BURNER MODIFICATIONS - PRELIMINARY TEST RESULTS

Unit 1 - Summary Burner Modifications:

Replacement of the Unit 1's original B&W burners in the Spring, 92 outage are summarized:

1. All original low Nox burners were replaced with new low Nox burners having a modified design to resolve certain mechanical problems. Intent of the burner changeout was to increase the mechanical life of the burners without affecting Nox levels.

Burner Fabrication Cost:	$1,582,000
Installation Cost:	$ 100,000
Consultant's Review:	$ 46,000
Total:	$1,728,000

2. All new burners were fitted with a flame stabilizer to mechanically resolve air flow concerns.

Stabilizer Cost:	$ 86,400
Installation Cost:	included in burner installation
Total:	$ 86,400

3. Secondary air flow balancing through the burners was also conducted. Shrouding was added to the outer air registers to vary the restriction through each burner. Back plate settings were used to balance the inner air flows. The objective was to balance the inner and outer air flows through each burner to within ±5 percent.

   Test and Analysis Cost: $ 74,000

4. Fuel balancing performed by changing and/or installing new restrictors in transport lines.

Materials:	$ 54,000
Labor:	$ 21,000
Total:	$ 75,000

Total Unit 1 Expenditures: $1,963,400

BURNER MODIFICATIONS - PRELIMINARY TEST RESULTS

Unit 2 - Summary Burner Modifications:

Modifications, and their objectives, that were made to Unit 2's original B&W burners in the Fall, 91 outage are summarized below:

1. Installation of flame stabilizers in the inner zone on all 48 burners. Stabilizers were added to address burner overheat and mechanical deterioration. The objective was to significantly lower the maximum backplate temperature on the outer air registers.

Stabilizer Cost:	$ 86,400
Labor:	$ 40,000
Total:	$ 126,400

2. Secondary air flow balancing through the burners was also conducted. Shrouding was added to the outer air registers to vary the restriction through each burner. Back plate settings were used to balance the inner air flows. The objective was to balance the inner and outer air flows through each burner to within ±5 percent. Perimeter loading around the burner, both inner and outer zones, was targeted for ±10 percent.

   Testing and Analysis: $ 74,000

3. Burner register settings were changed to reduce the amount of overswirl in the outer air zone and to achieve an improved flame shape. The objective was to move the flame out away from the nozzle tip, reduce the occurrence of eyebrows and prevent recirculation of flue gases back into the burner.

   No Cost

4. Fuel flow balancing was also conducted which consisted of adding and changing coal line restrictors. Ten new restrictors were added and thirteen changes were made to orifice sizing on existing restrictors. These changes were made to improve fuel to air flow ratios in potentially rich or lean zones. The objective was to balance cold primary air flow to within ±3 percent. Pre and post testing was performed.

Material Cost:	$ 23,000
Labor:	$ 21,000
	$ 44,000

Total Unit 2 Expenditures: $244,400

Total expenditures for Units 1 and 2: $2,207,800

Intermountain Generating Station
Yearly Emission Average
(lbs/mmbtu)

Year	Unit 1	Unit 2
1990	.379	.349
1991	.372	.347
1992	.389	.374
1993*	.388	.374

* January 1, 1993 - November 30, 1993

VAN NESS, FELDMAN & CURTIS
A Professional Corporation

MEMORANDUM

December 7, 1993

TO: LPPC Membership

FROM: Stephen C. Fotis

RE: Early Election Letter

Please find attached a copy of the draft LPPC letter to EPA on retaining the early election option in the final NOx acid rain rule. Please provide me with your comments as soon as possible, but by no later than Monday, December 13. Again, thanks for your assistance on this important LPPC matter.

Attachment

Post-It™ brand fax transmittal memo 7671	# of pages ▸ 6
To Lynn Banks	From Jodean Giese
Co. IPSC	Co. LADWP
Dept.	Phone # 213 367-0409
Fax # 801 864-4970	Fax # 213 367-0210

Draft

December 7, 1993

Brian McLean
Director
Acid Rain Division
Environmental Protection Agency
[Street Address]
Washington, D.C. [zip code]

Re: LPPC's Response to Recent Reports regarding the Early Election Option Contained in the Proposed NOX Acid Rain Rule, Air Docket No. A-93-15

Dear Mr. McLean:

This letter sets forth the Large Public Power Council's (LPPC's) response to reports that the Environmental Protection Agency (EPA) may not retain in the final NOx acid rain rule its proposal for the "early election" of Phase II units with tangentially-fired or dry bottom wall-fired boilers (Group 1 boilers). Specifically, we would like to respond to EPA's reported concerns about the environmental consequences of allowing these Phase II units to be "grandfathered" at their applicable Phase I limits for electing to achieve early compliance with those limits.

LPPC is an association consisting of 18 of the largest non-federal, publicly owned electric utilities in the nation.[1/]

1/ The LPPC association is geographically diverse, with members from New York to Los Angeles and Seattle to Florida. The combined population within the LPPC service territory totals nearly 15 million consumers. A list of LPPC members is attached hereto in Appendix A.

LPPC has been actively involved in the development of regulations to implement the acid rain program of the 1990 CAA Amendments. Among other things, LPPC has sought to provide EPA with technical information and policy views in support of final

(continued...)

Through the Acid Rain Advisory Committee process and other meetings with your staff, LPPC has supported the adoption of the early election option for Phase II units with Group 1 boilers. We also submitted detailed comments to the proposed NOx rule which outlined many of the compelling environmental, economic, and electric reliability reasons for the early election program. Although these reasons will not be reiterated here, LPPC would like to provide you and your staff with additional technical information on the environmental benefits that would accrue through the implementation of EPA's proposed early compliance option.

The proposed NOx rule identifies three categories of utility units eligible for the early election option. These include Phase II units with Group 1 boilers for which the utility has undertaken one of the following early election options prior to the promulgation of applicable revised NOx limits:

- commenced installation, fabrication, or erection of low-NOx burner (LNB) technology;
- initiated some other NOx emissions control strategy (including "fuel switching or boiler operational changes that reduce NOx emissions for the unit"); or
- notified EPA of an affirmative commitment to comply with the applicable Phase I NOx limitations through operation of existing NOx controls.

The following discussion provides a summary of the very substantial early NOx reductions that would likely be achieved and maintained by specific LPPC coal-fired units as a result of the early reduction option. As described in greater detail below, these actual NOx reductions will exceed [120,000] tons over the three years of the early election program (e.g., 1997-1999). Additional voluntary NOx reductions would also be maintained at LPPC units that agree to comply early with the applicable more stringent Phase I limits through existing NOx controls.

Early NOx Reductions from LPPC Units

LPPC members own and/or operate 42 coal-fired units with a total generating capacity of approximately [20,600] MW. All but two of these units are Phase II units not subject to any NOx control requirements during Phase I of the acid rain program. In addition, 37 of the 40 LPPC Phase II units have Group 1 boilers which are eligible for the early election option. Of these

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1/ (...continued)
acid regulations that are environmentally beneficial and cost-effective to the electric utility industry.

IP7_004154

units, 19 are currently not subject to NOx limitations and the remaining 18 units are subject to NOx limits less stringent than the applicable Phase I limits. As a general matter, the early election option provides LPPC members with a strong incentive to commit early to the use of more effective NOx controls at these units.

This fact was corroborated through a recent survey of LPPC members on the early election option. In particular, the following survey results demonstrate that very substantial NOx reductions would be achieved and maintained by LPPC members for each of the three categories of early election units.

Installation of LNB Technology. Many LPPC members have scheduled burner maintenance and repair work for their Phase II, Group 1 boilers prior to 1997. If EPA retained the early election option in the final rule, these members indicated in the survey a willingness to install more effective NOx controls in order to achieve the applicable presumptive limits. These efforts would consist of either (1) upgrading LNB hardware already installed on the unit, or (2) installing entirely new LNB technology in cases where the unit was operating without such hardware. A summary of these efforts are as follows:

- Two LPPC members would upgrade existing LNB technology at six coal-fired units with a total generating capacity of approximately [3,354] MW. These burner upgrades would result in estimated NOx emissions reductions of [9,587] tons per year (tpy) and [28,761] tons over the three years of the early election program (e.g., 1997-1999).

- Six LPPC members would install entirely new LNB technology at nine units with total generating capacity of approximately 3,184 MW. The installation of these new controls would translate into estimated NOx reductions of about [23,336] tpy and [70,008] tons over the 1997-1999 period.

The above survey results show that, as a result of EPA's proposed early election mechanism, seven LPPC members would likely undertake some type of LNB installation at 15 Phase II units with a generating capacity exceeding 6,500 MW. The estimated NOx reductions from these units would be approximately [99,000] tons over the three-year Phase I period.

Combustion Fineturning. The early election option is also available for utilities initiating some other NOx control strategy, including "boiler operational changes that NOx emissions for the unit." This option is especially useful for a significant number of LPPC units, which already have been installed with state-of-the-art LNB technology. For these units, the most cost-effective NOx control option is the application of

IP7_004155

combustion finetuning techniques designed to optimize NOx reductions achievable with the installed LNB technology.[2]

Survey results indicate that six LPPC members would consider implementing these NOx optimization techniques to ensure compliance with the NOx presumptive limits.[3] In five cases, the LPPC member would implement the techniques on seven units with existing LNB hardware in order to achieve NOx reductions totalling [xxxx] tpy. In the remaining situation, the LPPC member would be implementing the optimization techniques on five units which use a less polluting fuel to control NOx emissions. The annual reductions achievable from these units would be approximately [xxxx] tpy.

Again, these optimization efforts would translate into substantial NOx emissions reductions over the three-year early election period. In particular, total reductions for this category of LPPC units would be almost [23,000] tons from 1997 through 1999.

<u>Commitment for Early Compliance</u>. Two LPPC members indicated that they own five coal-fired units for which LNB technology and other optimization techniques were implemented prior to the November 15, 1990. In cases, these units achieve NOx rates well below their existing permitted limits as well as their applicable Phase I limits.

For example, one LPPC member has installed LNB technology on a 460 MW unit which is capable of achieving an annual NOx rate of about 0.3 lbs/mmBtu. The member is able to maximize its reductions to the 0.3 lbs/mmBtu level through a variety of good combustion practices and voluntarily switching from lignite -- which is the design fuel for the boiler -- to [a more expensive]

2/ These techniques are being developed by the Electric Power Research Institute as well as various NOx technology vendors. Projected reductions are expected to be in the range of 10 percent of the unit's current NOx levels, although the optimization techniques have achieved higher reduction levels in some cases. In the case of the surveyed LPPC units, the NOx reduction estimates are based on the more conservative performance capabilities of currently available optimization techniques.

3/ In most cases, these LPPC units achieve NOx rates which are just above or below the applicable Phase I presumptive limits.

coal with a much higher Btu heating value than the lignite. This effort results in actual NOx reductions of about 2,893 tpy.[5/]

Substantial early NOx reductions also are currently be achieved by the other four LPPC units with a generating capacity of 3,420 MW. Two of these LPPC units have no NOx emission limit, while the other two are subject to a NOx limit of 0.55 lbs/mmBtu limit. Through voluntary efforts, this particular LPPC member is able to achieve early NOx reductions of [xxxx] tpy.

Both of these LPPC members have expressed a willingness to commit their units to more stringent Phase I limits if EPA were to retain the early election option in the final NOx rule. This commitment would place substantial constraints on the operation of, and fuel options available for, these units. Although no additional NOx reductions may result from additional NOx control measures taken after November 15, 1990, the early election option will help ensure that these LPPC members continue to take affirmative measures to maximize the NOx reductions achievable on these five units. Furthermore, it would send the correct message to the utilities that voluntarily undertake measures to reduce their NOx emissions. This message is that utilities will be rewarded, not penalized, for exceeding the CAA requirements and operating their power plants in the most environmentally beneficial manner.

LPPC appreciates the opportunity to provide you and your staff with this additional information on the environmental benefits of the proposed early election program. As discussed above, we believe that substantial NOx reductions will in fact be achieved and maintained as a result of this program. We urge that EPA retain the early election option, as provided in the proposed NOx rule.

Again, we thank you for your attention regarding this important matter. If you should have any comments or questions, please do not hesitate to contact me at 202\298-1908.

Sincerely,

Stephen C. Fotis
Counsel for LPPC

5/ These reductions are calculated by comparing the unit's actual NOx emissions against the NOx emissions that the unit would have emitted at the permitted (0.5 lbs/mmBtu) rate with the same actual Btu input.

IP7_004157