% of the uncontrolled SO₂ emissions measured on an annual basis. This technology would be operational on January 1, 2000, the date when the first allowances will be issued to the plant.

Deferring selection of a 70% control system until after completion of the test, that is until the mid-1990s, offers several advantages. First, it would allow the NGS to take advantage of any other developments in pollution control technology in the interim, as long as the ultimate performance standard was met. Second, coordinating the receipt of allowances with the installation of higher cost controls will allow the market to underwrite part of the capital and operating costs of controls. Accordingly, the net costs to the ratepayers of Arizona and the Federal budget will be significantly less than they would be if control costs had to be incurred at an earlier time.

In light of the NRC's criticism of WHITEX and the gross cost-benefit disparity of the 90% scrubber proposal in the draft NPRM, EPA has an ample basis for determining not to proceed with the proposal but instead to pursue a promising alternative technology test program.

CONCLUSION

The alternative approach described above offers substantial benefits to the Administration. First, it avoids imposition of massive costs on the economy of Arizona to produce little, if any, improvement in visibility in the Grand Canyon. Second, this approach allows the Administration to seize the initiative on an important environmental issue. By expediting creation of the Grand Canyon Visibility Transport Commission and engaging the Governors of the affected States in a formal process to study and make comprehensive recommendations concerning the entire regional haze problem, the Administration would seize the high ground in the debate and move effectively toward a long-term solution to the problem. This approach already has been adopted (some would say required) by Congress in the CAA Amendments.

The alternative plan might have the effect of pushing back slightly the date at which further pollution controls would be imposed at the NGS. The delay, if any, would not be significant, and the environmental costs would, at most, be a few more days a

current visibility levels compared to the enormous potential cost savings. If any delay occurs, it is more than counterbalanced by an important clean coal technology program, with potentially broad emissions reductions implications both for the NGS and for other low sulfur coal plants. And in the final analysis, the alternative approach is assured of producing substantial emissions reductions from the NGS within a period of time that is eminently reasonable and integrated with other related deadlines in the CAA Amendments.

For these reasons, we solicit your support for our proposal that EPA proceed with this alternative approach in lieu of the draft NPRM instituting a BART rulemaking.

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EPA's Authority to Adopt a Seasonal Control Strategy in Implementing BART

Statutory Setting

Section 169A of the Clean Air Act calls for best available retrofit technology (BART) emission limitations to address "reasonably attributable" visibility impairments in Class I areas. Any BART limit must require continuous emission controls on a source during any and all periods that the source's emissions are "reasonably attributable" to impairments in the Class I area. These controls are required for the purpose of making "reasonable progress" toward the goal of eliminating visibility impairments.

Section 123 of the Act prohibits noncontinuous controls based upon a program to reduce emissions on a temporary basis in response to changing meteorological conditions. While section 123 prohibits such "interim" or "supplemental" control strategies, it nowhere prohibits "seasonal" control strategies under which one continuous limit applies for certain months and another applies for the remaining months.

Factual Setting

EPA's proposed attribution finding is based exclusively on a finding that emissions from the Navajo Generating Station

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contribute to haze in the Grand Canyon National Park during winter months (December through February). There is no evidence in the rulemaking record that emissions are contributing to summer haze in the Park. To the contrary, evidence in the record demonstrates that summer hazes are not attributable to emissions from Navajo. Emissions from sources in southern California are the main cause of the summertime visibility impairments.

Discussion

BART limitations are to reflect a balance of visibility benefits and costs for the purpose of making "reasonable progress." Assuming, for the purposes of this paper, that the wintertime visibility improvements resulting from reducing current emissions at Navajo outweigh the costs, a continuous reduction in emissions at Navajo during winter months would be justified under section 169A of the Act. On the other hand, costly emission reductions at Navajo in the summer, when haze in the Park cannot be attributed to Navajo emissions, would not improve visibility. Such summertime reductions could not be justified as BART because they would not contribute to "reasonable progress."

The legal standard governing BART would allow EPA to impose a more stringent limitation only during winter months and would require EPA to recognize the current limitation as BART for the

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summer months. In other words, BART would be a more stringent continuous emission limitation during December, January, and February and would be the current continuous emission limitation for the remaining months.

BART limits, like limits to meet ambient standards, are result-oriented. They must be tailored to meet the statutory objective: achieving air quality of a specific level during those periods that air quality may exceed the regulatory standards. The Agency has long recognized that, where these ambient objectives can be achieved using a seasonal control strategy, such a strategy is authorized.

In 1977, EPA approved a revision to the Massachusetts state implementation plan establishing "a seasonal control strategy" for certain sources subject to SO₂ emission limitations.^{1/} Under that control strategy, sources were allowed to burn a higher-sulfur oil in the summer than in the winter. The Agency approved this summertime relaxation in the SIP emission limits on the grounds that "none of the sources being approved to burn the higher sulfur content fuel [in the summer] is predicted to cause or contribute to violations of the primary or secondary NAAQS for SO₂."^{2/}

^{1/} 42 Fed. Reg. 25730 col. 3 (1977); see also 44 Fed. Reg. 41179 col. 1 (1979).

^{2/} 42 Fed. Reg. at 25731 col. 1 (1977).

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In the case of SIP emission limitations to attain the ozone standards, the Agency on July 29, 1976, issued a policy statement authorizing a seasonal control strategy for certain sources using natural gas-fired afterburners to reduce hydrocarbon emissions. Under that policy, SIPs could allow the shutdown of such afterburners (and an increase in hydrocarbon emissions) during months in which the mean temperature was 50 degrees Fahrenheit or less. The policy was based on the scientific fact that ozone does not readily form at temperatures below 59 degrees Fahrenheit and the conclusion that the additional hydrocarbon emissions would not impair attainment of the air quality objective. This seasonal control strategy was reaffirmed in a December 19, 1978, memorandum extending it to another source category of hydrocarbon emissions.

Again, the ozone seasonal control strategy, which EPA reaffirmed after enactment of section 123 as part of the 1977 Amendments to the Act, recognizes that different continuous controls can be established on a defined seasonal basis where annual controls are not required to achieve the statutorily mandated end -- in this case, attainment of the ozone ambient air quality standard. This is the case because such seasonal controls are not "intermittent" or "supplemental" controls regulated under section 123.

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These contemporaneous interpretations of the 1977 Amendments recognize that seasonal controls are not "intermittent" controls as defined in section 123. Accordingly, seasonal controls at Navajo are fully consistent with these precedents. Unless EPA can establish that summertime controls at Navajo are needed to abate "reasonably attributable" impairments in the summer by showing that such controls will make "reasonable progress" in improving visual air quality in a class I area, a seasonal limitation is the only kind of limitation that the Agency can lawfully impose as BART.

Conclusion

Seasonal control strategies are not proscribed by section 123 of the Clean Air Act. They are a cost-effective approach to achieving the Act's ambient air quality objectives where it is demonstrated that more stringent controls are needed only during certain months of the year.

Any reversal of the Agency's position on the legal validity of "seasonal" control strategies in the Navajo proceeding could have major implications for other Clean Air Act programs. For example, such a reversal would undermine the basis for EPA's summertime-only controls on gasoline volatility, which the Agency designed to help achieve the national ambient air quality

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standard for ozone.^{1/} Such a reversal also would undermine the basis for EPA's approval of SIP revisions imposing seasonal gasoline volatility controls more stringent than federal controls.^{2/}

A seasonal emission limitation to implement section 169A of the Act is authorized by existing law. It is the only kind of limitation authorized in the case of Navajo because the only impairments that can be abated under the proposed attribution finding for the Grand Canyon National Park are impairments that are alleged to occur in winter months and are known not to occur in summer months.

^{1/} See 40 C.F.R. § 80.27 (1989); 54 Fed. Reg. 11868 (1989).

^{2/} See, e.g., 54 Fed. Reg. 26030 (1989) (approval of New York SIP revision); id. at 25572 (approval of New Jersey SIP revision); id. at 23650 (approval of Connecticut and Rhode Island SIP revisions); id. at 19173 (approval of Massachusetts SIP revision).

January 15, 1991

PHOTOGRAPHS OF HAZE IN THE GRAND CANYON

Attached are two sets of photographs relevant to EPA's proposed NPRM to initiate a BART rulemaking for the Navajo Generating Station.

1. Chestnut & Rowe Photographs. The first exhibit consists of two photographs (labelled A and C) which were used by Chestnut & Rowe in asking their respondents how much they might be willing to pay for a change in visibility in the Grand Canyon. The Chestnut & Rowe study lies at the heart of the EPA benefits work that purportedly justifies initiating the rulemaking.

As you will see, there is a dramatic difference in the images in the two photographs. Chestnut & Rowe claims that the visibility is 155 km for photo C and 250 km for photo A, or a 61% improvement in visual range. The principal difference in the photos, however, is the dramatically different manner in which the Canyon cliffs are lighted. In photo C, they are dull, while in photo A, they are colorful and vibrant.

This color change principally results from the fact that photo A, the "good" visibility photo, was taken during January, when the sun is lower in the sky and thus more clearly illuminates the cliffs. By contrast, photo C, the "bad" visibility photo, was taken during summer, when the higher sun angle produces muted tones. Chestnut & Rowe therefore essentially asked respondents to place a monetary value on a seasonal change in lighting conditions, rather than on a small incremental change in the winter visual range.

The disparity in lighting conditions between the two photos irretrievably biases the Chestnut & Rowe study and makes their willingness to pay data worthless.¹

¹There are other reasons to conclude that this "willingness to pay" analysis is hopeless flawed: e.g., they asked respondents to value the preservation of the Canyon from irreversible effects in perpetuity, rather than asking them to value visibility for the remaining useful life of the plants; they attempted to extrapolate willingness to pay for small changes in discrete seasons of the year from responses to large visibility changes that last forever and affect all seasons of the year; and use of an improper survey technique -- conducting the study through the mail -- that eliminates a large portion of the total population and has a high self-selection bias.

2. Possible Visibility Changes from BART Action. The second exhibit consists of two photos (labelled B and D) that help illustrate the visibility changes that are 50% greater than the most optimistic projections of improvement under EPA's BART proposal. These photographs were taken by the National Park Service during the WHITEX study, and show the Grand Canyon at 1:00 p.m. on February 13 and 17, 1987 respectively. One of these photographs has a visual range of 45 km; the other has a visual range of 135 km, for a percentage change of 195%. According to the draft NPRM, the EPA BART proposal would produce a maximum change of 154% in the visual range. Thus, the change in the visual range represented by these two photos is substantially greater than the maximum improvement that a BART decision could produce.

The small difference between photos B and D supports two points:

a. It reinforces the validity of the benefits study conducted for NGS by DFI, which suggested that people have an extremely low willingness to pay for the degree of visual improvement contemplated by the BART rule; and

b. It demonstrates that the BART rule would produce little, if any, discernable improvement in visibility in the Grand Canyon during winter, and that even this greater change in visibility than EPA claims is possible from BART is not worth the enormous expenditures required.

§ 7491. Visibility protection for Federal class I areas

(a) Impairment of visibility; list of areas; study and report

(1) 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 manmade air pollution.

(2) Not later than six months after August 7, 1977, the Secretary of the Interior in consultation with other Federal land managers shall review all mandatory class I Federal areas and identify those where visibility is an important value of the area. From time to time the Secretary of the Interior may revise such identifications. Not later than one year after August 7, 1977, the Administrator shall, after consultation with the Secretary of the Interior, promulgate a list of mandatory class I Federal areas in which he determines visibility is an important value.

(3) Not later than eighteen months after August 7, 1977, the Administrator shall complete a study and report to Congress on available methods for implementing the national goal set forth in paragraph (1). Such report shall include recommendations for—

(A) methods for identifying, characterizing, determining, quantifying, and measuring visibility impairment in Federal areas referred to in paragraph (1), and

(B) modeling techniques (or other methods) for determining the extent to which manmade air pollution may reasonably be anticipated to cause or contribute to such impairment, and

(C) methods for preventing and remedying such manmade air pollution and resulting visibility impairment.

Such report shall also identify the classes or categories of sources and the types of air pollutants which, alone or in conjunction with other sources or pollutants, may reasonably be anticipated to cause or contribute significantly to impairment of visibility.

(4) Not later than twenty-four months after August 7, 1977, and after notice and public hearing, the Administrator shall promulgate regulations to assure (A) reasonable progress toward meeting the national goal specified in paragraph (1), and (B) compliance with the requirements of this section.

(b) Regulations

Regulations under subsection (a)(4) of this section shall—

(1) provide guidelines to the States, taking into account the recommendations under subsection (a)(3) of this section on appropriate techniques and methods for implementing this section (as provided in subparagraphs (A) through (C) of such subsection (a)(3)), and

(2) require each applicable implementation plan for a State in which any area listed by the Administrator under subsection (a)(2) of this section is located (or for a State the emissions from which may reasonably be anticipated to cause or contribute to any impairment of visibility in

any such area) to contain and other measures as it toward meeting the national goal, including—

(A) except as otherwise provided in this section, a requirement which is in existence at the time of the plan promulgated under this section for any pollutant which may contribute to any impairment of visibility, and thereafter the best practicable control measure (or the State (or the Administrator) under section 7410(c) of this title) for such source for the impairment, and

(B) a long-term strategy for attaining progress toward meeting the national goal (a) of this section.

In the case of a fossil-fuel fired powerplant with a rated capacity in excess of 75 megawatts, under this paragraph shall be determined by the Administrator under

(1) The Administrator may, after a public hearing, exempt any major source from subsection (b)(2)(A) of this section if it does not or will not, by itself, emit any air pollutant which may reasonably be anticipated to cause a significant impairment of visibility in any such area.

(2) Paragraph (1) of this section shall not apply to a fossil-fuel fired powerplant with a rated capacity of 75 megawatts or less unless the owner or operator of the powerplant has been notified by the Administrator that the powerplant is located in an area listed by the Administrator under subsection (a)(2) of this section that such powerplant, in combination with other sources, may reasonably be anticipated to cause or contribute to any impairment of visibility in any such area.

(3) An exemption under this subsection shall be in accordance with the appropriate criteria and procedures of the Administrator's determination.

any such area) to contain such emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress toward meeting the national goal specified in subsection (a) of this section, including—

(A) except as otherwise provided pursuant to subsection (c) of this section, a requirement that each major stationary source which is in existence on August 7, 1977, but which has not been in operation for more than fifteen years as of such date, and which, as determined by the State (or the Administrator in the case of a plan promulgated under section 7410(c) of this title) emits any air pollutant which may reasonably be anticipated to cause or contribute to any impairment of visibility in any such area, shall procure, install, and operate, as expeditiously as practicable (and maintain thereafter) the best available retrofit technology, as determined by the State (or the Administrator in the case of a plan promulgated under section 7410(c) of this title) for controlling emissions from such source for the purpose of eliminating or reducing any such impairment, and

(B) a long-term (ten to fifteen years) strategy for making reasonable progress toward meeting the national goal specified in subsection (a) of this section.

In the case of a fossil-fuel fired generating powerplant having a total generating capacity in excess of 750 megawatts, the emission limitations required under this paragraph shall be determined pursuant to guidelines, promulgated by the Administrator under paragraph (1).

(c) Exemptions

(1) The Administrator may, by rule, after notice and opportunity for public hearing, exempt any major stationary source from the requirement of subsection (b)(2)(A) of this section, upon his determination that such source 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 mandatory class I Federal area.

(2) Paragraph (1) of this subsection shall not be applicable to any fossil-fuel fired powerplant with total design capacity of 750 megawatts or more, unless the owner or operator of any such plant demonstrates to the satisfaction of the Administrator that such powerplant is located at such distance from all areas listed by the Administrator under subsection (a)(2) of this section 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 significant impairment of visibility in any such area.

(3) An exemption under this subsection shall be effective only upon concurrence by the appropriate Federal land manager or managers with the Administrator's determination under this subsection.

(d) Consultations with appropriate Federal land managers

Before holding the public hearing on the proposed revision of an applicable implementation plan to meet the requirements of this section, the State (or the Administrator, in the case of a plan promulgated under section 7410(c) of this title) shall consult in person with the appropriate Federal land manager or managers and shall include a summary of the conclusions and recommendations of the Federal land managers in the notice to the public.

(e) Buffer zones

In promulgating regulations under this section, the Administrator shall not require the use of any automatic or uniform buffer zone or zones.

(f) Nondiscretionary duty

For purposes of section 7604(a)(2) of this title, the meeting of the national goal specified in subsection (a)(1) of this section by any specific date or dates shall not be considered a "nondiscretionary duty" of the Administrator.

(g) Definitions

For the purpose of this section—

(1) In determining reasonable progress there shall be taken into consideration the costs of compliance, the time necessary for compliance, and the energy and nonair quality environmental impacts of compliance, and the remaining useful life of any existing source subject to such requirements;

(2) in determining best available retrofit technology the State (or the Administrator in determining emission limitations which reflect such technology) shall take into consideration the costs of compliance, the energy and nonair quality environmental impacts of compliance, any existing pollution control technology in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology;

(3) the term "manmade air pollution" means air pollution which results directly or indirectly from human activities;

(4) the term "as expeditiously as practicable" means as expeditiously as practicable but in no event later than five years after the date of approval of a plan revision under this section (or the date of promulgation of such a plan revision in the case of action by the Administrator under section 7410(c) of this title for purposes of this section);

(5) the term "mandatory class I Federal areas" means Federal areas which may not be designated as other than class I under this part;

(6) the terms "visibility impairment" and "impairment of visibility" shall include reduction in visual range and atmospheric discoloration; and

(7) the stationary pollutant: lion British (thermal d zinc smelte tion plants of charging ric, and nit rock proces bon black sion plants chemical p British ther fer facilitie processing facilities.

(July 14, 1955, c. § 128, 91 Stat. 7

¹ So in original. F

Effective Date.
1977, except as oth
see section 406(d) c
an Effective Date
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Emission standards
New stationary sou

Health and Enviro

1. Mandatory cla
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PART D—

Federally permitte
regulation
Compensati

(7) the term "major stationary source" means the following types of stationary sources with the potential to emit 250 tons or more of any pollutant: fossil-fuel fired steam electric plants of more than 250 million British thermal units per hour heat input, coal cleaning plants (thermal dryers), kraft pulp mills, Portland Cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants, primary copper smelters, municipal incinerators¹ capable of charging more than 250 tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnace process), primary lead smelters, fuel conversion plants, sintering plants, secondary metal production facilities, chemical process plants, fossil-fuel boilers of more than 250 million British thermal units per hour heat input, petroleum storage and transfer facilities with a capacity exceeding 300,000 barrels, taconite ore processing facilities, glass fiber processing plants, charcoal production facilities.

(July 14, 1955, c. 360, Title I, § 169A, as added Aug. 7, 1977, Pub.L. 95-95, Title I, § 128, 91 Stat. 742.)

¹ So in original. Probably should be "incinerators".

Historical Note

Effective Date. Section effective Aug. 7, 1977, except as otherwise expressly provided, see section 406(d) of Pub.L. 95-95, set out as an Effective Date of 1977 Amendment note under section 7401 of this title.

Legislative History. For legislative history and purpose of Pub.L. 95-95, see 1977 U.S. Code Cong. and Adm. News, p. 1077.

Code of Federal Regulations

Emission standards for hazardous pollutants, see 40 CFR 61.01 et seq.
New stationary sources, performance standards for, see 40 CFR 60.1 et seq.

Library References

Health and Environment § 25.6(3).

C.J.S. Health and Environment § 92.

Notes of Decisions

1. Mandatory class I areas

Determination by Administrator that wilderness area exceeded five thousand acres in size on relevant statutory date such that it was a mandatory Class I federal area and subject to visibility protection under this section was neither arbitrary nor capricious,

where it was objectively impossible to determine the exact acreage of the area and the Secretary of the Interior had determined that a designation of approximately 5,000 acres was appropriate. *Chevron U.S.A., Inc. v. U.S. Environmental Protection Agency*, C.A. 5, 1981, 658 F.2d 271.

PART D—PLAN REQUIREMENTS FOR NONATTAINMENT AREAS

Cross References

Federally permitted release defined to include emissions into air subject to permit or control regulation under this part for purposes of Comprehensive Environmental Response, Compensation, and Liability Act of 1980, see section 9601 of this title.

the current or projected interstate transport of air pollutants from one or more States contributes significantly to visibility impairment in class I areas located in the affected States, the Administrator may establish a transport region for such pollutants that includes such States. The Administrator, upon the Administrator's own motion or upon petition from the Governor of any affected State, or upon the recommendations of a transport commission established under subsection (b) of this section may—

"(A) add any State or portion of a State to a visibility transport region when the Administrator determines that the interstate transport of air pollutants from such State significantly contributes to visibility impairment in a class I area located within the transport region, or

"(B) remove any State or portion of a State from the region whenever the Administrator has reason to believe that the control of emissions in that State or portion of the State pursuant to this section will not significantly contribute to the protection or enhancement of visibility in any class I area in the region.

"(2) VISIBILITY TRANSPORT COMMISSIONS.—Wherever the Administrator establishes a transport region under subsection (c)(1), the Administrator shall establish a transport commission comprised of (as a minimum) each of the following members:

"(A) the Governor of each State in the Visibility Transport Region, or the Governor's designee;

"(B) The Administrator or the Administrator's designee; and

"(C) A representative of each Federal agency charged with the direct management of each class I area or areas within the Visibility Transport Region.

"(3) All representatives of the Federal Government shall be ex officio members.

"(4) The visibility transport commissions shall be exempt from the requirements of the Federal Advisory Committee Act (5 U.S.C. Appendix 2, Section 1).

"(d) DUTIES OF VISIBILITY TRANSPORT COMMISSIONS.—A Visibility Transport Commission—

"(1) shall assess the scientific and technical data, studies, and other currently available information, including studies conducted pursuant to subsection (a)(1), pertaining to adverse impacts on visibility from potential or projected growth in emissions from sources located in the Visibility Transport Region; and

"(2) shall, within 4 years of establishment, issue a report to the Administrator recommending what measures, if any, should be taken under the Clean Air Act to remedy such adverse impacts. The report required by this subsection shall address at least the following measures:

"(A) the establishment of clean air corridors, in which additional restrictions on increases in emissions may be appropriate to protect visibility in affected class I areas;

"(B) the imposition of the requirements of part D of this title affecting the construction of new major stationary sources or major modifications to existing sources in such clean air corridors specifically including the alternative siting analysis provisions of section 173(a)(5); and

"(C) the promulgation of regulations under section 169A to address long range strategies for addressing regional haze which impairs visibility in affected class I areas.

"(e) DUTIES OF THE ADMINISTRATOR.—(1) The Administrator shall, taking into account the studies pursuant to subsection (a)(1) and the reports pursuant to subsection (d)(2) and any other relevant information, within

eighteen months of receipt of the report referred to in subsection (d)(2) of this section, carry out the Administrator's regulatory responsibilities under section 169A, including criteria for measuring 'reasonable progress' toward the national goal.

"(2) Any regulations promulgated under section 169A of this title pursuant to this subsection shall require affected States to revise within 12 months their implementation plans under section 110 of this title to contain such emission limits, schedules of compliance, and other measures as may be necessary to carry out regulations promulgated pursuant to this subsection.

"(f) GRAND CANYON VISIBILITY TRANSPORT COMMISSION.—The Administrator pursuant to subsection (c)(1) shall, within 12 months, establish a visibility transport commission for the region affecting the visibility of the Grand Canyon National Park."

SEC. 116. VISIBILITY.

Subpart 2 of part C of title I of the Clean Air Act is amended by adding the following new section at the end thereof:

"SEC. 116. VISIBILITY.

"(a) STUDIES.—(1) The Administrator, in conjunction with the National Park Service and other appropriate Federal agencies, shall conduct research to identify and evaluate sources and source regions of both visibility impairment and regions that provide predominantly clean air in class I areas. A total of \$8,000,000 per year for 5 years is authorized to be appropriated for the Environmental Protection Agency and the other Federal agencies to conduct this research. The research shall include—

"(A) expansion of current visibility related monitoring in class I areas;

"(B) assessment of current sources of visibility impairing pollution and clean air corridors;

"(C) adaptation of regional air quality models for the assessment of visibility;

"(D) studies of atmospheric chemistry and physics of visibility.

"(2) Based on the findings available from the research required in subsection (a)(1) as well as other available scientific and technical data, studies, and other available information pertaining to visibility source-receptor relationships, the Administrator shall conduct an assessment and evaluation that identifies, to the extent possible, sources and source regions of visibility impairment including natural sources as well as source regions of clear air for class I areas. The Administrator shall produce interim findings from this study within 3 years after enactment of the Clean Air Act Amendments of 1990.

"(b) IMPACTS OF OTHER PROVISIONS.—Within 24 months after enactment of the Clean Air Act Amendments of 1990, the Administrator shall conduct an assessment of the progress and improvements in visibility in class I areas that are likely to result from the implementation of the provisions of the Clean Air Act Amendments of 1990 other than the provisions of this section. Every 5 years thereafter the Administrator shall conduct an assessment of actual progress and improvement in visibility in class I areas. The Administrator shall prepare a written report on each assessment and transmit copies of these reports to the appropriate committees of Congress.

"(c) ESTABLISHMENT OF VISIBILITY TRANSPORT REGIONS AND COMMISSIONS.—

"(1) AUTHORITY TO ESTABLISH VISIBILITY TRANSPORT REGIONS.—Wherever, upon the Administrator's motion or by petition from the Governors of at least two affected States, the Administrator has reason to believe that

FACT SHEET

U.S. DISTRICT COURT DECISION

NGS VISIBILITY IMPAIRMENT

U.S. District Court Judge James M. Ideman has granted the motion (EDF v. Raily, Northern District of California) of the Salt River Project to extend the deadline for EPA's regulatory process concerning visibility in the Grand Canyon.

Under the settlement agreement previously reached in EDF v. Raily, the Court had ordered EPA to adhere to a timetable which called for a finding whether visibility impairment in the Grand Canyon was reasonably attributable to the Navajo Generating Station and for EPA to propose by February 1, 1990 whether there was a need for additional emission controls. The order, issued January 9 by Judge Ideman, gives EPA the discretion to postpone that deadline until February 1, 1991.

In the SRP argument that an enormous expenditure is not justified in light of the minimal help it could render to visibility concerns, the Court found that the possible expenditure of \$1.6 billion dollars for emission controls constituted a showing of good cause for adjustment of the regulatory timetable. "Such an enormous expense would eventually be passed on to utility consumers for years to come," the Court stated. "This overwhelming possibility requires the Court to extend the time limits of the order."

The SRP motion argued that, under the tight deadlines agreed to in the settlement, EPA was not permitted to take the time necessary to do a scientifically credible job in determining whether there was a visibility impairment in the Grand Canyon that was reasonably attributable to Navajo and, in any event, what its regulations required EPA to do about any impairment that may exist.

The SRP motion further explained that under the prior deadlines:

- o the EPA had based its proposed visibility impairment attribution on preliminary results from a draft report on the WHITEX experiment which suffers from a number of scientific flaws.
- o the EPA has not responded to scientific criticism leveled at that draft report.

- o the EPA did not have the time to consider formal public comments on the attribution proposal published in The Federal Register before it began its regulatory analysis regarding the need for additional emission controls at Navajo.
- o the EPA regulatory process was being pursued with novel analytical techniques that have not been approved and that are of unknown validity.
- o the EPA would not be able to consider the results of a comprehensive field study being conducted by SRP to provide all the data necessary to support rational regulatory decisions and to alleviate the flaws in the WHITEX experiment.

Under the Court's new order, EPA will have the discretion to review the available evidence and to determine whether it should use the time provided by the court to assemble a complete and accurate rulemaking record. With such a record, the Agency would have the factual information necessary to decide whether Navajo should be regulated and, in any event, what the appropriate course should be to protect the visibility in the Grand Canyon.

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

ENVIRONMENTAL DEFENSE FUND,
INC., et al.,

CV 82-6850 RPA

Plaintiffs,

ORDER GRANTING INTERVENORS'
MOTION RE: DEADLINE
EXTENSION

v.

WILLIAM K. REILLY,
Administrator of the United
States Environmental
Protection Agency,

Defendant,

ALABAMA POWER COMPANY, et al.,
SALT RIVER PROJECT, et al.,
et al.,

Intervenors.

IT IS HEREBY ORDERED:

1. Intervenors' Motion to Extend Deadlines for Rulemaking is
hereby GRANTED.

2. Intervenors contend that the Environmental Protection
Agency's (hereinafter the EPA) rulemaking deadlines should be
extended so that Intervenors can conduct their own studies of

1 visibility impairment in the Grand Canyon. They assert that
2 these studies would show that Interveners are not liable for the
3 problem and that imposition of BART technology would be
4 prohibitively costly and useless in addressing the visibility
5 problem. Interveners also contend that additional time would
6 allow the EPA to more fully consider that Interveners' comments
7 on the proposal. Interveners further contend that the EPA has
8 used the Court-imposed deadlines to avoid compliance with certain
9 procedural laws.

10 3. The Supreme Court has stated that "[a]bsent
11 constitutional constraints or extremely compelling circumstances
12 the 'administrative agencies 'should be free to fashion their own
13 rules of procedure and to pursue methods of inquiry capable of
14 permitting them to discharge their multitudinous duties.'" [cite
15 omitted.] vt. Yankee Nuclear Power v. Natural Resources Defense
16 Council, 435 U.S. 519, 543 (1978). The Court also stated that
17 "for more than four decades [it has] emphasized that the
18 formulation of procedures was basically to be left within the
19 discretion of the agencies to which Congress had confided the
20 responsibility for substantive judgments." *Id.* at 524.

21 4. The Clean Air Act (hereinafter the CAA) states that
22 rulemaking procedures lie within the control and direction of the
23 Administrator of the EPA and the CAA further directs the
24 Administrator how to carry out his or her duties and
25 responsibilities. 42 U.S.C. (7607. The Code further states
26 that "[t]he sole forum for challenging procedural determinations
27

made by the Administrator under this subsection shall be in the United States court of appeals for the appropriate circuit . . . at the time of the substantive review of the rule." 42 U.S.C. (7607(d)(8)).

5. Paragraph 6 of the Order approved in the present case by this Court on April 30, 1984 states that the "time limits" contained in the Order may be extended "by the court" upon a showing of good cause.

In the case at bar, Intervenor argues that the final outcome of the rulemaking will result in a \$1.6 billion dollar expenditure by the Intervenor. 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

1 on the EPA. Additionally, the parties will have the opportunity
2 to raise their procedural claims to the Court of Appeals,
3 pursuant to the CAA. Therefore, this Court grants the
4 Intervenor's motion to extend the EPA's rulemaking deadlines.

5 6. The provisions of the amended stipulation approved by
6 Order of this court on July 6, 1989, are hereby modified as
7 follows:

8 (1) Paragraph 4(m) is modified by changing "February 1,
9 1990" to "February 1, 1991."

10 (2) Paragraph 4(n) is modified by insertion in lieu
11 thereof the following paragraph:

12 "4(n) If a proposal is issued pursuant to Paragraph
13 4(m), provide that the comment period shall close by a
14 date not later than April 2, 1991, unless the
15 Administrator extends the comment period for good cause
16 shown;"

17 (3) Paragraph 4(o) is modified by insertion in lieu
18 thereof the following paragraph:

19 "4(o) If a proposal is issued pursuant to Paragraph
20 4(m), take final action on that proposal and on any
21 proposed identification under Paragraph 4(1) not later
22 than October 2, 1991, or, if later, 6 months after the
23

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close of the comment period on the proposal made
pursuant to Paragraph 4(m) or the close of the record
under section 307(d)(5)(iv) of the Clean Air Act."
IT IS SO ORDERED.

DATED: Jan. 9, 1990

James M. Ideman

JAMES M. IDEMAN
United States District Judge