United States of America
Before the
Federal Energy Regulatory Commission

Joint Application of the Jurisdictional	**)**	
Subsidiaries of American Electric Power, Inc.	**)**	**Docket Nos. EC98-40-000, et al.**
And Central and South West Corporation	**)**	
For Authorization and Approval of Merger	**)**	

Testimony of

Bruce E. Biewald

On Behalf of

The Environmental Coalition

April 27, 1999

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Exhibits

Testimony of Bruce E. Biewald

Q. State your name, occupation and business address.

A. My name is Bruce Edward Biewald. My address is Synapse Energy Economics, Inc., 22 Crescent Street, Cambridge, Massachusetts, 01238.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of the Environmental Coalition, which consists of the Environmental Law and Policy Center of the Midwest, Citizens Action Coalition of Indiana, the Hoosier Environmental Council, Ohio Citizen Action, and the Ohio Environmental Council.

Q. What is the purpose of your testimony in this case?

A. I was retained by the Environmental Coalition to review the filing of AEP and CSW, and to comment on issues related to horizontal market power and barriers to entry created by differential environmental regulations.

1. Qualifications

Q. Please describe your current employment.

A. I am President of Synapse Energy Economics, Inc., a consulting firm specializing in economic and policy analysis of electricity industry restructuring particularly issues relating to consumer protection, market power, stranded costs, renewable energy, efficiency, and environmental quality.

Q. What are your qualifications in the fields of electric utility regulation and energy policy?

A. I graduated from the Massachusetts Institute of Technology in 1981, where I studied energy use in buildings. I was employed for fifteen years at the Tellus Institute where, as Manager of the Electricity Program, I was responsible for studies on a broad range of electric system regulatory and policy issues. I have provided testimony on energy issues in more than fifty cases in regulatory proceedings in twenty states, two Canadian provinces, and before FERC. I have co-authored more than one hundred reports including studies for the Electric Power Research Institute, the U.S. Department of Energy, the U.S. Environmental Protection Agency, the Office of Technology Assessment, the New England Governors' Conference, the New England Conference of Public Utility Commissioners, and the National Association of Regulatory Utility

Commissioners. My papers have been published in the *Electricity Journal*, *Energy Journal*, *Energy Policy*, *Public Utilities Fortnightly* and numerous conference proceedings, and I have made presentations on the economic and environmental dimensions of energy production and use throughout the U.S. and internationally. My resume is provided here as Exhibit___BEB-1.

Q. Have you studied horizontal market power issues that affect the electric industry?

A. I have analyzed electricity market power issues in New York, New England, and PJM. I have testified on market power issues in the New Hampshire restructuring docket on behalf of the Consumer Advocate; in the Vermont restructuring docket on behalf of the Department of Public Service; in Consolidated Edison's restructuring case on behalf of the City of New York; in Pennsylvania's restructuring dockets on behalf of a coalition of intervenors; and in Mississippi on behalf of the Attorney General.

I have conducted a simulation analysis of horizontal market power in New England on behalf of the New England Conference of Public Utility Commissioners (NECPUC). My June 11, 1997 report was filed by NECPUC with its comments to FERC on market power in New England.

I was retained by the Maine Department of Attorney General in July of 1997 to

work on a study of market power issues raised by the prospect of retail competition in the electric industry. My testimony on horizontal market power in New England was filed on behalf of the Maine Attorney General on January 23, 1998 in FERC Docket Nos. OA97-237-000 and ER97-1079-000.

My analysis of the market concentration and horizontal market power impacts of the proposed merger of Allegheny Power and Duquesne was filed on behalf of the Maryland Office of Peoples' Counsel in FERC Docket No. EC97-46-000 and in Public Service Commission of Maryland Case No. 8774.

I was recently hired by the Utah Committee of Consumer Services to analyze the proposed merger of PacifiCorp with Scottish Power.

I have been invited to speak on market power issues by the National Association of Regulatory Utility Commissioners, the New England Conference of Public Utility Commissioners, the National Consumer Law Center, and the National Association of State Utility Consumer Advocates.

Q. Have you studied environmental issues that affect the electric industry?

A. Yes. Much of my work has involved topics of environmental externalities and regulation of the environmental impacts of electricity production and use. My testimony served as the basis for the monetary values for air emissions adopted by the Massachusetts Department of Public Utilities in Dockets 89-239 and 91-131. I

have testified on environmental impacts of electricity production and use before state regulatory commissions in California, Massachusetts, Nevada, Pennsylvania, Wisconsin, and before the British Columbia Utilities Commission. I have co-authored many reports on environmental issues including:

- a report for the U.S. EPA on the costs of strategies to reduce sulfur dioxide (SO_2) and carbon dioxide (CO_2) emissions from electric generators;
- a report for the New England Governors' Conference on sustainable electricity;
- a report for the Northeast States for Coordinated Air Use Management (NESCAUM) on ozone transport and nitrogen oxides (NO_x) emissions reduction;
- a report for the Empire State Electric Energy Research Corporation (ESEERCO) and the New York State Energy Research and Development Authority (NYSERDA) on environmental and health damages from power plants; and
- reports for the National Association of Regulatory Utility Commissioners (NARUC) on grandfathering and comparability in emissions regulations and on promoting environmental quality in a restructured electric industry.

I am currently working for the two national associations of air pollution control

officials – the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) – on a comprehensive assessment of greenhouse gas emission reduction options.

2. Summary and Recommendations

Q. Please provide an overview of your analysis and this testimony.

A. I find that environmental regulations can create and increase barriers to entry in electricity markets, and that air emission regulations are a particular concern. AEP as a large utility relying primarily upon coal-fired generation is the nation's leading emitter of SO_2 and NO_x, and the second highest emitter of CO_2. With the addition of CSW's generation, the merged company would be the leading source of criteria air pollution and greenhouse gases in the U.S. AEP's emissions rates are high, in large part, because its coal generating units lack the up-to-date emissions controls that would be required to be installed on new generating facilities. The emission control requirements that new entrants to the generating market must meet are much more stringent than those faced by existing generating units – and the additional costs are significant.

In nonattainment areas, the New Source Review requirements are even more stringent and pose special market power concerns. For example, the new entrant may be faced with a situation in which emissions offsets are required and the offsets must be purchased from the incumbent generating company.

The analysis of horizontal market power submitted on behalf of the Applicants by Dr. Hieronymus' finds that many destination markets are highly concentrated,

but concludes that the effect of the proposed merger would be minimal because the two companies do not currently compete in these markets. This rationale, however, ignores or unreasonably discounts the expanding geographic reach of generators as transmission becomes increasingly accessible and as retail markets open up across the region.

Moreover, Dr. Hieronymus has glossed over barriers to entry in his testimony in this case, summarily dismissing the issue in two sentences without providing any supporting analysis or documentation, or even describing his reasoning. Assessment of barriers to entry is an important aspect of market power analysis according to the DOJ/FTC merger guidelines and FERC's merger policy statement.

The FERC has previously found (in its order in the Primergy merger case) that differential control requirements in environmental regulations can frustrate new entry and that these impacts on new entrants should be considered in assessing the market power implications of proposed mergers.

Q. What do you recommend in this case?

A. I recommend that the FERC find that the vast and unprecedented scale of the proposed merger calls for a broader and more forward looking assessment of market concentration and market power than that performed by the Applicants in

this case. The potential for market entry and barriers to entry, including the impacts of grandfathering in environmental regulations, are a necessary part of such an assessment. My analysis demonstrates that differential emission regulations pose a significant barrier to market entry in this case. I recommend that the FERC take emission regulations into consideration as a significant barrier to market entry in assessing whether the levels of concentration (and changes to those levels as a result of the merger) are problematic. I urge that the FERC not approve the proposed merger unless and until the Applicants revise their market power analysis and mitigation proposal to address these issues.

3. Differential Air Emission Regulations as a Barrier to Entry

Q. What is a barrier to entry and why is it important?

A. The Department of Justice and Federal Trade Commission issued revised horizontal merger guidelines in April, 1992 (57 Fed. Reg. 41,552). The FERC subsequently adopted those guidelines as the "basic framework for evaluating the competitive effects of proposed mergers" in its policy statement on merger issues in December 1996 (page 56, Order No. 592 in Docket No. RM96-6-000). Both the DOJ/FTC guidelines and the FERC policy statement identify market entry as one of several factors to be analyzed in determining whether and to what extent a merger is likely to create or enhance market power.

With all other things equal, a market in which entry is likely, timely, and sufficient will be less prone to the exercise of market power. Conversely, where market entry is unlikely, slow, or limited, market power is more of a concern at lower levels of concentration. As economic regulation of electricity markets is gradually reduced, potential new market entrants will be relied upon to discipline attempts to exploit market power. Thus, ease of market entry is very important.

Barriers to entry can take many forms, including regulations that favor the owners of existing facilities, laws that give existing firms monopoly control over essential inputs, or administrative procedures that are burdensome to new firms.

Such barriers can frustrate potential market entrants and create or enhance opportunities for incumbent firms to exercise market power.

Q. Can environmental regulations pose barriers to market entry?

A. Yes. Environmental regulations can be a significant entry barrier. In the U.S., the environmental regulation of electricity generation has systematically grandfathered existing generating units and focused tighter new standards on new market entrants. While the regulation of emissions from existing facilities has been gradually tightening, the standards for new entrants are typically much more stringent than those for existing facilities. Moreover, emissions rights have been allocated free of charge to existing firms while new entrants must purchase those rights, sometimes from the same incumbent firms with which they seek to compete.

Q. Do environmental regulations necessarily pose barriers to entry?

A. No. Well designed environmental regulations need not create barriers to market entry. The key element is comparable treatment of existing facilities and new potential competitors.

Q. Why do the environmental regulations for electric generators treat existing and new facilities differently?

A. In some cases, prior to industry restructuring, policy makers believed it would

be unfair to impose new environmental requirements upon the owners of facilities who had invested before the new regulation was adopted. Also, as a practical matter in order to get sufficient political support for a new or tighter environmental regulation it has often been necessary to grandfather existing facilities. Historically, there was little or no concern about differential treatment of electric generating units because regulated monopoly utility companies were responsible for building new capacity to serve load reliably at regulated prices.

With deregulation of electricity markets, environmental regulators are starting to think differently about the form of their regulations and the implications for market barriers and market power. At the same time, economic regulators, including FERC, are recognizing that environmental regulations can pose barriers to entry to be considered in evaluating whether and to what extent market power is likely to be a problem in various circumstances, particularly where the environmental rules were developed in a different regulatory context.

Q. Are there other barriers to entry of concern in electricity markets?

A. Yes. Potential entry barriers in electricity markets include non-comparable access to transmission facilities, difficulties in access to information and know-how that has been accumulated by the incumbent firms, limits on the availability of appropriate sites for construction of new capacity, and regulatory decisions to

grant or even guarantee stranded cost recovery for uneconomic investments.

Q. Please describe AEP and CSW air emission levels?

A. AEP's air emissions in 1996 included 1,061,000 tons of SO_2, 503,000 tons of NO_x, and 129 million tons of CO_2. Out of 62 companies in the EPA's E-GRID96 database, AEP has the highest levels of SO_2 and NO_x emissions, and the second highest CO_2 emissions.

CSW is smaller than AEP and has some natural gas in its generating mix, so its air emissions are considerably lower – but still in the top tier of emitters. CSW's air emissions in 1996 included 127,000 tons of SO_2, 107,00 tons of NO_x, and 53 million tons of CO_2, putting it at number 18 in the country for SO_2, number 9 for NO_x, and number 5 for CO_2.

Together, the merged company would easily be the leading source of criteria air pollution and greenhouse gases in the U.S. Exhibits___BEB-3, ___BEB-4, and ___BEB-5 show the top twenty utilities in the U.S. for SO_2, NO_x, and CO_2 emissions. At 1,188,000 tons, the merged company's annual SO_2 emissions would exceed those of the second highest company (the Southern Company) by 18 percent, and be more than double the third highest company's SO_2 emissions. At 610,000 tons per year of NO_x for the merged company would exceed the second highest NO_x emitter by 79 percent. At 181 million tons per year of CO_2, the

merged company would be 34 percent above the second highest utility in the U.S.

Q. How do AEP's rates of emissions per unit of electricity compare with other companies?

A. AEP's emits nearly twice as much SO_2, NO_x, and CO_2 as other U.S. electric companies, per unit of electricity output. AEP's web site shows that AEP average emission rates are about 16 lbs./MWh for SO_2 and about 7 lbs./MWh for NO_x. These are both nearly double the U.S. average emission rates for these pollutants, according to the EPA's data.

Q. Why are AEP and CSW emissions and emission rates so high?

A. AEP and CSW have high total emissions in part because they are big companies, producing large amounts of electricity from fossil fuels – especially coal – and because of the grandfathering provisions in the Federal Clean Air Act discussed above and in Exhibit___BEB-2.

The age of AEP's coal capacity is depicted in Exhibit___BEB-7. The graph shows the amounts of AEP's current coal capacity brought online by specific years. Only 3,900 MW of AEP's 21,155 MW of coal capacity was brought into service after 1978.

Q. What portion of AEP's fleet of coal generating units control emissions of

SO_2 and NO_x?

A. Exhibit___BEB-6 lists AEP's coal-fired generating units. Most of the units were brought into service in the 1950s, 1960s and early 1970s, and have no controls for SO_2. Only 6 of the 45 units have SO_2 emission controls: Conesville 5 and 6, Gavin 1 and 2, and Rockport 1 and 2. Only thirteen units report controls for NO_x emissions, and these are all low NO_x burners – a technology that is less effective and less expensive than the SCR control technology that would be required for most new generating facilities. Twenty-eight of AEP's units, representing 38 percent of the company's coal generating capacity, do not have any SO_2 or NO_x controls.

Q. What types of emission controls are required on a new power plants in the U.S.?

A. In the U.S., proposed new power plants must not exceed emissions levels established by the EPA in its New Source Review program, which is designed to prevent significant deterioration (PSD) of air quality in "attainment" areas and promote attainment in "nonattainment" areas. The U.S. EPA has established National Ambient Air Quality Standards (NAAQS) that prescribe the maximum permissible concentrations of NO_x, SO_2, and ozone smog formed by NO_x emissions allowed in the ambient air. Counties where air pollution levels

persistently exceed NAAQS are designated “nonattainment” areas; other counties are designated “attainment” areas.

Facilities located in attainment areas – where SO_2 and ozone levels meet National Ambient Air Quality Standards (NAAQS) – must install Best Available Control Technology (BACT) to control SO_2 and NO_x emissions. New coal plants would be required to install selective catalytic reduction (SCR) technology to control NO_x and a flue gas desulfurization (FGD) system to control SO_2 emissions (“advanced technologies” such as fluidized bed combustion can also be used for coal generation). New gas turbine generators are also required to meet NO_x emission limitations that in many cases require the installation of SCR and/or low NO_x burners.

In nonattainment areas new power plants are also required to install control technology that meets the standard for lowest achievable emission rate (LAER). The control technology required to meet LAER is established on a case-by-case basis for each source as it is permitted. LAER is defined as that rate of emissions which reflects: (a) the most stringent emission limitation that is contained in the air quality implementation plan of any State, or (b) the most stringent emission limitation that has been achieved in practice, whichever is more stringent.

Furthermore, the owner of a new source in a nonattainment area is required to

purchase offsets for each criteria pollutant that is in nonattainment. Because EPA requires that emission offsets provide a positive air quality benefit to the area to promote attainment, owners of a new facility are required to obtain more than one offset for each unit of pollutant to be emitted. The offset ratio depends upon the severity of the nonattainment problem in the county where a new facility is proposed.

Q. Does the offset requirement for new sources in nonattainment areas create a significant barrier to entry?

A. Yes. The offset requirement creates one of the most direct barriers to entry. NSR offsets must be purchased from an existing business or industry that is willing to reduce emissions, often making a new entrant directly dependent upon an incumbent power company that would be threatened by new entry. (While emission offsets can be generated by industries other than incumbent utilities such offsets are significantly fewer in number.)

Also, power plant retirements can be used to generate emission offsets for the owner of the retired plant to use for a new facility. At the time of retirement, therefore, when a new market entrant might be most interested in building a power plant to compete with the incumbent power company, the incumbent will have the ability to withhold offsets and to use them to construct its own power plant -- even

if it costs more than the new market entrant's.

Q. Are there nonattainment areas in the States currently served by the merger applicants?

A. Yes. There are nonattainment areas for SO_2 in Indiana, Illinois, Kentucky, Louisiana, Michigan, Ohio and West Virginia. There are nonattainment areas for ozone in Indiana, Illinois, Kentucky, Ohio, and Texas. There are nonattainment areas for particulates in Indiana, Illinois, Ohio, Texas, and West Virginia. The number of nonattainment areas for ozone and particulates is expected to increase significantly in a few years, when the new NAAQS go into effect.

Q. How do the emissions of AEP and CSW generating facilities compare with emissions from new generators?

A. The emissions from new facilities are significantly lower than those from the AEP and CSW generators, as is shown in Exhibit___BEB-8. A new coal unit would have SO_2 and NO_x emissions at about 20 percent of AEP's average rates. A new gas combined-cycle unit would have negligible SO_2 emissions, NO_x emissions at about 20 percent of AEP's average NO_x emission rate, and CO_2 at less than one half of AEP's average. The reductions for new units relative to CSW's average emission rates are smaller, but still substantial.

Q. What are the implications of requiring different emission controls for

existing and new generators?

A. The tighter standards for new generators create barriers to entry that enhance the ability of the owners of existing generating capacity to exercise market power.

Q. What is the magnitude of this grandfathering in economic terms?

A. Exhibit BEB-9 presents estimates of control costs for new coal and gas fired combined cycle facilities. The costs of installing, maintaining and operating FGD and SCR systems on new coal plants range from 5.1-9.5 mills/kWh. Cost estimates for installing, maintaining, and operating SCR systems for combined cycle plants range from 1.7-3.8 mills/kWh. In both cases the new facilities would be forced to incur additional incremental costs to control emissions that existing AEP plants do not face.

For comparison, AEP's coal plants produce electricity at costs ranging from 13 to 24 mills/kWh, averaging 17 mills/kWh, as indicated in Exhibit___BEB-10. The competitive advantage to AEP from not having to incur the added costs of NSR emissions compliance for SO_2 and NO_x are significant. In this context, the cost implications of differential emission control requirements are a significant market barrier.

In the analysis of grandfathering that my firm performed for NARUC we reached the same conclusion – that the existing coal plants in the U.S. have a

substantial cost advantage relative to new market entrants. We also found that even if the existing fleet of coal units were required to reduce emissions of SO_2 and NO_x to levels required for new facilities, the vast majority of the existing capacity (94 percent) would remain economical to operate. The cost of bringing the existing coal units up to comparable SO_2 and NO_x emission standards was estimated at $9 billion on an annualized basis. This large sum is one measure of the entry barrier effect of "grandfathering" in U.S. air emissions regulation.

4. Barriers to Entry Are an Essential Factor in the Analysis of Horizontal Market Power

Q. What is horizontal market power?

A. Horizontal market power in electricity markets arises from horizontal concentration in generation. A key mechanism for exploiting horizontal market power is for a large firm to raise market prices by withholding capacity from the market, raising the market price and thereby increasing profits over competitive-market levels. The withholding can be "physical," such as declaring a unit to be out of service, or "economic," such as bidding some capacity at high prices that effectively remove it from the dispatch. Sophisticated strategies can be developed, in which bidding generation into the market is done in order to maximize profits -- with bids differing by hour and tailored to create and exploit transmission constraints.

Q. Are measures of concentration, such as HHIs, useful in analyzing market power?

A. Yes, certainly. Measures of concentration can be very useful in market power analysis, but they do not measure the extent of market power directly. As a general matter, however, with other things constant, markets with higher levels of concentration will tend to have more and greater opportunities to exploit market

power and will have correspondingly higher market prices.

Q. Please summarize the Applicants' analysis of horizontal market power prepared in support of the proposed merger.

A. Applicants' witness, Dr. William H. Hieronymus, of Putnam, Hayes & Bartlett (PHB) applied the CASm computer model in analyzing market concentration. He calculated market shares and HHIs for fifty-nine destination markets. The majority of the destination markets analyzed were found to have very high levels of concentration (see Exhibits AC-511 through AC-515), with concentration levels tending to be worse during the peak load periods.

The merger, however, is found to have little effect on concentration. This is because:

> …historically, the utility subsidiaries of the two companies have not traded with each other, or with utilities that are reached through the transmission system of the other. The only overlap in wholesale sales of the two companies is in sales to utilities that lie between them, and in those cases the extent of the overlap is small. Accordingly, the amount of competition eliminated by the merger is very small… (pages 3 and 4, Direct Testimony of Hieronymus, Exhibit No. AC-500)

Q. Is the lack of overlap between the two companies a good basis to conclude that the merger does not raise horizontal market power problems?

No. Dr. Hieronymus' model may show little overlap, but this is little comfort. As

markets develop it is reasonable to expect generating companies to have greater access to transmission and further geographic reach. AEP and CSW acting separately would naturally overlap in some markets over time as transmission becomes increasingly available at lower prices and as retail markets open up across the region. In those markets the two companies would compete, and the merger does represent an increase in concentration and a loss in competition.

Q. Does Dr. Hieronymus provide any analysis of market entry in his testimony?

A. No. Dr. Hieronymus asserts that he "examined the ability of new generators to enter the relevant geographic markets in this case…" and that he "found that the merged company will not be able to control desirable sites or other critical inputs, and that a number of new entrants are at various stages of the process of entering these markets." (page 9) There is no explanation as to what his "examination" entailed, how it was conducted, or what specifically was considered. There is no quantitative analysis whatsoever, and no identification of the new entrants and where their projects stand.

Q. Are there, in fact, new generating projects proposed for the Midwest region?

A. Yes, some new projects have been announced in the trade press. The proposed

new capacity additions represent a small amount of capacity relative to the size of the region and they are mainly combustion turbines for peaking service rather than plants designed to provide baseload generation.

Q. Has the FERC previously found that environmental regulations could create barriers to entry with unacceptable market power implications?

A. Yes. In its May 14, 1997 Order in the Primergy merger case (Docket Nos. EC95-16-000 etc.), FERC considered these issues and decided not to approve the proposed merger in part because it found that differential environmental regulations presented a barrier to entry:

> We find that the record establishes that such factors as the lengthy regulatory approval a new entrant must undergo and the length of time between planning and completion of new generation would in all likelihood prevent new entrants from mitigating Primergy's market power in a timely fashion and would prevent the expansion of existing capacity in a timely fashion. In addition, there are also significant environmental obstacles that would frustrate new entrants, such as the requirement that new entrants emit less sulfur dioxide than Primergy's existing facilities and the related need to purchase sulfur dioxide emission allowances.
>
> . . .
>
> In the face of this evidence, we must reverse the Initial Decision's finding that the proposed merger would not have anti-competitive effects. Not only has it been demonstrated that the proposed merger would create highly concentrated markets and thereby create or enhance Primergy's market power or facilitate its exercise, but Certain Intervenors also have

> demonstrated that due to such factors as regulatory delay and the costs associated with environmental compliance, as well as a limited number of new entrants within the relevant time frame, timely market entry by others . . . would not mitigate Primergy's market power. Thus, under current circumstances we cannot find that the proposed merger would be consistent with the public interest. (pages 49 and 50, footnotes omitted)

Q. Based upon your analysis of differential environmental regulations and barriers to entry, and your review of Dr. Hieronymus' horizontal market power analysis, what do you recommend?

A. I recommend that the FERC find that the vast and unprecedented scale of the proposed merger calls for a broader and more forward looking assessment of market concentration and market power than that performed by the Applicants in this case. The potential for market entry and barriers to entry, including the impacts of grandfathering in environmental regulations, are a necessary part of such an assessment. My analysis demonstrates that differential emission regulations pose a significant barrier to market entry in this case. I recommend that the FERC take emission regulations into consideration as a significant barrier to market entry in assessing whether the levels of concentration (and changes to those levels as a result of the merger) are problematic. I urge that the FERC not approve the proposed merger unless and until the Applicants revise their market

power analysis and mitigation proposal to address these issues.

Q. Does this conclude your testimony?

A. Yes.