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January 14, 1986

Re: Pennsylvania Public Utility Commission, et al.,
v. Philadelphia Electric Company
Docket No. R-850152

Jerry Rich, Secretary
Pennsylvania Public Utility Commission
New Filing Section
Room B-18 - North Office Building
P. O. Box 3265
Harrisburg, PA 17120

Dear Secretary Rich:

Enclosed for filing with the Commission please find the original and nine (9) copies of the Testimony and Exhibits of Randall J. Falkenberg of Kennedy and Associates on behalf of the Philadelphia Area Industrial Energy Users Group (PAIEUG) in the above-captioned proceeding.

We are enclosing with Mr. Falkenberg's testimony a complete copy of his workpapers. These workpapers are only being provided to Philadelphia Electric Company, but if any other party to the proceeding wishes to receive a copy of the workpapers we will certainly do so.

Mr. Falkenberg will be available for cross-examination during the week of February 5-7, 1986. We understand that this week of hearings has been scheduled in Philadelphia.

All parties of record have been provided with copies as evidenced by the attached Certificate of Service.

Very truly yours,

McNEES, WALLACE & NURICK

By David M. Kleppinger
David M. Kleppinger

DMK/jf
Enclosures
HAND DELIVERED
cc: All Parties of Record (w/encl.)

CERTIFICATE OF SERVICE

Pennsylvania Public Utility Commission, et al., :
v. : Docket No. R-850152
Philadelphia Electric Company :

I hereby certify that I have served a copy of the foregoing document on all known parties of record to this proceeding, all by first class mail (unless otherwise indicated) properly addressed as follows:

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David M. Kleppinger

David M. Kleppinger

Dated this 14th day of JANUARY, 1986, at Harrisburg, PA.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PENNSYLVANIA PUBLIC UTILITY COMMISSION, et al.,

v.

PHILADELPHIA ELECTRIC COMPANY

Docket No. R-850152

TESTIMONY AND EXHIBITS OF RANDALL J. FALKENBERG

ON BEHALF OF
PHILADELPHIA AREA INDUSTRIAL ENERGY USERS GROUP:

*Allied Corporation, Fibers Division
Boeing-Vertol Company
BP Oil, Inc.
The Budd Company, Inc.
Liquid Air Corporation
Lukens Steel Company
Nabisco Brands, Inc.
SDC/A Burroughs Corporation
Smithkline Beckman Corporation
Sun Refining and Marketing Company
3M Company
United States Steel Corporation

Kennedy and Associates
January, 1986

PHILADELPHIA ELECTRIC COMPANY

DOCKET NO. R-850152 (LIMERICK 1)

TESTIMONY OF RANDALL J. FALKENBERG

Q. Please state your name and business address.

A. Randall J. Falkenberg, Suite A-1220, 1150 Hammond Drive, Atlanta, Georgia 30328.

Q. What is your occupation and by whom are you employed?

A. I am a utility rate and planning consultant holding the position of Vice President and Principal with the firm Kennedy and Associates.

Q. Please summarize your educational background.

A. I received my Bachelor of Science degree with Honors in Physics and a minor in mathematics from Indiana University. I received a Master of Science degree in Physics from the University of Minnesota. My thesis research was in nuclear theory. At Minnesota I also did graduate work in engineering economics and econometrics.

Q. Please summarize your professional experience and qualifications.

A. After graduating from the University of Minnesota in 1977, I was employed by Minnesota Power as a Rate Engineer. I designed and coordinated the Company's first load research program. I also performed load studies used in

cost-of-service studies and assisted in rate design activities.

In 1978, I accepted the position of Research Analyst in the Marketing and Rates department of Puget Sound Power and Light Company. In that position I prepared the two year sales and revenue forecasts used in the Company's budgeting activities and developed methods to perform both near and long-term load forecasting studies.

In 1979, I accepted the position of Consultant in the Utility Rate Department of Ebasco Service Inc. In 1980, I was promoted to Senior Consultant in the Energy Management Services Department. At Ebasco I performed and assisted in numerous studies in the areas of cost-of-service, load research and utility planning. In particular I was involved in studies concerning analysis of excess capacity, evaluation of the planning activities of a major utility on behalf of its public service commission, development of a methodology for computing avoided costs and cogeneration rates, long-term electricity price forecasts and cost allocation studies.

I was the principal author of production costing software used by 18 utility clients and public service commissions for evaluation of marginal costs, avoided costs and production costing analysis. I assisted over a dozen utilities in the performance of marginal and avoided cost studies related to the PURPA of 1978 and cogeneration rate design. In this capacity I worked with utility planners and rate specialists in quantifying the rate and cost impact

of generation expansion alternatives. This activity included estimating carrying costs, O&M expenses and capital cost estimates for future generation.

In 1982 I accepted the position of Senior Consultant with Energy Management Associates, Inc. and was promoted to Lead Consultant in June 1983. At EMA I trained and consulted with planners and financial analysts at several utilities in applications of the PROMOD and PROSCREEN planning models. I assisted planners in applications of these models to the preparation of studies evaluating the revenue requirements and financial impact of generation expansion alternatives, alternate load growth patterns, alternate regulatory treatments such as CWIP in rate base, and the phase-in of new baseload generation. I also assisted in EMA's educational seminars where we trained utility personnel in aspects of production cost modeling and other modern techniques of generation planning.

I became a Principal in Kennedy and Associates in 1984. Since then I have performed studies of future industrial electric rates and performed analyses of the impact of alternate planning decisions on industrial consumers. I have testified before the regulatory commissions in Arkansas, Florida, Kentucky, Connecticut, Pennsylvania, North Carolina, Georgia and West Virginia as an expert witness on utility planning, addressing issues of CWIP in rate base, generation expansion alternatives, excess capacity and phase-in. In previous testimony I have testified that the Susquehanna and Millstone nuclear units, along with the Crystal River 5 coal unit were economically beneficial to

customers. I have testified regarding the economic and reliability advantages of alternatives to the Limerick 2 nuclear unit. Kennedy and Associates performed an independent investigation for the Georgia Public Service Commission regarding Georgia Power Company's Construction Program. In that study, we recommended completion of GPC's Vogtle nuclear plants and the Scherer coal units. We recommended cancellation of the Rocky Mountain pumped storage unit.

Also, in June of 1984, I was asked to speak before the Mid-America Regulatory Commissioners' convention on the topic "Nuclear Rate Shock - Is Phase-In the Answer"

Q. On whose behalf are you appearing and what is the purpose of your testimony?

A. I have been asked by the Philadelphia Area Industrial Energy Users' Group ("PAIEUG") to analyze the phase-in proposal developed by the Philadelphia Electric Company ("PECO") in this case, and to study the possibility of an alternative phase-in for the Limerick Nuclear Plant. In particular, in my testimony, I will discuss the following points:

1. PECO's Phase-in Proposal has a serious flaw, which must be corrected in order for it to be useful in this case.

2. PECO has incorrectly included 100% of Limerick common plant in rate base.

Thus, the rate increase it proposes is overstated.

3. The Commission should adopt an alternative depreciation method, the sinking fund depreciation technique, for use on the Limerick plant.

4. I will discuss the economics of the Limerick 1 nuclear plant, and its reliability impact. I will show the plant is now excess capacity and will not benefit consumers over the long run.

5. I will discuss the logical errors in Dr. Hieronymus' testimony concerning the proper regulatory principles the Commission should consider in determining the proper rate treatment for the Limerick plant.

6. I will establish that in deciding to construct the Limerick nuclear unit, PECO was engaging in a course of action it should have known would carry substantial risks that the plant would prove to be too expensive or unneeded. Now that some of these risks have materialized, PECO should bear some of the consequences.

PECO'S PHASE-IN PROPOSAL

Q. Mr. Falkenberg have you had an opportunity to review PECO's phase-in proposal?

A. Yes, I have. This proposal contains a serious flaw which must be corrected to

render it useful in this case.

Q. Mr. Falkenberg what is the problem with the PECO phase-in proposal?

A. PECO's phase-in proposal does not follow sound regulatory ratemaking principles. PECO has determined a revenue requirement for the test year based on its costs of providing service (not to be confused with an allocated class cost-of-service study). However, the collection of these revenue requirements occurs over a six year period. Thus, PECO proposes to collect revenue requirements for the current test year, several years beyond the test year.

The theory of the test year is that it will represent the future level of the costs of service of the utility company. Until the utility proves that the rates from the prior test year are insufficient (in a rate case) it is assumed that the test year based rates are sufficient to provide investors an opportunity to earn a reasonable profit. In cases where a known and measurable change in costs from the test year can be shown to exist beyond the test year, the test year cost-of-service may be modified to reflect those changes. From time to time utilities have requested attrition allowances to adjust for the possibility of future inflation. As a general principle I do not recommend attrition allowances since they could remove some of the incentive of management to control costs, particularly when inflation is low.

In the case at hand, PECO is proposing to develop a rate structure which

will collect test year revenue requirements automatically over a period of the next six years. The flaw in the approach is that known and measurable changes will exist in PECO's cost-of-service over this period of time. In particular the cost of power from the Limerick plant will decline during the phase-in period because Limerick ratebase will decline through depreciation and increases in deferred income taxes. Based on my analysis, the base rate revenue requirement of Limerick Unit 1 will be $950 million for the test year. During the second year of operation this amount will decrease to $918 million. By year six, the revenue requirement will reduce to $807 million. In total, Limerick 1 revenue requirements will decrease by over $400 million dollars during the Phase-In period.

Q. Are you suggesting that PECO may overcollect Limerick revenue requirements as a result of this phase-in proposal?

A. Yes that is a possibility. In effect, the Company is building an attrition allowance into its cost and rate structure. The Company would propose to be granted automatic rate increases over the next several years to collect the initial increase in cost due to Limerick. However, the Company is ignoring the fact that the cost of Limerick will be declining during this time. Thus, the money needed to completely cover Limerick revenue requirements in the years following the test year, is actually less than the Company will be collecting through its rates, unless an annual true-up of rates and costs occure through a base rate case. PECO has announced its intention to avoid base rate cases as

long a possible and has made a promise of sorts to stay out until September of 1987. A skeptic might suggest that this is not simply a charitable gesture by the Company.

Q. Hasn't it always been the case that power plant costs decrease through time and yet inflation has caused utilities to need rate increases?

A. Yes that is true. Historically, however, utilities built plants more often and built lower cost plants. In this case, Limerick is adding $3.8 billion dollars to PECO's rate base. Limerick alone is over 50% of PECO's rate base. Thus, the declining cost pressure from this one plant is significant. At the same time, the rate of inflation is currently quite low.

Q. Isn't it true that other costs may go up, and the overcollection may not materialize?

A. PECO's other plant in service will depreciate, inflation may drive up O&M expenses, interest rates and PECO's cost of money may go up or down, and class revenue requirements may change from the test year. In any event other than depreciation, it would not be safe to say that the future changes in costs are known and measurable at this time. Reduction in carrying costs is something that can be computed mechanically, however.

Q. Mr. Falkenberg you seem to be suggesting that the problem with the PECO phase-in is that it applies test year rate base and expense figures to a rate

structure which is expected to persist over the next six years. Do you believe it would be more appropriate to develop a phase-in proposal which reflects cost-of-service for the Limerick plant reflecting the next six years of operation?

A. This would be a method to correct for the flaws in PECO's phase-in. Essentially all that is required is to redesign PECO's phase in plan to reflect considerations beyond the test year.

Q. Has PECO filed for any rate base adjustments in this case which reflect cost-of-service beyond the test year?

A. Yes. Mr. Hill has prepared a rate base adjustment for nuclear fuel assemblies contained within the Limerick reactor which are based on a two year average of the cost of the assemblies. Mr. Hill states, and correctly so, that it is necessary to use a two year average cost for these fuel assemblies or these cost will be overstated.

In another instance the Company has estimated fuel cost savings attributable to the Limerick plant as being $207 million. This figure also is not a test year figure. It is actually an estimate of the average fuel savings over the next two years. Once again, PECO has adjusted its cost-of-service to reflect considerations beyond the test year. I believe that to correct PECO's phase-in, it must contain a reflection of this same approach, i.e.,

consideration of the cost and rate base characteristics of the Limerick plant beyond the single test year if the phase-in of the cost of the unit is to extend beyond the test year.

Q. Please discuss your correction to the PECO phase-in proposal.

A. Please turn to Falkenberg Exhibit-1. This exhibit shows the Limerick fixed charges through the period 1986 to 1991 as well the PECO proposed phase-in. The Limerick rate increase is composed of fixed charges and credits to operating expenses. For the 1986 test year for retail jurisdictional customers the base rate increases, i.e., fixed charges, amount to $950 million. As a result of changes in fuel cost, reduced operating expenses from retirement and life extension of older plants, and a reduction in the return requirement, PECO proposes to reduce the $950 million base increase by $279 million during the test year. The result is the $671 million rate increase. The reductions in cost are primarily related to changes in fuel cost which are trued-up periodically by the Company in the ECR adjustment cases. These costs do not substantially affect PECO's ability to properly collect its revenue requirements. For purposes of this illustration only the $279 million is held constant. The fourth column of the exhibit shows the total revenue requirement associated with Limerick over the next six years computed on the same basis as the test year. The first year revenue requirement is $671 million. By the fifth year the rate impact of Limerick has been reduced to $528 million. This is due to a reduction in fixed charges from $950 million to $807 million. The

fifth column of the exhibit shows the increased revenues PECO proposes to collect over the next six years. These amount to about $4.0 billion. However, returning to the previous column we see that the full increase in cost-of-service resulting from the Limerick plant amounts to about $3.6 billion. Thus, the Company phase-in proposal could result in an overcollection of over $400 million over the next six years. The exhibit shows that even after imputing interest on the deferred rate increase, an overcollection of PECO's revenue requirements of over $200 million could exist. Thus, it is misleading for PECO to state that the deferred revenue requirements are collected without interest. In fact if the maximum potential overcollection occurs, PECO would actually be collecting interest at a rate of 16%! It is no surprise that PECO's auditor, Coopers and Lybrand partner Mr. David Farling, was able to accept the PECO phase-in without reservations when one considers these facts.

Q. How do you propose to correct this error?

A. Many approaches are possible. One possibility is to simply use the average of Limerick 1 revenue requirements over the six year phase-in period. This is analogous to Mr. Hill's treatment of nuclear fuel assemblies. The result is a $875 million base rate increase, or a total rate increase of $596 million. This amount is phased-in as $199 million in year one, $397 million in year two, $596 million in year three, and $795 million in years four, five and six. This adjustment alone would reduce first year revenue requirements by $25 million.

Q. Please summarize the advantages of this correction to PECO's phase-in.

A. With this adjustment to PECO's phase-in, the Company will have the opportunity to collect all of the Limerick 1 revenue requirements over the phase-in period, but only that amount. No disguised attrition allowance is built into PECO's rates. Thus management will have to continuously strive to control expenses and will not reap an unjustified reward from building Limerick. If during the phase-in period, PECO fears it will earn an insufficient return, it will always have the opportunity to file for base rate increases. Thus there is no undue risk placed upon PECO that it will fail to earn a reasonable return.

Q. Mr. Falkenberg, have any other regulatory commissions recognized ratemaking considerations beyond the test year under similar circumstances?

A. In Duke Power Co. Docket E7-Sub 391, the North Carolina Public Service Commission required the utility to recover purchased power costs from the Catawba 1 nuclear plant by levelizing those costs over the life of the contracts (10 to 15 years). The levelization approach required in the Duke case is analogous to the averaging process suggested here, except that a return is imputed to the deferred costs. Given the shorter time period of this phase-in, and PECO's stated desire not to earn interest on the deferred amount, I have imputed no interest in this calculation. Finally, I will establish later that PECO must bear some of the risks associated with the Limerick plant,

and for this reason it is appropriate to at least award the company with no interest on the phase-in deferral.

LIMERICK COMMON PLANT

Q. Has PECO included 100% of Limerick common plant into its rate request?

A. Yes, it has. I recommend that the Commission allow only 50% of Limerick common plant into rate base for a number of reasons: minimization of costs to customers, past PUC precedent, and to require PECO to live up to prior commitments concerning Limerick common plant.

Q. Please elaborate.

A. First of all, it is easy to show that if the AFUDC rate is the discount rate, the present value of revenue requirements to consumers is equal whether AFUDC accumulates on half of Limerick common plant, or the cost of common plant is currently included in ratebase. Currently, PECO's AFUDC rate is about 9.7%. However, customers have higher discount rates than this. Credit cards charge customers 15-18%. Home mortgages cost customers about 11% now. Many consumers obtained mortgages in the past few years at much higher interest rates. The prime lending rate is now about 9.5%, but this is the rate banks charge their most credit worthy borrowers. Many commercial and industrial firms face much higher rates. If consumers wish to make a long term investment in PECO, they

could buy its bonds. Currently, these securities are considered investment grade and some currently yield over 15%. Thus, consumers of all financial circumstances can find opportunities to invest, (or cut interest cost by paying off debts early) at rates substantially above PECO's 9.7% AFUDC rate. Clearly, investing in Limerick common plant through higher rates is not an attractive investment for PECO's customers.

Secondly, the Pennsylvania PUC has consistently required that common plant be split between the units at a generating station. This was done in the case of Peach Bottom 2 and 3 in the 1970's, and reaffirmed in the case of Susquehanna Units 1 and 2 recently. Past commissions have recognized the wisdom of this approach.

Finally, and most significantly, PECO implied in the recent Limerick 2 investigation that the company would include only 50% of common plant into ratebase, if it was given permission to complete Limerick Unit 2. In the economic studies presented by PECO, it was assumed that only if Limerick 2 were cancelled, would 100% of common plant be requested in rate base when Unit 1 entered service. In cases where Unit 2 was completed it was assumed that common plant would be split equally between the units.

Our testimony in that case showed that Limerick 2 was not the most economic alternative for PECO. The Administrative Law Judges order found that to be a fact as well. The PUC has granted PECO a conditional permission to complete

Unit 2, in an order with a strong dissent from one of the Commissioners. At present PECO still intends to complete Unit 2 and the Company has accepted the Commission plan. Given this situation, I believe PECO should live up to its prior commitment to ratebase only one half of Limerick common plant, until Unit 2 is completed or cancelled. At that time examination of the proper rate treatment of the remaining common plant could take place.

I believe that Limerick Unit 2 is not the most economical alternative for PECO. This view is widely shared by PAIEUG members, other intervening parties and the ALJ in Docket No.I-840381. I do not believe it would be a sound regulatory policy to provide PECO with unnecessary financial rewards at consumers expense, for pursuing an uneconomic course of action. The denial of one half of Limerick common plant from rate base is perhaps an effective means to encourage PECO to pursue the prudent and economically sensible alternatives to completing Unit 2. Certainly PECO needs no further encouragement to complete the unit.

Q. What is the implication of including only 50% of Limerick common plant into ratebase for the PECO phase-in?

A. Falkenberg Exhibit 2 shows the corrected phase-in assuming that only 50% of common plant is currently included in ratebase. The exhibit shows that the test year revenue requirement of $671 million would be reduced to $523 million. The six year average revenue requirement is $466 million. Applying the same

correction as shown in Falkenberg Exhibit 1 yields a phase-in schedule where a $155 million increase is allowed in year one, $310 million in year two, $466 million in year three, and $621 million is allowed in years four, five and six. This implies a first year rate increase of 6.3%.

SINKING FUND DEPRECIATION

Q. Do you have any recommendations concerning the appropriate depreciation technique for use on the Limerick Unit?

A. Yes. In Dockets No. R-822169 and No. R-842651 the PUC allowed Pennsylvania Power and Light Co. to use a modified sinking fund technique for depreciation of the Susquehanna nuclear plant. I would like to recommend that sinking fund depreciation be used on the Limerick unit as well.

Q. Explain sinking fund depreciation.

A. In this technique, the amount of annual depreciation on an asset increases by a constant percentage each year of its life. The first year depreciation expense is computed so that over the life of the asset it is fully depreciated. The rate of annual increase is called the sinking fund rate, and conceptually corresponds to the rate of interest which might be earned on the depreciation reserve, were it actually invested to provide for the ultimate replacement of the asset. In reality this is not done, of course.

One of the problems with a capital intensive investment like a nuclear plant, is that it takes a long time for the investment to benefit consumers. This is exacerbated by the fact that traditional utility ratemaking (using straight line depreciation and tax normalization) makes the carrying costs on a unit highest during its first years of operation. Thus consumers have to wait a long time to benefit from the unit (if they ever do). Years later, the cost of the unit is heavily depreciated and consumers at that time have lower rates than would otherwise be the case.

An additional factor to consider is that when PECO finishes its nuclear construction program (presuming both Units 1 and 2 are built) it will enter a period of time where little construction is needed. Eventually new plant will be needed and financing that construction will be quite costly.

Under the sinking fund depreciation technique, depreciation expense is deferred into the future. This reduces the large rate increases required in the test year and will ultimately improve cash generation from depreciation in the future, when it will be needed more.

It is interesting to note that sinking fund depreciation techniques are closely related to the concept of levelization. Without tax normalization, under sinking fund depreciation the annual carrying costs of a generating unit would be levelized through time. Customers in each year would pay the same

revenue requirement for return and depreciation on the plant. Levelization techniques were commonly used by PECO and other utilities when studying the economics of nuclear plants compared to other options in the mid to late 1970's. For this reason, the short-term rate impact of the nuclear unit may not have been fully recognized in those studies. While there is nothing wrong with this approach to performing life cycle economic studies, it would seem appropriate now to adopt this concept for the actual rate treatment of the Limerick unit. In this manner the economic considerations involved in the early Limerick decisions may be reflected in current rates, and the large first year rate increase will be mitigated.

Q. What is the sinking fund rate you would propose to use and why?

A. First of all, I would point out that straight line depreciation is really a sinking fund at a 0% sinking fund rate. I would propose to use a 6% sinking fund rate. The 6% approximates PECO's projections of the long-term rate of inflation. Thus, customers will pay the same amount of depreciation expense each year in real dollars. This seems to be an equitable result. PECO's cost of money of 12.7% could be used as the sinking fund rate, as I proposed in the PP&L case. However, I recognize the fact that the commission was concerned this would lead to too great of a deferral in the collection of depreciation. Using 6% will reduce that problem considerably. The final result will be a test year depreciation expense of about $25 million dollars, a level reasonably close to that used in the PP&L case.

Q. What are some of the other advantages of the sinking fund depreciation approach you propose?

A. The use of sinking fund partially levelizes the carrying costs of Limerick 1 over the phase-in period. Thus the potential for overcollecting built into the phase-in is reduced.

Another advantage of sinking fund is that it may immediately be switched to straightline by the PUC in the event that PECO's financial requirements necessitate it. In the event PECO requires more internal fund generation to construct new plant in the future, the remaining plant balance can be straight lined. This would allow flexibility in the future.

Finally, it is important to remember that use of sinking fund depreciation has no impact on PECO's earnings and will increase the amount of deferred taxes from the difference between liberalized tax and book depreciation. PECO's own witness Dr. Lewis J. Perl testified in the Limerick 2 investigation that sinking fund depreciation was a useful approach to use to improve the economic impact of a nuclear plant on consumers.

Q. Can the sinking fund approach you propose be integrated into the phase-in plan?

A. Yes, in fact PP&L proposed to do just that in the last Susquehanna case.

There is no reason PECO's phase-in could not accommodate such a plan.

Falkenberg Exhibit 3 shows the modified and corrected phase-in plan assuming sinking fund depreciation computed at 6%, and only 50% of common plant included in rate base. The test year revenue requirement is reduced to $439 million, the six year average revenue requirement is reduced to $404 million. Thus, the modified phase-in proposal I recommend allows a $135 million increase in year one, $269 million in year two, $404 million in year three, and $539 million in years four, five, and six.

GUARANTEE OF LIMERICK FUEL SAVINGS

Q. Should PECO guarantee the $207 million fuel savings

A. Yes. The Company should be required to live up to that estimate. PECO has made much of the fact that Limerick will produce these savings. Unfortunately, if oil prices fall, or Limerick doesn't operate at 65% capacity factor, the rate impact of the unit will be even more severe.

Q. Is this consistent with PUC precedent?

A. Yes, in the Salem rate case, the PUC required the Company to guarantee the fuel savings. PECO agreed to this approach in that case.

Q. Should PECO also guarantee the 65% capacity factor assumed in the development of the $207 million fuel cost credit?

A. I believe this should be required of the Company as well. PECO estimates Limerick will operate at a 65% capacity factor for the purpose of computing the $207 million figure. PECO contends Limerick will operate at this level. I believe it should be required to live up to this estimate. To the present time, the Salem and Peach Bottom units have not achieved a 65% lifetime capacity factor. In addition, it is necessary to guarantee the capacity factor, as well as the total fuel savings, because a rapid (though perhaps unlikely) increase in oil prices could allow PECO to achieve the $207 million with a much lower capacity factor.

IMPLICATIONS OF PP&L ORDER

Q. Please describe Falkenberg Exhibit 4.

A. This exhibit shows the implications of the recent Commission order in the PP&L SSES-2 case. In that case the PUC found that a reserve margin of 22% for installed capacity was reasonable for a determination of excess capacity. Since PP&L installed reserves exceed that level, it was found that the SSES-2 nuclear plant was excess capacity. No equity return was allowed for the unit, and according to the PUC order, none will be allowed until the unit is needed or beneficial to consumers. In addition the PUC adopted the sinking fund

depreciation technique for the unit. Finally, in the PP&L order the procedure of spliting common plant equally between units was continued by the PUC. Falkenberg Exhibit 4 shows the implications of the PP&L order if it were applied to the Limerick unit, in this case. The exhibit shows that if the PP&L order were applied to this rate case, PECO's total rate request would be reduced by $609 million. Thus, instead of a $671 million increase, PECO would be allowed, at most, a $61 million dollar increase. Furthermore, based on PECO's own analysis of the economic benefits of Limerick, no equity return would be allowed until 1994.

Q. Would the PP&L precedent be applicable to PECO's current situation?

A. Yes. Falkenberg Exhibit 5 shows that PECO's current installed reserve margin is 2660 MW, or 43.2%. Without Limerick Unit 1, PECO would have an installed reserve of 1605 MW, or 26.1%. Staff witness Gruber recommended calculation of reserves based on a five year average of peak demand in the PP&L case. Applying the installed capacity to the five year average peak demand of 6200 MW, produces a reserve margin of 42% with Limerick 1 or 25% without the unit. Removing the excess capacity on the PP&L system, based on the Gruber method, produced a 24% reserve margin. Clearly PECO's installed reserves without Limerick 1 are sufficient to meet either the PUC's 22% reserve level, or the PJM reserve requirement of 25%. Thus the situation here is entirely analogous to the PP&L case, where the last unit added to the system (SSES-2) was found to be the excess capacity on the system.

Q. Do you recommend the PP&L precedent be applied in this case?

A. No. However, I do believe the PP&L precedent is a more reasonable alternative than PECO's filed request. In the PP&L case, Kennedy and Associates did not propose action as drastic as the PUC took, and we do not recommend complete adoption of the PP&L precedent in this case either. However, it is clear that the PUC needs to recognize the excess capacity nature of Limerick 1, and should also be cognizant of the fact that Limerick 1 costs substantially more per KW than Susquehanna. There are important economic implications of the PP&L order, that go beyond regulatory philosophies or precedents. For example, businesses and industries in the PECO service territory may have competitors in PP&L's service area. Considering that PP&L's rates are already lower than PECO's, the drastic increase in PECO's rates as a result of Limerick could have substantial impact on the competitiveness of industry in the area. Clearly, the PUC needs to be cognizant of its treatment of PP&L, while considering this case.

ANALYSIS OF THE RELIABILITY AND ECONOMIC BENEFITS OF LIMERICK

Q. Have you performed any analysis of the reliability and life cycle economic impact of Limerick Unit 1?

A. Yes I have. I conclude that Limerick Unit 1 will reduce PECO's operational reliability from previous levels, though reliability will remain more than

adequate for the system. Secondly Limerick Unit 1 will not produce economic benefits to consumers over the life of the plant, based on PECO's own economic study, as would be interpreted by the majority of executives in the electric utility industry in the United States. My alternative economic analysis shows Limerick to produce even greater losses to consumers than the corrected PECO study shows.

Q. Regarding the subject of reliability, I am somewhat confused by the fact that PECO contends its reserve is only 28% with Limerick Unit 1. You contend PECO has a 43% reserve margin. Also, explain how adding the Limerick unit will reduce reliability on the PECO system.

A. The answer lies in the fact that PECO intends to remove several older oil steam plants, and a number of combustion turbines from service. In total PECO will remove some 1585 MW of capacity from service over the next 9 years. In 1985 and 1986 PECO will remove 962 MW of oil fired capacity. Clearly, one large nuclear plant which is expected to be available only 65% of the time, cannot provide the same level of reliability as several smaller units. In addition the nuclear plant cannot provide the quick start capability of the combustion turbines. Thus, Limerick Unit 1 will degrade PECO's reliability. However, owing to the interconnections with the PJM pool, the reliability of the PECO system will still be more than adequate at the 28% active capacity level. Thus, the removal of several hundred megwatts of capacity from the PECO system, is proof of the fact that Limerick Unit 1 is not needed for reliable

service. Based on PECO's load forecast and the 25% PJM reserve requirement, PECO does not begin to need the capacity of Limerick Unit 1 until 1989. With PECO's load growing less than 60 MW per year at that time, it would be a long time before the capacity of Limerick Unit 1 is fully needed.

Q. Isn't it true that by removing the older units, PECO is making economic retirements?

A. Yes, that is quite correct. Limerick 1 is an unavoidable fact of life. Given that the unit is on line, there is no longer any need for the older oil fired units. However, in the Limerick 2 investigation, it was made quite clear, that it was possible to extend the lives of the older units, for many years at a very low cost per KW of capacity. I showed that life extension of these units was economically preferable to completion of Limerick Unit 2. In the case of Limerick Unit 1, it appears that the recognition of the viability of the life extension option came too late, or was simply rejected by PECO, as the Company has done in the case of Limerick 2. In any event, given that Limerick Unit 1 is now completed and in service, it arguably makes economic sense to retire some of the older units. However, it is a quantum leap of logic to suggest, that on the basis of these retirements Limerick Unit 1 is now needed capacity. Clearly the unit is not needed, because ample, lower cost capacity is available without the new plant.

Q. Has the economic retirement phenomenon become commonplace in the utility

industry?

A. Yes, the so called economic retirement of generating plants and Extended Cold Shutdown (ECS) plans have become a common practice in recent years when large new plants have entered service. While this is an economic response to an excess capacity situation, I am disturbed that many utilities (PECO included) seem to believe this approach eliminates the problem rather than just slightly reduces the economic burden of excess capacity. The financial community is aware of this situation, as well. Quoting Merrill Lynch's Leonard S. Hyman

> "Now consider the utility that was going to explain its 90% reserve margin to the regulators. All it has to do is take a lot of plants out of service, for long term maintenance, or even because they aren't as economical to run as the new station, and down goes the reserve margin and along comes a low operating margin. At least that's how we would see it.....".

I do not believe the PUC should fall victim to this sort of reasoning.

Q. Dr. Hieronymus discusses at great length the prudence standard, and its role in utility ratemaking. He concludes that prospective lifecycle economic studies such as the one he performed have no relevance as regards prudence. Is that your view as well?

A. Yes. How attractive or unattractive a plant looks today is no <u>proof</u> of the prudence or imprudence of past decisions. However, that does not mean such analyses have no proper role in the ratemaking treatment of a new plant. First of all, if a current life cycle economic study shows the project to be a cost

effective capacity addition over its life, prudence is not an issue as concerns planning decisions. Obviously, engineering construction management and operational areas such as fuel procurement might still be areas for a prudence review. In the case at hand, Dr. Hieronymus contends that Limerick Unit 1 will produce lifetime savings of $2.0 to $2.8 billion dollars for PECO's customers. If that is true then Dr. Hieronymus analysis of the prudence of past PECO decisions and studies is irrelevant. Likewise the testimony of NERA witnesses Perl, Wile and Guth should simply be ignored.

Q. **Why is that?**

A. Based on Dr. Hieronymus study, PECO would be prudent today to acquire Limerick Unit 1 if it had been built by someone else. Since the plant would ultimately lower rates for consumers, (even with todays knowledge of load forecasts and the actual cost of the Limerick unit) there would be no damages from any possible past imprudence in PECO's planning or forecasting activities. If we believe Dr. Hieronymus calculations, Limerick is ultimately a benefit to consumers. Thus, there is no serious long term consequence of past imprudence. This interpretation is verified in Dr. Hieronymus testimony and his response to our data request, attached as Falkenberg Exhibit 6. My interpretation of Dr. Hieronymus testimony is that he believes PECO was prudent at every step along the way, as regards Limerick Unit 1 planning decisions. More importantly, even knowing how things have turned out in 1986, and if PECO had the opportunity to do it all over, they shouldn't change a thing according to Dr. Hieronymus.

Somehow, I am skeptical of this conclusion.

Q. What role do you think lifecycle economic studies should have in determining the prudence and ratemaking treatment of a new plant?

A. As regards prudence, all the lifecycle studies do is identify whether a potential problem exists. In a case where a unit fails to produce economic benefits, one may wish to examine the prudence of past decisions. In a case where a project is known to be the result of imprudence, the analysis quantifies the damages to consumers. However, prudence alone, is not sufficient for full rate treatment of an investment. As I will discuss later, the project must also be used and useful. Lifecycle economic studies, done prospectively provide information concerning whether a project is used and useful or will ever be so.

Q. How do you interpret the lifecycle economic study performed by Dr. Hieronymus?

A. I have some serious differences of opinion concerning some of Dr. Hieronymus' assumptions. However, I believe it would be enlightening to accept his study for a moment, and ask how the rest of the electric utility industry might interpret the results of the Limerick 1 cost benefit study over the life of the plant.

Q. How can that be done?

A. Falkenberg Exhibit 7 is a survey of the EEI Finance Committee which discusses the discount rate used in economic studies within the utility industry. The survey covers 106 electric utilities owning 76% of the investor-owned electric utility assets in 1983.

Based on the EEI survey 75% of Investor Owned Utilities in the United States used the incremental cost of capital (with no adjustment for tax deductibility of debt interest) for internal economic evaluations. For the utilities responding to the survey this cost of capital figure averaged 14.3%. Dr. Hieronymus has used a net of tax discount rate of 9.7%. According to the EEI survey only 8 percent of the survey respondents used the net of tax discount rate for their economic studies. By using the 14.3% discount rate it is possible to interpret Dr. Hieronymus study as it would be viewed by others in the industry.

Q. What is the result of the analysis using the 14.3% discount rate?

A. Falkenberg Exhibit 8 shows that rather than producing a benefit of $2.0 billion dollars, as computed by Dr. Hieronymus, the Limerick plant produces a penalty of over $600 million dollars in the next 40 years. From this I conclude that the view of executives within the electric utility industry would be that Limerick is not a cost effective addition for PECO. Though I have not actually surveyed utility executives to validate this contention, it would appear to be

the conclusion one would draw based on the responses to the EEI study. Considering that 14.3% is actually an average figure for the industry, and that PECO's cost of capital may exceed the industry average, Limerick Unit 1 is even less cost effective for PECO.

Q. What is the conclusion you would draw from this interpretation of the Hieronymus study?

A. First of all, it would now appear that the testimony concerning prudence is of some relevance, because at least in hindsight we can see that Limerick is a mistake for PECO. Thus it is important to consider whether this mistake was due to bad luck or bad management. Second, and more importantly, regardless of the prudence of past PECO decisions, which led to the current situation, the question is raised as to whether PECO should profit from its mistakes. None of the members of PAIEUG profit from mistakes they make. At a minimum I would suggest that the PUC should simply take note of the economic disadvantages of Limerick Unit 1, in weighing the factors which influence the ultimate rate treatment of the project.

Q. Have you performed an independent lifecycle analysis of Limerick Unit 1?

A. Yes, though many of my assumptions were developed from Dr. Hieronymus study. The main difference between my study and PECO's is that I used my own computer models to compute carrying costs, I included my own estimates of Limerick 1 O&M

expenses, and I included 100% of common plant with Limerick 1 in ratebase. I ignore the "acid rain" costs PECO uses and employ the 14.3% discount rate. Since my computer models only differ in some minor accounting details from Dr. Hieronymus calculation, the major differences concern O&M expenses and the treatment of common plant.

Q. Why do you include 100% of common plant in ratebase with Limerick 1 when you recommend the PUC disallow current recovery on 50% of common plant?

A. First of all, that is the rate treatment PECO is requesting in this case. Second, and most important, I have already demonstrated in the Limerick 2 Show Cause Investigation that Unit 2 is not cost effective for PECO without any common facilities. My conclusion is that the alternatives to unit 2 are more economic, and that if PECO follows the most economic course of action, 100% of common plant will ultimately be associated with Unit 1.

Q. Why are your O&M expense assumptions different from PECO's?

A. Once again, PECO is largely ignoring the observed trend of real increases in nuclear O&M expenses. In this case PECO assumes a 3% real growth in nuclear O&M expenses until 1990, and 0% real growth thereafter. Historically, nuclear plant O&M expenses have grown at a real rate of escalation in excess of 10%. For Peach Bottom, O&M expenses grew at a real rate of 11% from 1976 to 1983. Falkenberg Exhibit 9 shows a summary of Peach Bottom O&M expenses in the period

1976 to 1983. I have developed a regression equation to predict the level of O&M expenses as a function of time. This model implies a very conservative real growth in O&M expenses of $2.3 million dollars annually which is only about 3% real growth at current levels slowing down to .3% in the future.

Q. What is the result of your lifecycle economic analysis of Limerick Unit 1?

A. My analysis shows that Limerick Unit 1 is not a cost effective addition for PECO and that it results in $1.2 billion dollars in higher rates over the life of the plant.

RISK SHARING AND REGULATORY PRINCIPLES

Q. What is the implication of the economic analysis you have performed as regards the rate treatment of Limerick Unit 1?

A. The study shows that Limerick is not cost effective for PECO for two simple reasons: Limerick Unit 1 costs too much compared to alternatives and the plant is currently not needed to provide reliable service. By allowing full and immediate ratebase treatment for the unit, the PUC would be in a position of allowing PECO to profit from its mistakes at the ultimate expense of consumers. I do not believe this to be a sound regulatory policy. The PUC should strike a balance between the interests of consumers and shareholders. I recommend that the PUC require PECO shareholders to bear some of the adverse consequences of

the investment decisions of management. As I will show later on, PECO should have been aware for some time that there was a substantial risk that Limerick could cost more than it expected, and that the demand for its power would not be as great as PECO anticipated. First I will discuss our recommendation as to the proper approach for PECO to share in the adverse consequences of the Limerick unit.

Q. Please elaborate.

A. PECO has proposed a phase-in plan to fully collect Limerick revenue requirements in a period of six years. I believe a longer phase-in could easily be justified on reliability or economic grounds. Based on a reliability criteria the phase-in would not begin until 1989. However, in the interest of moderation of the financial impact on the Company, I will accept the PECO phase-in period. PAIEUG clients wish to support a responsible phase-in plan that doesn't jeopardize PECO's financial capability over the long run. At the same time, I propose that any reductions in PECO's request made by the PUC should be taken off proportionately from each years phase-in revenue requirements, as opposed to being taken off the last years as suggested by PECO. I also recommend that no interest be allowed on the deferred revenue requirements, so that PECO does absorb some of the excess costs of the Limerick plant. This approach, I believe will provide an acceptable compromise between the interests of PECO's owners and customers.

Q. Why do you believe this is a sound approach?

A. The PUC should determine the proper level of test year revenue requirements, and any anticipated future adjustments. Costs found to be incorrectly included in ratebase (such as the additional 50% of common plant) or found to be imprudently incurred (such as possible excess costs due to delays) would not be granted rate recognition. The resulting reasonable costs are then phased-in using the same six year schedule as proposed by PECO. The ultimate financial impact on PECO is no greater than would be the case under traditional ratemaking and the lost interest on the deferred revenues is less as the total ratebase adjustments diminish the rate increases. Thus, the lost interest tends to be mitigated by other disallowances.

Q. Please elaborate on your previous contention that PECO should bear some of the risks of its decision to build Limerick.

A. Dr. Hieronymus has discussed at length the prudence standard. I believe it is important to understand some of the limitations in this ratemaking standard. It is often suggested in proceedings such as this, that unforeseen events such as the 1973 oil embargo or the 1979 accident at Three Mile Island, changed the world to such a degree that utilities could not accurately predict the future need for nuclear plants or their final costs. Testimony of PECO witnesses and Dr. Hieronymus and Mr. Guth seem to support these types of propositions. Based on this type of reasoning, it is suggested that the managers of utilities were

pursuing sound and prudent expansion plans designed to minimize customer costs. Due to unforeseen events, it is argued that utilities could not have avoided the mistakes that they may have made. Having made only prudent mistakes, so the story goes, the utility should fully recover the costs of the project. Dr. Hieronymus cites a Wall Street Journal article by Alfred Kahn, that suggests customers should pay for "power plant duds", which were prudently planned and built.

The problem with this approach is that it seeks to completely eliminate the risk of mistakes from the owners and managers of utilities. In effect the utilities are requesting the regulators to use their ratemaking authority to guarantee the profitability of the utility companies, much the same as the U.S. Government uses its taxing authority to guarantee the interest and principal of treasury securities. The utilities who promote this prudence standard as the only important ratemaking consideration would see the regulator act as a taxing agent to back the utilities investments. Under Dr. Hieronymus prudence standard, it is virtually impossible for consumers as a whole to reduce their contributions to the profits of the utility company. Reductions in consumption, ultimately are rewarded only by a small reduction in fuel costs and variable O&M expenses. Based on this prudence principle, reduction in consumption, due to the economic self interest of consumers, conservation, or innovation is destined to fail in substantially reducing consumers payments to utilities.

It is important to realize that not even the Federal government can insure that all those who purchase long term treasury securities will be able to sell those securities at any time for their full purchase price, due to interest rate risk. If the prudence standard is the only factor considered, it should be possible for equity investors to fully recover their investment in utilities, because the equity return could be adjusted once or twice a year to eliminate interest rate risk. The Federal Government does issue securities which have their interest rate adjusted twice a year, series EE savings bonds. They pay an interest rate of 85% that of longer term securities (currently 8.36%). PECO seeks a much higher return on Limerick. However, PECO's discount rate used to evaluate the value of Limerick is close to the current return on treasury bonds.

Q. What is the basis for the regulatory principles espoused by Dr. Hieronymus, and do you see any flaws in his reasoning.

A. Dr. Hieronymus discusses, at great length, the unwritten contract between consumers and shareholders. In my view, Dr. Hieronymus has misinterpreted this "implicit bargain" between consumers and investors, at least as it has been interpreted in the Commonwealth of Pennsylvania.

In Pennsylvania, the utilities have received protection for competition in a limited sense, and have received in exchange a return on investments in prudently constructed assets which are useful to consumers. In cases where

assets were not used and useful during the test year, investors received no return.

Despite the fact that Three Mile Island may have been a prudent investment originally, it was removed from ratebase when it could no longer operate. When TMI-1 returned to service, it began to earn a return once more. A number of years ago the Commission found that a number of PECO's combustion turbines were excess capacity and disallowed rate recognition. The PUC did not find that PP&L was imprudent in constructing SSES, but on two separate occasions disallowed return on the excess capacity created by the unit. In many instances, the PUC has upheld the used and useful principle as the most important element in determining the revenue requirements of a particular utility. For this reason, the cost of capital of PECO and other utilities in Pennsylvania reflects the level of risk shareholders have become accustomed to. In removing the used and useful criteria and relying on the prudence standard alone, Dr. Hieronymus seeks to "opportunistically change the rules of the game" now that the result is an unfavorable outcome for investors. I would suggest that if the Commission wishes to adopt a prudence only requirement, that proper notice be given, and return levels gradually be adjusted or reflect the risk level of that situation.

Q. What do you mean by the comment that electric utilities are protected from competition in a limited sense.

A. The utility franchise provides that PECO be the only electric company that can sell power in its service territory. However, individual consumers always have the option to find other sources of power, alternative fuels or ways to simply use less electricity.

If the Commission were to drop the possibility of excess capacity penalties, in effect, it is severly limiting the ability of consumers to make economic choices between electricity and competing products. If a "prudence only" standard is applied, shareholders profits are protected from all forms of competition -- alternative fuels or even the customers prerogative to turn off his lights. In effect, the prudence only standard advocated by Dr. Hieronymus would seem to require that customer contributions to shareholder profits be based solely on the level of consumption which may have been reasonably expected (but not actually achieved) in the past. Clearly, it is unreasonable to expect such a regulatory policy to result in efficient investment in utility plant or energy consuming equipment.

Applying the technique of "reductio ad absurdium" one would find a situation where only one consumer remains on the electric system, and is expected to pay all of the revenue requirements. Under the prudence standard his only possible escape would be to disconnect from the system (and that might not even work). Clearly, even Dr. Hieronymus would agree that some limit must exist on the application of the prudence standard. The real question is then, when does one begin to look beyond prudence. In this case, I suggest that the

limits of the prudence standard have been exceeded and the Commission should require PECO to share in the adverse consequences of Limerick Unit 1.

Q What are the implications of Dr. Hieronymus's framework regarding the prudence standard?

A. In effect, Dr. Hieronymus is suggesting that an electric utility company is entitled to a full return on all of its investments unless imprudence can be established. In other words, unless it can be proven that the decision making by the utility was totally unreasonable, regardless of the outcome.

The implication is that the utility's owners will receive their desired return on investment even if their appointed management has badly managed the enterprise, as long as it can't be shown that these managers were any worse than others in similar businesses. As a result of this standard, the stockholders face no business risk on their investments. As long as the management of the utility performs in a similar manner to other utility management, it does not matter whether a reasonable or sufficient performance level is acheived, only that it is not significantly worse than comparable management.

Q What do you perceive the risk to be for the investors under Dr. Hieronymus's prudence standard?

A. Given his definition and framework for evaluating prudence, I believe that the risk to investors is only the risk associated with interest rate fluctuation and not business risk. The appropriate cost of debt under this framework is the cost of long term U.S. treasury bonds. These bonds provide a business risk free return yet incorporate a premium over and above short term rates to reflect interest rate risk over a long period (20 to 30 years).

Q What is a representative long term credit risk free rate in today's market?

A. U.S. treasury bonds maturing in 2015 are currently yielding 9.28% to maturity.

Q What would be the impact on PECO's requested rate increase if Dr. Heironymus was correct in his interpretation of the prudence standard?

A. Using the business risk free cost of debt of 9.28% for PECO's interest costs and 8.36% for the cost of equity, I have computed PECO's revenue requirements using their claimed test year costs for all other (except capital cost) components of cost of service. In essence, I simply substituted a 9.28% value for PECO's debt return and the savings bond rate of 8.36% for the return on equity. The results of this analysis are presented in Falkenberg Exhibit 11.

This exhibit shows that under Dr. Heironysus's proposed definition of prudence, PECO should only receive a $193 million increase or 8%. This includes a return on 100% of Limerick I common plant, as requested by Dr. Heironymus.

Q. Why would there be only a 8.36% return on equity under the approach proposed by Dr. Heironymus?

A. If his philosophy were adopted it appears that since management was presumed to be prudent, some sort of cost-of-service indexing approach would be in effect to grant automatic rate increases once or twice a year. Since the equity return could be adjusted to reflect changes in the cost of funds, interest rate risk would be substantially reduced. Thus, I presume that the rate on savings bonds would be a proxy for the risk free equity return.

PECO LOAD FORECASTS FROM 1972 TO 1985

Q. You contend that Limerick Unit 1 is not needed for reliable service. NERA witness Guth, has testified that PECO's load forecasts were reasonable during the period from 1972 to the present. Dr. Hieronymus also testified that PECO's load forecasts were sound. What is your view of the reasonableness of PECO's load forecasts?

A. I have not concluded that PECO's load forecasts were imprudent, when developed. However, I can show that other analysts within the utility industry could have developed much different and more reasonable forecasts using very simple techniques available during this period. From this I conclude that PECO should have been aware that there was some risk that the capacity from Limerick would not be needed when completed. This supports my conclusion that PECO

should bear some of the adverse consequences of the Limerick decision.

Q. Please discuss your analysis of PECO's load forecasts.

A. Mr. Guth has suggested that a reasonable test of the PECO load forecasts is to compare them to those which might have been developed through statistical analysis of historical trends. In general, I believe this is a reasonable approach, for it allows one to determine if PECO's forecasts were consistent with the trends occurring at the time.

Q. Was trend-line analysis common in the utility industry in the 1970's?

A. Yes, in fact this approach was the basis for the load forecasts of many utilities. West Penn Power used this method until 1980. Historically, the approach had proven a successful forecasting tool. It is often suggested that unforeseen events such as the oil embargoes and the recessions of the 1970's led to a situation where past trends no longer continued. Utility forecasts based on historic trends could no longer accurately predict the future. From this scenario, it is often concluded that load forecasts errors were not the result of imprudence, but rather simply bad luck.

I believe that analysis of PECO's historic load growth patterns is a useful exercise, to test the hypothesis that unforeseen events made it <u>impossible</u> for PECO to produce reasonable load forecasts. At the same time this analysis will

show whether PECO's load forecasts were at least consistent with historic trends. If PECO's forecast were not consistent with historic trends, one may wonder why.

Q. How was this analysis performed?

A. The approach used was to study the growth patterns in PECO's loads for ten year periods. For example to analyze the 1972 load forecast, the load growth over the period 1961 to 1971 was studied. This would have been the most recent 10 year period of data available prior to preparation of the 1972 load forecast. Likewise the 1973 forecast analysis was based on the peak demand data for the period 1962 to 1972.

Q. Why use a ten year period as the basis for the forecast?

A. PECO typically projected ten years ahead, thus a ten year historic period seems reasonable. Also PECO was not a summer peaking utility until 1959 or 1960, so the data prior to that time may have been influenced by other trends.

Q. Please discuss the analytic procedures you employed.

A. The summer peak demand data was examined using regression analysis. Exponential and linear growth models were examined. The model exhibiting the best statistical results was used as the basis for the forecast, until 1978.

After that the linear trend model was used.

Q. What are the results of this analysis?

A. Falkenberg Exhibit 12, shows the results of the trend based forecasts compared to PECO's actual forecasts. Every year from 1972 to 1977 PECO's own peak demand forecasts significantly exceeded the trend based forecasts. In all cases PECO's peak demand forecasts in the terminal year exceed the trend analysis result by 900 MW. In some cases the PECO forecasts exceeded the trend prediction by 2000-3000 MW. From 1978 to the present time, PECO's load forecasts are quite close to the trend line model predictions. Thus the immediate conclusion from this analysis is that during a period of time critical to Limerick decision making, PECO's load forecasts were consistently higher than historic trends would have suggested. The implication is that PECO expected future load growth to differ from that in the past in a consistent fashion. From 1972 to 1977 PECO expected future load growth to consistently exceed that of the past ten years.

For whatever reasons PECO expected load growth to depart from historical experience, it appears that they were consistently disappointed with the actual result. It is instructive to examine the load growth expected in the first year of each forecast. In 1972 PECO predicted load would grow by 818 MW over 1971. The 1972 forecasts predicted the annual load growth in all subsequent years would be much lower, and would only average 568 MW from 1973 to 1981.

In the 1973 PECO load forecast a similar situation emerges. In that year PECO predicted peak demand would grow by 707 Mw over the 1972 peak. In the period that followed, load was expected to grow by 571 mw per year (the average growth from 1974 to 1982). It is interesting to note that during the period 1962 to 1972 PECO's peak demand grew at a rate of only 262 MW on average. What is more significant is that during the ten year period preceding the 1973 load forecast there is no significant trend of increase in the annual peak demand growth. By the time the 1973 forecast was prepared PECO's summer peak demand was exhibiting a pattern of linear growth. Thus PECO's forecast of 707 Mw growth in PEAK demand in 1973 was 2.7 times greater than the level actually experienced during the previous ten years.

The 1974 and 1975 forecasts exhibit a similar pattern. In the 1974 forecast first year load growth of 640 Mw was expected compared to actual experience of 276 Mw for the preceding ten years. In 1975 first year load growth of 849 Mw was expected as opposed to historical growth of 261 Mw. In both cases the growth expected in the first year was higher than the level expected in subsequent years.

It is unclear, what PECO expected to drive such large increases in load growth. However, it is clear that PECO expected it to occur quickly, and to have its greatest influence on the first year of the forecast. Each year this expectation was not realized.

Q. Discuss the implications of the linear pattern of load growth?

A. In the 1970's many utilities expected that the historic pattern of exponential growth in electric demand would continue. Such a growth pattern implies that the annual increase in peak demand grows through time. In essence, it is a pattern of a constant percentage growth. In the linear trend model it is expected that the peak demand would increase by the same number of megawatts each year. PECO's forecasts were much closer to the linear growth model, except for the fact that higher growth was usually expected in the first year of the forecast. In general it appears PECO correctly anticipated the pattern of load growth, however, the level of load growth expected far exceeded experienced trends.

Q. What are the implications of the trend model predictions for the 1973 and 1974 load forecasts?

A. The 1973 and 1974 trend forecasts predicted future demand levels 2000 to 3000 MW less than PECO's forecasts did at the time. The data from these forecasts would have been available by mid 1973, before the first oil embargo. By comparing the trend model predictions to actual load growth during the period 1974 to 1985 it is possible to discern the impact of the oil embargo and subsequent unforeseen events on PECO's load growth. The difference between trend model predictions and actual load growth might reasonably be attributed

to the events that led to the discontinuation of the historic trends. Thus the difference between the trend model prediction and actual loads is the unavoidable forecast error. A positive value suggests the forecasts were worse than necessary. A negative value for the unavoidable forecast error suggests better forecasts than could normally be expected.

The difference between the PECO forecast and the trend model prediction, would arguably be forecast errors that could have been anticipated. In the testimony of Dr. Hieronymus and Mr. Guth, it seems to be implied that all of the variances in the forecasts could be attributed to unavoidable errors. In fact as Falkenberg Exhibit 12 shows, avoidable forecast errors account for a substantial portion of the variation between actual load and PECO's predictions in the period 1972 to 1977. In the pre-embargo 1973 and 1974 forecasts, over half of the error in PECO's forecasts was avoidable. This is arguably a low standard of comparison, because it presumes that the reasonable analyst could have done no better than simply extrapolate observed trends. It seems that PECO's management would have had the advantage of much more knowledge of their load growth prospects than a few observations of peak demand.

Q. What is your conclusion from this analysis?

A. First of all it is apparent that the Commission should not be impressed by the argument that PECO's forecasts proved wrong because they did not foresee events such as the oil embargo. PECO's forecasts would have been too high even

without these events had past trends continued. Second, it is clear that PECO could or should have known that its projections of peak demand growth (and therefore the need for Limerick) vastly exceeded previous experience. For whatever reasons PECO expected this growth, there should have been an awareness that this level of growth was unprecedented. Clearly, this suggests PECO's management should have considered this forecast carried a substantial downside risk. Finally, I think it is interesting to note that even when PECO's forecasts dramatically declined and improved in 1978 and afterwards, they still are quite close to simple trend line results. Thus it would appear that the improvement on PECO's load forecasts came when it was finally recognized that future growth would approximate (not exceed) past trends.

PECO'S EARLY LIMERICK COST ESTIMATES

Q. Your economic studies indicate that Limerick costs too much to be a cost effective addition for PECO. PECO's earlier cost estimates for Limerick were much lower than the actual final cost of the plant. Have you analyzed PECO's early cost estimates?

A. Yes. I have focused on the pre-1979 (TMI) period cost estimates, for two reasons. First of all, by 1980, the PUC investigated completion of the unit, and found it reasonable (at that time) to complete Unit 1. It appears that by that time PECO had crossed the point of no return on Unit 1. Thus the question is whether the company might have acted differently before 1980 if it had

perceived the possibility of Limerick costing more to build. Secondly, I wished to see what level of cost might have been expected for Limerick, based on information available before the TMI accident. This allows one to examine whether the unforeseen TMI incident might have made it impossible to accurately predict the cost of the nuclear plant.

Q. What is the conclusion of your analysis?

A. I have concluded PECO could have been aware that their was considerable risk that their forecast of the cost of Limerick would be much too low, based on data available by 1978. My analysis shows that PECO could have expected the cost of the Limerick plant to be more than 60% greater than the 1978 forecast predicted.

Q. What is the basis for this conclusion?

A. I have based this conclusion on statistical data. First of all, the phenomenon of rapidly escalating nuclear plants is not new. Since the late 1960's nuclear plant costs have escalated rapidly. Falkenberg Exhibit 13 shows generic nuclear plant cost estimates published by the Federal Power Commission in the "1964 Naticnal Power Survey". This document projected nuclear plant costs would be in the range of $107 to $125 per KW for a mid to late 1970's vintage plant. This cost was expected to be quite close to the cost of new coal fired plant. At that time nuclear units were expected to be more reliable, have

greater operational flexibility, offer the potential to avoid expensive air pollution control equipment, and cost less to operate than conventional plants. With all these advantages it is not surprising that many utilities like PECO, embraced nuclear power.

By 1970 the outlook for nuclear power was becoming less favorable. The estimated costs of new reactors had more than doubled in just 4 years. According to the 1970 FPC "National Power Survey" in March 1967 large nuclear plants were expected to cost $135/KW. By 1969 the expected cost of a new unit rose to $220/KW and by 1971 the cost jumped to $300/KW. PECO's 1971 cost estimate for Limerick was $339/KW. This cost was the first "order of magnitude" estimate, according to the Theodore Barry testimony. Unfortunately, in this case "order of magnitude" carries the scientific connotation : the estimate is within a factor of 10 of the correct value.

Q. Why did nuclear plant cost rise so much?

A. There are probably many reasons. Turning to Falkenberg Exhibit 14, we see comparisons of the original estimated costs to actual for nuclear plants of different vintages (Source Power Engineering: The data base for U.S. Power Plants). Plants coming on line in the period 1969 to 1974 exceeded original estimates by 57%, on average. Plants coming on line from 1975 to 1979 exceeded original expectations by 178%. As we now know the situation has only gotten worse since that time.

In this rate case it has been suggested that changing regulatory requirements have been partly responsible for the increase in nuclear plant costs. This is not new in the utility industry either. For example, in the 1972 Florida Power Corporation Annual Report we find the following statement:

> "A major concern in our efforts to meet the increasing need for electricity is being able to build new plants on schedule and at the planned cost. A key factor is the delay caused by the red tape of regulatory bodies."
>
> "Sometimes, as was the case this year, the tangle of delay is just too much. In July, we cancelled plans to build a second nuclear plant at Crystal River.....Our first nuclear unit was originally scheduled to be in operation by April 1972. This plant is now delayed to late 1974, over 2 1/2 years behind schedule."

Q. Did PECO's early cost estimates reflect the trend towards increasing costs for nuclear plants?

A. Yes, in the July 1972 estimate the cost of Limerick had increased by 69% to $573/KW. By 1975 the estimated cost had jumped another 66% to $949/KW.

Q. What was the observed trend nuclear plant costs for units entering service in the period 1968 to 1978?

A. Falkenberg Exhibit 15 shows a summary of the installed cost per KW of nuclear plants entering service during this time period. The source of data for this

exhibit are surveys performed by TVA and the Alabama Power Co. The exhibit shows the plants entering service each year, and the size of these plants and their installed cost per KW (including AFUDC). On the same exhibit is PECO's estimated cost for Limerick during each year.

The figures show that installed cost of nuclear plants actually dropped slightly after the first plants entered service from 1968 to 1971. Possible explanations would be that new plant were getting larger, and that a learning curve effect was taking place. In 1970 and 1971 the average cost of a plant coming on line was about $164/KW. As we know the estimated cost for new plants ordered in that year was $300-$339/KW. Thus in 1971, it was expected that new plant costs would escalate at a rate of 16% per year (or 11 % in real terms) over the most recently completed units.

During the period 1971 to 1978 the cost of new plants entering service showed a remarkable upward trend. By 1974 the average plant entering service cost $331/KW, twice as much as plants completed in 1971. In 1975 the average cost rose again to $457/KW nearly triple the cost of plants finished in 1971. By 1977 the cost of nuclear plants reached $638/KW, nearly quadruple the cost of plants completed 6 years earlier. This was an annual rate of escalation of over 25%, or a real escalation rate of about 20%!

Q. How did PECO's cost estimates for Limerick compare to the cost of plant completed during the 1971 to 1978 time frame?

A. In the early years (1971 to 1974) PECO was expecting a substantial level of escalation in the cost of Limerick compared to recently completed plants. During this time frame PECO expected the cost of Limerick would escalate over recently completed plants at an annual rate of almost 10% over inflation. It would seem clear that PECO's management recognized there were forces at work which would cause the cost of nuclear power to dramatically increase in real terms.

As years passed, the cost of new plants entering service continued to rise. However, PECO's estimates for Limerick rose at a much slower rate. The implied real level of escalation in Limerick's cost began to drop substantially in the period 1975 to 1978. In 1977 and 1978, PECO's expected cost of Limerick, implied only a 2% real annual rate of escalation over the cost of the most recently completed units. From this it would appear that PECO expected, for some reason, that the trend of substantial real escalation in the cost of nuclear plants would be substantially reduced. In light of the observed trends this seems to have been a rather optimistic point of view.

Q What kind of cost estimate might PECO have developed for Limerick in 1978 looking only at statistical data?

A. I have developed a regression equation of the installed cost of the nuclear plants completed before 1979. In developing this equation, I decided to simply

examine the implications of the observed trends in nuclear plant cost circa 1978. Thus the model I develop simply identifies and measures the magnitude of cost increases for nuclear plants that occurred during 1968 to 1978. It makes no attempt to explain why these cost increases occurred. The model does attempt to measure the impact of economies of scale on nuclear plant costs, as well as the differences in costs between initial and add-on units, and extra costs incurred in plants built in the Northeast. The model identifies and measures these factors with no attempt to explain why they occur. Falkenberg Exhibit 16 summarizes the results of the best fit regression model. All of the explanatory variables are statistically significant, and the model successfully explained 85% of the variation in the cost of nuclear plants in the sample.

Q. What would the regression model have predicted as the final installed cost for the Limerick plant, based on the in-service dates expected in 1978?

A. The model would have predicted a final installed cost of $2454/KW for the station. In 1978 PECO was predicting Limerick would cost $1508/KW, some 60% less.

Q. What is your interpretation of this result?

A. The forecast of the regression model is based on the assumption that past trends would continue to the future. By 1978 it was fairly clear that a

temporal trend towards rapidly escalating nuclear plant cost had persisted for a number of years. The reasons for this trend may have been inflation, rising interest rates, lengthening construction times, and perhaps even "regulatory red tape". The model tells what kind of cost could be expected if these trends did not get any better or worse. The fact that PECO's 1978 estimate is $900/KW less that the regression prediction, implies that the Company was optimistic that the trends experienced prior to 1979 would for some reason abate in the future. While that may not have been an imprudent expectation, on its own, it was at least a risky proposition. Certainly by 1979 when the TMI accident occured, there should have been cause for concern that the previous trends in cost would not improve.

The second conclusion one might draw from this statistical analysis is that if PECO's estimates for nuclear plants were reasonable compared to the rest of the industry in 1978, then the industry as a whole, was either ignoring or discounting the experienced trend towards increasing nuclear plant costs.

Finally, it is interesting to note that even before the TMI accident, there was ample evidence that nuclear plant costs were going to be much more expensive than predicted. Just as in the case of the impact of the oil embargo on load growth, the impact of unforeseen events (i.e., TMI) on the economics of nuclear power may have been exagerated.

CONCLUSION

Q. Please summarize the conclusions of your testimony?

A. It is clear that in deciding to build Limerick, PECO was pursuing a risky course of action. Whether the company evaluated these risks or not, reasonable analysts could have suggested that PECO's load forecasts were optimistic on the high side, and that PECO's Limerick cost forecast was optimistic on the low side. Now PECO has ended up with a plant that is not needed and costs too much to be an economical capacity addition. It is not simply hindsight to say that PECO should have been aware of the risks it was taking. Others within the utility industry recognized the problems with nuclear power much earlier. Turning to Florida Power Corporation's 1975 Annual Report we find:

> "While the cost of producing energy from nuclear fuel is now lower, the outlook is changing rapidly. The cost of constructing nuclear generating plants is increasing faster than the cost of fossil-fueled plants. An extension of this trend in relative costs could make nuclear power plants economically impractical within the near future." (emphasis added)

Had PECO adopted this position in 1975, the $1.2 billion dollar penalty to rates Limerick creates would have been avoided.

Q. Please summarize your conclusions.

A. PECO must bear some of the adverse consequences of the Limerick plant. It does not appear that PECO can absorb all of the costs of Limerick and remain

financially viable. The proposal I suggest would equitably distribute the Limerick burden between consumers and investors. This phase-in plan allows PECO a $404 million rate increase to be collected over six years, starting with $135 million in 1986. PECO should also bear the risk of operating Limerick at a 65% capacity factor, or better and guarantee the $207 million in fuel savings. Most importantly, any reductions in PECO's rate request must be removed proportionately from each years rate increase, not taken off the last years as proposed by the Company.

Q. Does this complete your testimony?

A. Yes.

Randall J. Falkenberg

State of Georgia
County of Fulton

Subscribed and sworn to before me, a notary public in and for the State and County aforesaid.

My commission expires

MY COMMISSION EXPIRES SEPT. 12, 1988

This 10th day of January 1986

Barbara J. Trojanowski
Notary Public

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PENNSYLVANIA PUBLIC UTILITY COMMISSION, et al.,	:	
v.	:	Docket No. R-850152
PHILADELPHIA ELECTRIC COMPANY	:	

EXHIBITS
OF
RANDALL J. FALKENBERG

ON BEHALF OF
PHILADELPHIA AREA INDUSTRIAL ENERGY USERS GROUP

Kennedy and Associates
January, 1986

Falkenberg Exhibit 1a
Corrected PECO Phase-In
$Millions

Year	Limerick Fix Charge	Other Change	Total Revenue Reqmt.	Peco Phase-In	Actual Deferal	With Int. at 9.7	Corrected Phase-In
							875
1986	950	279	671	224	-447	-469	199
1987	918	279	639	447	-191	-715	397
1988	885	279	606	671	65	-717	596
1989	859	279	580	895	315	-456	795
1990	832	279	553	895	341	-143	795
1991	807	279	526	895	368	228	795
Total 1986:1991	5250	1673	3577	4025	448		3577
Six Year Average	875	279	596	671			596

Falkenberg Exhibit 1b
Corrected PECO Phase-In
$Millions

Year	Limerick Fix Charge	Other Change	Total Revenue Reqmt.	Peco Phase-In	Actual Deferal	With Int. at 16	Corrected Phase-In
							875
1986	950	279	671	224	-447	-483	199
1987	918	279	639	447	-191	-767	397
1988	885	279	606	671	65	-820	596
1989	859	279	580	895	315	-611	795
1990	832	279	553	895	341	-340	795
1991	807	279	528	895	366	1	795
Total 1986:1991	5250	1673	3577	4025	448		3577
Six Year Average	875	279	596	671			596

Falkenberg Exhibit 2
Modified and Corrected Phase-In with 50% Common Plant
$Millions

Year	Limerick Fix Charge	Other Change	Total Revenue Reqmt.	Peco Phase-In	Corrected Phase-In
					744
1986	802	279	523	174	155
1987	777	279	498	349	310
1988	752	279	473	523	466
1989	731	279	453	698	621
1990	712	279	433	698	621
1991	693	279	414	698	621
Total 1986:1991	4467	1673	2793	3139	2793
Six Year Average	744	279	466	523	466

Falkenberg Exhibit 3
Modified and Corrected Phase-In with 50% Common Plant
With Sinking Fund Depreciation
$Millions

Year	Limerick Fix Charge	Other Change	Total Revenue Reqmt.	Peco Phase-In	Corrected Phase-In
					683
1986	718	279	439	146	135
1987	699	279	420	293	269
1988	684	279	405	439	404
1989	674	279	395	586	539
1990	665	279	386	586	539
1991	656	279	377	586	539
Total 1986:1991	4097	1673	2423	2636	2423
Six Year Average	683	279	404	439	404

FALKENBERG EXHIBIT 4

IMPACT OF SSES-2 ORDER ON LIMERICK UNIT 1

RATE REQUEST ($ millions)

Rate Base with 100% Common Plant	3,700
Rate Base with 50% Common Plant	3,100
Depreciation Expense	25
Preferred Equity	35
Normalized Income Tax	31
ITC Amortization	(13)
O&M and Other	101
Debt Return	170
Limerick Revenue Requirement	349
Non-Jurisdicational	(9)
Change in Fuel and O&M Costs	(279)
Total Rate Increase	61

FALKENBERG EXHIBIT 5
DEMAND/CAPACITY BALANCE
1984:1994

YEAR	PEAK (MW)	INSTALLED CAPACITY	RESERVE (MW)	RESERVE (%)	RESERVE (%) w/o Limerick
1984*	5925	7282	1357	22.9	22.9
1985*	6034	7765	1731	28.7	28.7
1986	6160	8820	2660	43.2	26.1
1987	6180	8820	2640	42.7	25.6
1988	6200	8820	2620	42.3	25.2
1989	6220	8820	2600	41.8	24.8
1990	6240	8820	2580	41.3	24.4
1991	6260	9875	3615	57.7	24.0
1992	6320	9875	3555	56.3	22.9
1993	6380	9875	3495	54.8	21.7
1994	6440	9875	3435	53.3	20.6

* ACTUAL PEAKS

FALKENBERG EXHIBIT 6

IR-PAIEUG-2-65

Q. IR-PAIEUG-2-65 Is it correct to infer from the testimony on page 56 of PECo Statement No. 15 that PECo would consider it prudent to buy today the Limerick Unit No. 1 nuclear plant from an outside party in the hypothetical event that someone else had built it?

A. IR-PAIEUG-2-65 As discussed at length at pages 16 to 55 of PECo Statement No. 15, Dr. Hieronymus is of the opinion that these calculations are not relevant to any prudence issue in this proceeding. Nevertheless, it does follow from the conclusion on page 56 that Limerick Unit No. 1 is a cost effective addition to the PECO system that the acquisition of the hypothetical plant with like characteristics would be prudent if Limerick Unit No. 1 were not already available to PECo. While he cannot speak directly for it, Dr. Hieronymus presumes that this same conclusion would be reached by PECo management.

Responsible Witness: W. H. Hieronymus, Putnam, Hayes & Bartlett

FALKENBERG EXHIBIT 7

EDISON ELECTRIC INSTITUTE

FINANCE COMMITTEE

COST OF CAPITAL USED FOR INTERNAL ECONOMIC EVALUATIONS
1984 SURVEY OF EEI MEMBERS

PREPARED BY THE FINANCE DIVISION
OF
EDISON ELECTRIC INSTITUTE

MAY 1985

Contents

Tables

Figures

1984 Cost of Capital Survey

Background

The intent of this study was to analyze the average costs of capital used by the investor-owned electric utility industry for the purpose of evaluating economic alternatives. Surveys were received from 106 electric utility companies. Those companies accounted for approximately 76 percent of the investor-owned electric utility industry assets in 1983.

The survey was conducted during the second half of 1984. During that period, interest rates and bond and dividend yields declined about 200 basis points. Nevertheless, the average yield on a public utility bond was 50 basis points higher during the period of the 1984 survey than during the 1983 survey. The result was an increase in the composite weighted average cost of capital from 13.9 percent in 1983 to 14.3 percent in 1984.

Respondents were asked to provide financial, regulatory, and accounting data. In addition to cost of capital components and weighted average costs of capital, respondents provided information pertaining to regulatory (i.e. allowed) costs of capital, accounting returns, bond ratings, construction work in progress in rate base, and plant and revenue statistics. EEI appreciates the efforts made by the companies to complete this survey.

Cost of Capital

Respondents to the 1984 survey used a composite weighted average cost of capital of 14.3 percent for the internal evaluation of economic alternatives. This rate was up slightly from 13.9 percent in 1983 and can be attributed to a number of factors including higher market interest rates and, to some degree, higher degrees of risk for some utilities as perceived by investors. The increased perception of risk stemmed primarily from the trouble experienced by many companies which are still involved in the construction of large generating plants.

Respondents were not asked to differentiate between capital costs for varying types of facilities such as generation versus transmission or nuclear versus coal. However, those companies with an interest in a nuclear generating plant reported a 14.8 percent composite weighted average cost of capital, 50 basis points higher than the cost of capital for the entire industry, and 90 to 100 basis points over the composite weighted average cost of capital for companies with no participation in nuclear generating plants.

The 14.3 percent weighted average cost of capital is based on companies which use the incremental cost of debt for internal economic evaluations. For the 1984 survey, those companies accounted for 75 percent of the companies responding. Fourteen percent of the respondents reported using historical or embedded

cost of debt in determining their cost of capital, the average of which was 11.6 percent. The remaining companies used net-of-tax costs and other methods of costing debt in determining their cost of capital.

Table 1 presents the average cost of capital for investor-owned electric utilities using incremental and historical costs of debt.

Table 1

Average Cost of Capital, 1975-1984

Year	Average Cost of Capital for Users of Historical Cost of Debt (a)	Average Cost of Capital for Users of Incremental Cost of Debt
1984	11.6	14.3
1983	12.4	13.9
1982	12.0	15.4
1981	11.9	15.2
1980	10.1	12.7
1979	9.9	11.5
1978	9.3	11.0
1977	9.8	11.0
1976	9.9	11.4
1975	9.4	11.4

Cost of Debt

The average cost of incremental debt reported by respondents to the 1984 survey increased to 13.2 percent from 12.4 percent as reported in the 1983 survey. A summary of the cost of debt using various methods of measurement previously discussed is presented in Table 2.

(a) 1984 is based on a fewer number of reporting companies and conseqently is not strictly comparable to earlier years.

Table 2

Determination of the Cost of Debt
Used for Internal Economic Evaluations

Method of Determination of Cost of Debt	Number of Companies	Percent of Total Respondents	Average Cost of Debt
Incremental	80	75	13.2
Embedded	15	14	9.6
Net of Tax	8	8	7.4
Other	3	3	

During the period the survey was conducted (third and fourth quarter, 1984), yields on public utility bonds declined more than 200 basis points. The average public utility bond (gas and electric) yield as measured by Moody's Investors Service fell from 15.2 percent in the beginning of July to 12.9 percent at the end of December.

The average yields on public utility bonds with various bond ratings as reported by Moody's during the period of the 1984 survey are shown in Table 3.

Table 3

Average Yields on Public Utility Bonds
July 1984 through December 1984
(Percent)

	Aaa	Aa	A	Baa	Average
Average	12.62	13.45	13.93	14.37	13.86
Range	12.35-12.92	12.64-14.77	12.94-15.12	13.38-15.66	12.83-15.18

Source: Moody's Investor Service - Manual.

On average, however, bond public utility yields were 50 basis points higher during the period covered by the 1984 survey than they had been one year earlier during the 1983 survey. This was in part due to higher market interest rates and in part due to increased risk as perceived by investors. Continuing financial problems and the association with nuclear generating plants may have inflicted an additional risk premium on some utilities at certain times during the survey periods which in turn affected the higher bond yields.

Inflation, high interest rates, and the massive construction financing requirements since 1975 have had severe impacts on electric utility bond ratings. In turn, declining bond ratings have contributed to generally increasing debt costs since 1975. Table 4 presents the distribution of bond ratings of the same 95 companies in each of the years 1984, 1982, 1980, and 1975. Eleven respondents whose debt was either privately placed or for some other reason not rated by Moody's were excluded from the distributions. The same data are presented graphically in Figure 1.

Table 4

Distribution of 1984 Survey Respondents by Bond Ratings
1984, 1982, 1980, 1975

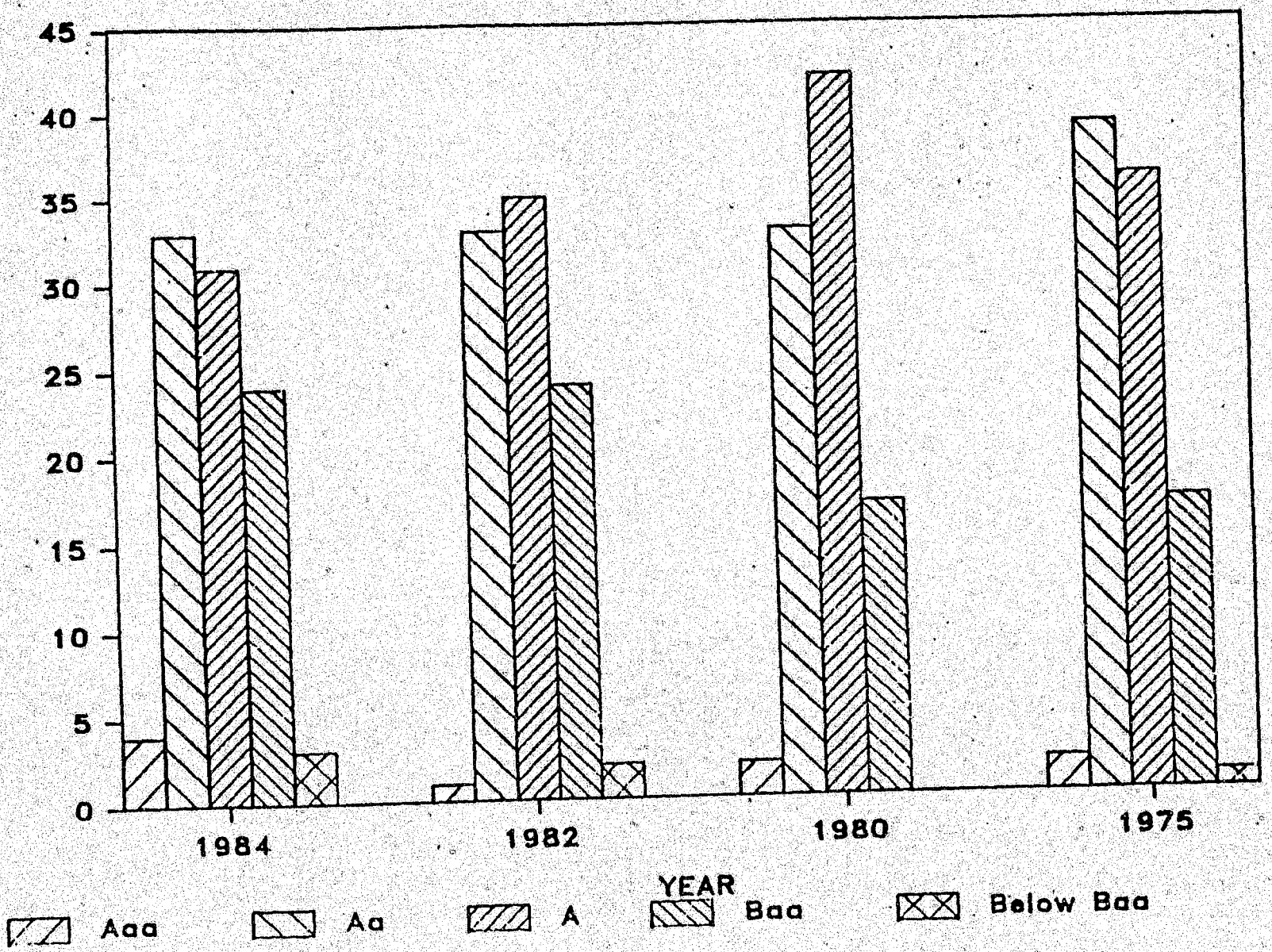
Year	Aaa	Aa	A	Baa	Below Baa
1984	4	33	31	24	3
1982	1	33	35	24	2
1980	2	33	42	17	0
1975	2	39	36	17	1

Table 4 and Figure 1 demonstrate the shift that occurred in the industry's financial well being in the late seventies and early eighties. During the mid-seventies, the industry was predominately rated A to Aa. As the decade progressed and construction programs, interest rates, and inflation escalated, bond ratings began to fall. By the beginning of the eighties, the industry had shifted closer to an A rating on average. Finally, the ratings from 1984 reflect the increased financial hetrogeneity of the industry.

Cost of Equity

The average cost of equity used by respondents to the 1984 survey was 16.3 percent, the same rate reported in the 1983 survey. For purposes of determining their cost of equity, the majority of the respondents relied primarily on the discounted cash flow (DCF) methodology. Fifty-seven of the 103 companies responding to this question (55 percent) reported using the DCF methodology as the primary means of determining their cost of

ELECTRIC UTILITY BOND RATINGS



Falkenberg Exhibit 7

equity. Thirty-three of the 48 companies reporting alternative or corroborating means of determining cost of equity (69 percent) used a risk premium-based methodology.

Regulatory Cost of Capital

The average regulatory cost of equity (most recently approved) cited by respondents to the 1984 survey was 16.1 percent -- about 20 basis points below the average cost of equity used for internal economic evaluations. The regulatory cost of debt averaged 9.3 percent, compared to the 9.6 percent average cost of debt for companies using embedded or historical debt costs in determining their weighted average cost of capital.

Construction Work In Progress

Fifty of the 106 respondents (47 percent) reported some percentage of construction work in progress (CWIP) in rate base. Percentages of construction work in progress allowed in rate base ranged from less than 1 percent to 100 percent with the mean allowance equalling about 59 percent.

The presence of CWIP in rate base was found to have an impact on the composite weighted average cost of capital reported in the 1984 survey. Companies reporting some percentage of CWIP in rate base had a composite weighted average cost of capital of 13.9 percent. Companies reporting no CWIP in rate base had a composite weighted average cost of capital of 14.7 percent. Table 5 pre-

sents a comparison of the average costs of capital components reported by companies with and without CWIP in rate base.

Table 5

Average Costs of Capital Components

	Companies With CWIP In Rate Base	Companies Without CWIP In Rate Base
Debt	12.8	13.5
Preferred	11.7	12.6
Common Equity	15.8	16.4
Weighted Average	13.9	14.7

Falkenberg Exhibit 8a
Hieronymus Limerick Unit 1 Cost Benefit Study
$Millions

Year	Total Costs	Capacity Charges Avoided	Total Benefits	Benefits Less Costs
1986	$857.52	$80.57	$231.39	($626.13)
1987	$830.85	$88.78	$274.82	($556.03)
1988	$811.59	$97.23	$306.68	($504.91)
1989	$801.44	$144.03	$466.39	($335.05)
1990	$779.64	$152.68	$435.14	($344.50)
1991	$764.54	$161.84	$482.64	($281.90)
1992	$750.82	$171.54	$651.57	($99.25)
1993	$736.01	$181.84	$607.75	($128.26)
1994	$716.51	$192.75	$756.43	$39.92
1995	$716.86	$204.31	$1,050.35	$333.49
1996	$709.57	$216.57	$954.38	$244.81
1997	$712.97	$229.57	$1,032.10	$319.13
1998	$727.63	$243.35	$1,319.21	$591.58
1999	$718.95	$257.95	$1,095.76	$376.81
2000	$728.22	$273.43	$1,255.89	$527.67
2001	$745.46	$289.85	$1,549.16	$803.70
2002	$739.33	$307.24	$1,486.61	$747.28
2003	$749.14	$325.68	$1,487.76	$738.62
2004	$774.30	$345.22	$2,033.79	$1,259.49
2005	$769.39	$365.94	$1,747.58	$978.19
2006	$783.48	$387.90	$1,894.61	$1,111.13
2007	$813.77	$411.18	$2,501.36	$1,687.59
2008	$812.16	$435.84	$2,268.23	$1,456.07
2009	$830.51	$461.98	$2,290.95	$1,460.44
2010	$870.32	$489.71	$3,180.50	$2,310.18
2011	$870.03	$519.10	$2,752.38	$1,882.35
2012	$895.08	$550.25	$2,943.48	$2,048.40
2013	$944.22	$583.27	$3,983.85	$3,039.63
2014	$946.89	$618.27	$3,572.35	$2,625.46
2015	$979.79	$655.37	$3,674.63	$2,694.84
2016	$1,036.60	$694.70	$5,214.07	$4,177.47
2017	$1,039.54	$736.37	$4,471.32	$3,431.78
2018	$1,081.12	$780.55	$4,587.13	$3,506.01
2019	$1,158.69	$827.39	$6,325.73	$5,167.04
2020	$1,178.20	$877.04	$5,545.68	$4,367.48
2021	$1,245.30	$929.67	$5,889.83	$4,644.53
2022	$1,366.46	$985.45	$8,314.74	$6,948.28
2023	$1,438.96	$1,044.58	$7,331.79	$5,892.83
2024	$1,645.45	$1,107.24	$7,908.12	$6,262.67
Total	$35,077.31	$17,426.23	$103,876.15	$68,798.84
		2,312		
Gross Recpt. Tax		4.5		
Discount Rate		9.7%		

Net present Value of Benefits with 100% Increase in Capacity Charges 3,166
Net present Value of Benefits with 50% Increase in Capacity Charges 2,561
Net present Value of Benefits with 0% Increase in Capacity Charges 1,956

Falkenberg Exhibit 8b
Hieronymus Limerick Unit 1 Cost Benefit Study
$Millions

Year	Total Costs	Capacity Charges Avoided	Total Benefits	Benefits Less Costs
1986	$857.52	$80.57	$231.39	($626.13)
1987	$830.85	$88.78	$274.82	($556.03)
1988	$811.59	$97.23	$306.68	($504.91)
1989	$801.44	$144.03	$466.39	($335.05)
1990	$779.64	$152.68	$435.14	($344.50)
1991	$764.54	$161.84	$482.64	($281.90)
1992	$750.82	$171.54	$651.57	($99.25)
1993	$736.01	$181.84	$607.75	($128.26)
1994	$716.51	$192.75	$756.43	$39.92
1995	$716.86	$204.31	$1,050.35	$333.49
1996	$709.57	$216.57	$954.38	$244.81
1997	$712.97	$229.57	$1,032.10	$319.13
1998	$727.63	$243.35	$1,319.21	$591.58
1999	$718.95	$257.95	$1,095.76	$376.81
2000	$728.22	$273.43	$1,255.89	$527.67
2001	$745.46	$289.85	$1,549.16	$803.70
2002	$739.33	$307.24	$1,486.61	$747.28
2003	$749.14	$325.68	$1,487.76	$738.62
2004	$774.30	$345.22	$2,033.79	$1,259.49
2005	$769.39	$365.94	$1,747.58	$978.19
2006	$783.48	$387.90	$1,894.61	$1,111.13
2007	$813.77	$411.18	$2,501.36	$1,687.59
2008	$812.16	$435.84	$2,268.23	$1,456.07
2009	$830.51	$461.98	$2,290.95	$1,460.44
2010	$870.32	$489.71	$3,180.50	$2,310.18
2011	$870.03	$519.10	$2,752.38	$1,882.35
2012	$895.08	$550.25	$2,943.48	$2,048.40
2013	$944.22	$583.27	$3,983.85	$3,039.63
2014	$946.89	$618.27	$3,572.35	$2,625.46
2015	$979.79	$655.37	$3,674.63	$2,694.84
2016	$1,036.60	$694.70	$5,214.07	$4,177.47
2017	$1,039.54	$736.37	$4,471.32	$3,431.78
2018	$1,081.12	$780.55	$4,587.13	$3,506.01
2019	$1,158.69	$827.39	$6,325.73	$5,167.04
2020	$1,178.20	$877.04	$5,545.68	$4,367.48
2021	$1,245.30	$929.67	$5,889.83	$4,644.53
2022	$1,366.46	$985.45	$8,314.74	$6,948.28
2023	$1,438.96	$1,044.58	$7,331.79	$5,892.83
2024	$1,645.45	$1,107.24	$7,908.12	$6,262.67
Total	$35,077.31	$17,426.23	$103,876.15	$68,798.84
		1,289		
Gross Recpt. Tax		4.5		
Discount Rate		14.3%		

Net present Value of Benefits with 100% Increase in Capacity Charges 30
Net present Value of Benefits with 50% Increase in Capacity Charges -308
Net present Value of Benefits with 0% Increase in Capacity Charges -645

Falkenberg Exhibit 9a

Trend in Nuclear O&M Costs

	Peach Bottom O&M		Gross National Product Implicit Price Deflator		Peach Bottom O&M	
Year	Nominal $	% Increase	Base 1972	Base 1983	Real $	% Increase
1976	$11,902		1.3234	0.61374	$19,393	
1977	$18,499	55.4%	1.4005	0.64949	$28,482	46.9%
1978	$16,701	-9.7%	1.5042	0.69758	$23,941	-15.9%
1979	$16,998	1.8%	1.6342	0.75787	$22,429	-6.3%
1980	$24,167	42.2%	1.7842	0.82744	$29,207	30.2%
1981	$27,822	15.1%	1.9514	0.90498	$30,743	5.3%
1982	$31,269	12.4%	2.0688	0.95942	$32,592	6.0%
1983	$40,700	30.2%	2.1563	1.00000	$40,700	24.9%
1976-1983		19.2%				11.2%
1978-1983		19.5%				11.2%

Falkenberg Exhibit 9b

Regression Results
For Equation of the Form
$ O&M = A + B*Year
(Million of 1983 $)

Period	R^2	T	A	B
1979 - 1983	88.6	5.56	-6523.8	3.309
1976 - 1983	74	4.14	-4611.2	2.343

FALKENBERG EXHIBIT 10
ACCUMULATED PRESENT WORTH OF LIMMERICK UNIT 1 COST BENEFIT

Year	Total Benefits	Total Costs	Benefits-Costs	Accum PW *
1986	191	999	-808	-707
1987	230	963	-733	-1268
1988	258	926	-668	-1715
1989	394	899	-505	-2011
1990	359	862	-503	-2269
1991	402	835	-433	-2463
1992	566	812	-246	-2560
1993	514	787	-273	-2653
1994	657	758	-101	-2684
1995	945	749	196	-2632
1996	843	736	107	-2608
1997	914	737	177	-2572
1998	1194	748	446	-2494
1999	963	736	227	-2459
2000	1116	742	374	-2408
2001	1401	756	645	-2332
2002	1330	747	583	-2272
2003	1321	753	568	-2221
2004	1857	775	1082	-2136
2005	1560	767	793	-2081
2006	1696	778	918	-2025
2007	2291	805	1486	-1947
2008	2045	800	1245	-1889
2009	2054	815	1239	-1839
2010	2929	851	2078	-1766
2011	2486	847	1639	-1715
2012	2661	869	1792	-1666
2013	3685	914	2771	-1601
2014	3256	912	2344	-1552
2015	3339	941	2398	-1509
2016	4859	998	3861	-1447
2017	4095	998	3097	-1404
2018	4188	1035	3153	-1366
2019	5903	1104	4799	-1315
2020	5097	1110	3987	-1278
2021	5415	1156	4259	-1243
2022	7811	1242	6569	-1197

* A negative value indicates that Limerick results in higher rates over the plant life. A positive value indicates lower rates.

Falkenberg Exhibit 11

PHILADELPHIA ELECTRIC COMPANY
REVENUE REQUIREMENTS ANALYSIS
USING RISK FREE COST OF CAPITAL

O & M EXPENSES	1441
DEPRECIATION	265
OTHER TAXES	36
ITC (NET)	3
RATE BASE	6964
PRE-TAX RETURN ON RATE BASE (a)	913
REVENUE REQUIREMENTS	2652
TOTAL REV REQ INCLD GRT	2706
CURRENT REVENUES	2502
RATE INCREASE	204
INCREASE LESS GROWTH ADJUSTMENT	193
PERCENT	8%

(a) RATE OF RETURN COMPONENTS

	CAPITALIZATION	COST	WTD COST	TAX EFFECT	PRE-TAX REV REQ
DEBT	50.7%	9.28%	0.0470	1	4.70%
PREFERRED	10.8%	9.28%	0.0100	1.9907629	2.00%
COMMON EQ	38.5%	8.36%	0.0322	1.9907629	6.41%
TOTAL			8.93%		13.11%

WSJ 1/3/86
US TREAS NOV 2015, 9 7/8S
YIELD 9.28%

FALKENBERG EXHIBIT 12-A
1972 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	EXPONENTIAL REGRESSION FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313	5740	8.04	5412	1.87	6.17
1973	5760	6300	9.38	5785	0.43	8.95
1974	5431	6850	26.13	6182	13.83	12.29
1975	5530	7480	35.26	6608	19.49	15.78
1976	5346	8110	51.70	7062	32.10	19.60
1977	5888	8630	46.57	7548	28.19	18.38
1978	5667	9240	63.05	8067	42.34	20.70
1979	5641	9770	73.20	8621	52.84	20.36
1980	6095	10300	68.99	9214	51.18	17.81
1981	5731	10840	89.15	9848	71.84	17.31

FALKENBERG EXHIBIT 12-B
1973 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	LINEAR REG FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760	6020	4.51	5523	-4.11	8.62
1974	5431	6670	22.81	5786	6.53	16.28
1975	5530	7240	30.92	6048	9.36	21.56
1976	5346	7850	46.84	6310	18.03	28.81
1977	5888	8400	42.66	6572	11.62	31.05
1978	5667	8950	57.93	6834	20.59	37.34
1979	5641	9750	72.84	7096	25.80	47.05
1980	6095	10110	65.87	7358	20.73	45.15
1981	5731	10680	86.35	7620	32.97	53.39
1982	5691	11240	97.50	7882	38.51	59.00

FALKENBERG EXHIBIT 12-C
1974 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	LINEAR REG FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431	6400	17.84	5891	8.47	9.38
1975	5530	6960	25.86	6168	11.54	14.32
1976	5346	7490	40.10	6445	20.56	19.54
1977	5888	8020	36.21	6723	14.17	22.04
1978	5667	8530	50.52	7000	23.52	27.00
1979	5641	9010	59.72	7277	29.00	30.72
1980	6095	9480	55.54	7554	23.94	31.59
1981	5731	9960	73.79	7832	36.65	37.14
1982	5691	10460	83.80	8109	42.48	41.31
1983	5879	10950	86.26	8386	42.64	43.61

FALKENBERG EXHIBIT 12-D
1975 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	% DIFFERENCE	LINEAR REG FORECAST	% DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530	6280	13.56	6021	8.88	4.69
1976	5346	6690	25.14	6282	17.51	7.63
1977	5888	7130	21.09	6543	11.12	9.97
1978	5667	7600	34.11	6804	20.06	14.05
1979	5641	8040	42.53	7065	25.24	17.29
1980	6095	8490	39.29	7326	20.19	19.10
1981	5731	8950	56.17	7587	32.38	23.79
1982	5691	9430	65.70	7848	37.90	27.80
1983	5879	9900	68.40	8109	37.93	30.47
1984	5925	10380	75.19	8370	41.26	33.93

FALKENBERG EXHIBIT 12-E
1976 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	LINEAR REG FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530					
1976	5346	5820	8.87	6100	14.10	-5.23
1977	5888	6320	7.34	6337	7.63	-0.29
1978	5667	6660	17.52	6575	16.02	1.50
1979	5641	7020	24.45	6813	20.78	3.67
1980	6095	7390	21.25	7051	15.68	5.57
1981	5731	7780	35.75	7289	27.18	8.58
1982	5691	8180	43.74	7526	32.25	11.49
1983	5879	8580	45.94	7764	32.06	13.88
1984	5925	8990	51.73	8002	35.05	16.68
1985	6035	9390	55.59	8240	36.53	19.06

FALKENBERG EXHIBIT 12-F
1977 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	LINEAR REG FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530					
1976	5346					
1977	5888	6000	1.90	6035	2.50	-0.60
1978	5667	6300	11.17	6233	9.98	1.19
1979	5641	6600	17.00	6430	13.98	3.02
1980	6095	6900	13.21	6627	8.73	4.48
1981	5731	7200	25.63	6824	19.07	6.56
1982	5691	7500	31.79	7021	23.37	8.42
1983	5879	7800	32.68	7218	22.78	9.90
1984	5925	8100	36.71	7415	25.15	11.56
1985	6035	8400	39.19	7612	26.14	13.05
1986		8700		7809		0.00

FALKENBERG EXHIBIT 12-G
1978 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	LINEAR REG FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530					
1976	5346					
1977	5888					
1978	5667	5700	0.58	6133	8.22	-7.64
1979	5641	5850	3.71	6313	11.91	-8.21
1980	6095	6050	-0.74	6493	6.52	-7.26
1981	5731	6250	9.06	6672	16.43	-7.37
1982	5691	6480	13.86	6852	20.41	-6.54
1983	5879	6710	14.14	7032	19.61	-5.48
1984	5925	6940	17.13	7212	21.72	-4.59
1985	6035	7150	18.48	7392	22.48	-4.01
1986		7350		7572		
1987		7550		7751		

FALKENBERG EXHIBIT 12-H
1979 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	LINEAR REG FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530					
1976	5346					
1977	5888					
1978	5667					
1979	5641	5700	1.05	6042	7.11	-6.07
1980	6095	5850	-4.02	6177	1.35	-5.37
1981	5731	6000	4.69	6313	10.15	-5.46
1982	5691	6150	8.07	6448	13.30	-5.24
1983	5879	6300	7.16	6583	11.98	-4.82
1984	5925	6450	8.86	6718	13.39	-4.53
1985	6035	6600	9.36	6854	13.57	-4.20
1986		6800		6989		
1987		7000		7124		
1988		7200		7260		

FALKENBERG EXHIBIT 12-1
1980 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	LINEAR REG FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530					
1976	5346					
1977	5888					
1978	5667					
1979	5641					
1980	6095	5800	-4.84	5989	-1.74	-3.10
1981	5731	5900	2.95	6096	6.38	-3.43
1982	5691	6000	5.43	6204	9.01	-3.58
1983	5879	6100	3.76	6311	7.35	-3.59
1984	5925	6200	4.64	6418	8.32	-3.68
1985	6035	6300	4.39	6525	8.13	-3.74
1986		6400		6633		
1987		6500		6740		
1988		6600		6847		
1989		6700		6955		

FALKENBERG EXHIBIT 12-J
1981 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	LINEAR REG FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530					
1976	5346					
1977	5888					
1978	5667					
1979	5641					
1980	6095					
1981	5731	5900	2.95	6084	6.15	-3.20
1982	5691	6000	5.43	6184	8.66	-3.23
1983	5879	6100	3.76	6284	6.89	-3.13
1984	5925	6200	4.64	6384	7.75	-3.11
1985	6035	6300	4.39	6484	7.45	-3.06
1986		6400		6585		
1987		6500		6685		
1988		6600		6785		
1989		6700		6885		
1990		6800		6986		

FALKENBERG EXHIBIT 12-K
1982 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	% DIFFERENCE	LINEAR REG FORECAST	% DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530					
1976	5346					
1977	5888					
1978	5667					
1979	5641					
1980	6095					
1981	5731					
1982	5691	5800	1.92	5992	5.29	-3.37
1983	5879	5850	-0.49	6061	3.10	-3.60
1984	5925	5900	-0.42	6131	3.48	-3.90
1985	6035	5950	-1.41	6201	2.74	-4.15
1986		6000		6270		
1987		6050		6340		
1988		6100		6409		
1989		6150		6479		
1990		6210		6548		
1991		6270		6618		

FALKENBERG EXHIBIT 12-L
1983 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	LINEAR REG FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530					
1976	5346					
1977	5888					
1978	5667					
1979	5641					
1980	6095					
1981	5731					
1982	5691					
1983	5879	5600	-4.75	5880	0.01	-4.76
1984	5925	5650	-4.64	5919	-0.10	-4.54
1985	6035	5700	-5.55	5958	-1.27	-4.28
1986		5750		5997		
1987		5800		6036		
1988		5850		6076		
1989		5900		6115		
1990		5950		6154		
1991		5980		6193		
1992		6010		6232		

FALKENBERG EXHIBIT 12-M
1984 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	PECO FORECAST ERROR % DIFFERENCE	LINEAR REG FORECAST	UNAVOIDABLE FORECAST ERROR % DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530					
1976	5346					
1977	5888					
1978	5667					
1979	5641					
1980	6095					
1981	5731					
1982	5691					
1983	5879					
1984	5925	5900	-0.42	5887	-0.65	0.23
1985	6035	5930	-1.74	5918	-1.93	0.19
1986		5960		5950		
1987		5990		5982		
1988		6020		6013		
1989		6050		6045		
1990		6080		6077		
1991		6110		6109		
1992		6150		6140		
1993		6190		6172		

FALKENBERG EXHIBIT 12-N
1985 FORECAST

YEAR	HISTORIC LOAD	PECO FORECAST	% DIFFERENCE	LINEAR REG FORECAST	% DIFFERENCE	AVOIDABLE FORECAST ERROR % DIFFERENCE
1962	2721					
1963	2926					
1964	3134					
1965	3366					
1966	3673					
1967	3727					
1968	4375					
1969	4592					
1970	4712					
1971	4922					
1972	5313					
1973	5760					
1974	5431					
1975	5530					
1976	5346					
1977	5888					
1978	5667					
1979	5641					
1980	6095					
1981	5731					
1982	5691					
1983	5879					
1984	5925					
1985	6035	6140	1.74	5985	-0.83	2.57
1986		6160		6030		
1987		6180		6076		
1988		6200		6122		
1989		6220		6167		
1990		6240		6213		
1991		6260		6258		
1992		6320		6304		
1993		6380		6350		
		6440				

FALKENBERG EXHIBIT 13

1964 Estimates of Future Nuclear Power Plant Costs Compared to Conventional Plants

TABLE 31

Approximate General Range of Competition Between Nuclear and Coal Fired Generation

	1967	1970	1975	1980
1. Year plant placed in service				
2. Nominal plant output—kilowatts	300,000	500,000	1,000,000	1,200,000
3. Projected investment cost of alternative conventional plant (reference base for line 4)—$/kw	130	122	110	107
4. Approximate additional investment cost of nuclear plant compared to alternative fossil fuel plant. Dollars per kw of capacity	40–60	10–30	0–15	0–12
5. Effect of additional investment in nuclear plant on energy cost—mills per kwh	0.7–1.1	0.2–0.5	0–0.3	0–0.2
6. Effect of additional operation and maintenance of nuclear plant on energy cost—mills per kwh	0.3	0.2	0.1	0.1
7. Nuclear fuel cost—mills per kwh	1.8–2.1	1.5–1.9	1.2–1.6	1.0–1.4
8. Cost of fossil fuel—in mills per kwh (total of items 5, 6, 7) at which total power cost of nuclear generation or fossil fuel generation would be about equal under generalized conditions assumed herein. (Referred to as "break even" cost.)	2.8–3.5	1.9–2.6	1.3–2.0	1.1–1.7
9. Break-even fossil fuel cost in item 8 converted to cents per million Btu of fossil fuel cost	31–39	21–29	15–22	12–19

Source: Federal Power Commission 1964 National Power Survey

FALKENBERG EXHIBIT 14

OVERRUN IN NUCLEAR PLANT COST ESTIMATES 1969-1989

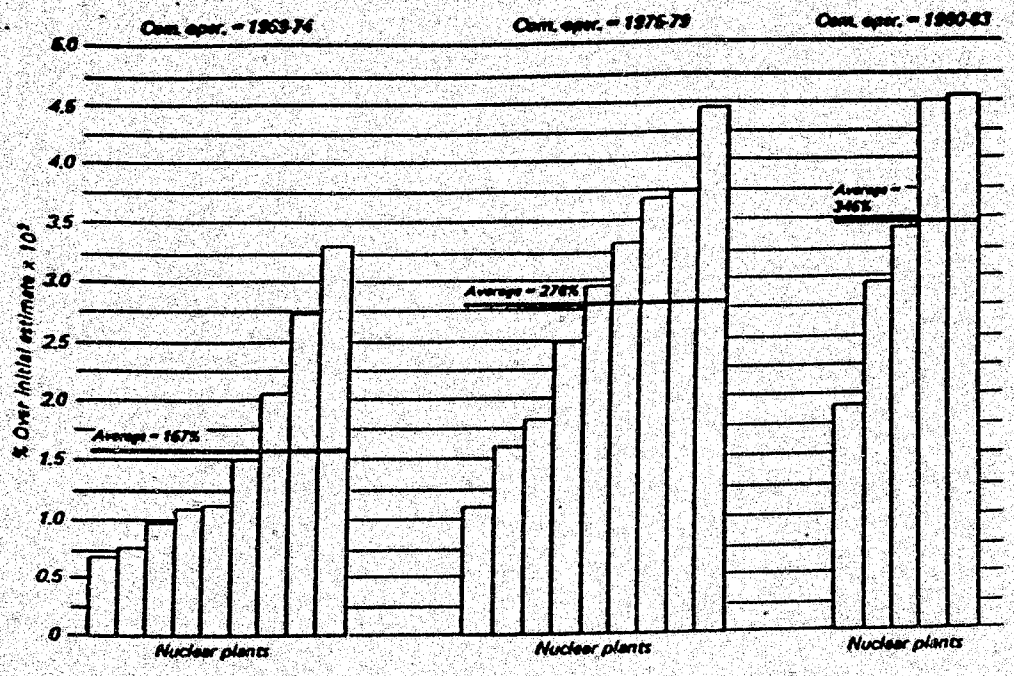


Figure 24. Actual percent increase in capital costs over initial estimates for completed nuclear plants.

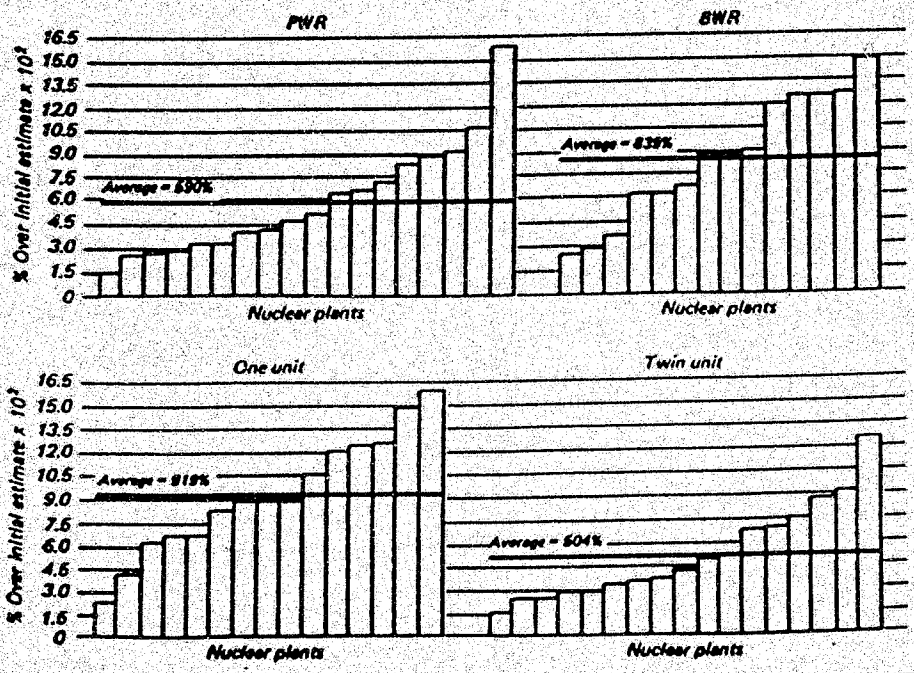


Figure 25. Percent increase in capital costs over initial estimates for nuclear plants scheduled for commercial operation between 1954 and 1968. The data base for Figures 24 and 25 consists of 65 plants designed by nine A/Es and two utilities.

Source: Power Engineering - The Data Base for U.S. Power Plants

Falkenberg Exhibit 15

Comparison of PECO Limerick Cost Estimates to Plants Completed from 1968-1978

Plant	COD	Total Cost ($Millions)	Gross Capacity MW	$/kw	Annual Average $/kw	Source	Peco Est. Limerick $/kw	Limerick Station Avg. COD	Recent Plants	Expected Inflation	Real Esc Implied in PECO Est.
San Onofre 1	68	88	436	202	202	TVA					
Oyster Creek	69	93	620	150		TVA					
Nine Mile Pt 1	69	164	620	265	207	TVA					
Ginna 1	70	87	470	185		TVA					
Dresden 2	70	115	794	145		TVA					
Pt Beach 1	70	86	519	166	165	APCO					
Millstone 1	71	101	660	153		TVA					
Robinson 2	71	84	700	120		TVA					
Monticello	71	119	545	216		TVA					
Dresden 3	71	117	794	147		TVA					
Palidase 5	71	143	805	178	163	TVA	339	76	15.7%	5.0%	10.8%
Pilgrim 1	72	238	670	355		APCO					
Pt Beach 2	72	75	519	145		APCO					
Vermont Yankee	72	180	537	335		APCO					
Maine Yankee 1	72	217	863	251		APCO					
Turky Pt 3	72	104	760	137	245	APCO	573	79	12.9%	4.9%	8.0%
Quad City 1	73	140	789	177		TVA					
Quad City 2	73	120	789	152		TVA					
Oconee 1	73	156	887	176		TVA					
Indian Pt 2	73	216	1013	213		APCO					
Pt. Calhoun	73	163	481	339		APCO					
Turky Pt 4	73	94	760	124		APCO					
Zion 1	73	284	1080	263	206	APCO	573	79	18.6%	5.1%	13.5%
Prairie Island 1	74	234	560	418		APCO					
Cooper 1	74	380	801	474		APCO					
Peach Bottom 2	74	497	1098	453		APCO					
TMI 1	74	402	840	479		APCO					
Zion 2	74	286	1080	265		APCO					
Oconee 2	74	160	887	180		TVA					
Arkansas 1	74	260	903	288		APCO					
Peach Bottom 3	74	263	1098	240		APCO					
Prairie Island 2	74	181	560	323		APCO					
Oconee 3	74	166	887	187	331	TVA	824	82	12.1%	5.9%	6.2%
Rancho Seco 1	75	340	966	352		APCO					
Calvert Cliffs 1	75	429	880	488		APCO					
Fitzpatrick	75	319	821	389		TVA					
BSEP 2	75	412	821	502		APCO					
Hatch 1	75	414	810	511		APCO					
Millstone 2	75	434	870	499	457	APCO	949	82	11.0%	7.0%	4.0%
Trojan 1	76	470	1178	399		APCO					
Indian Pt 3	76	527	965	546		TVA					
St. Lucie 1	76	486	890	546	497	APCO	949	82	11.4%	7.3%	4.1%
Crystal River 3	77	417	855	488		APCO					
BSEP 1	77	344	821	419		APCO					
Beaver Valley 1	77	679	852	797		APCO					
Calvert Cliffs 2	77	310	880	352		APCO					
Salem 1	77	963	1136	848		APCO					
Davis Besse	77	668	906	737		APCO					
Farley 1	77	741	898	825	638	APCO	1222	84	9.7%	7.3%	2.5%
North Anna 1	78	784	947	828		APCO					
Unit 2	78	675	905	746	787	APCO	1508	86	8.5%	6.9%	1.5%

FALKENBERG EXHIBIT 16

Regression Equation Relating Total Cost Per KW of Nuclear Plants Completed from 1968 to 1978 to Commercial Operation Date and other Factors

Variable	Variable Mean	Regression Coefficient	t-Statictic
Installed Cost $/KW (1)	356.3725	-	-
Constant	-	41191.26	-
C.O.D.(2)	74.1973	-1185.2391	-4.955
INITIAL/ADD-ON (3)	0.7059	132.4998	5.365
MW (4)	808.3529	-0.1267	-1.595
(C.O.D.) (2)	5511.2378	8.5439	5.298
Northeast (5)	0.3725	75.071	3.298
Number of Observations	51		
Adjusted R^2	0.8604		
Standard Error	77.57		

Sources and Notes

1. Installed cost per KW is measured in total installed cost (including AFUDC) per KW of capacity. Source is Alabama Power Co.'Power Plant Cost Trends' -January 1984 and 1983 TVA Survey of Nuclear Plant Costs.

2. C.O.D. is year and month of commercial operation; source TVA and APCO surveys.

3. Initial Add-On Indicator = 1 for First Unit at Site, 0 for subsequent units.

4. Gross Capacity in Megawatts for the unit.

5. Northeast Indicator = 1 for Utilities in FERC region 1, 0 otherwise.

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January 14, 1986

The Honorable Joseph P. Matuschak
Administrative Law Judge
Pennsylvania Public Utility Commission
97 East Main Street
Uniontown, PA 15401

Re: Pennsylvania Public Utility Commission v. Philadelphia Electric Company, Docket No. R-850152

Dear Judge Matuschak:

On December 31, 1985, Philadelphia Electric Company ("PECO" or the "Company") filed a Petition for Stay of the December 20, 1985 ruling which excluded from the record certain undefined evidence dealing with the reasonableness of the 1976 and 1978 Limerick construction deferral announcements and precluded the submission in this proceeding of additional evidence on this matter. An Answer to the Company's Petition was subsequently filed by the Pennsylvania Public Utility Commission Trial Staff ("Trial Staff") on January 10, 1986. The purpose of this letter is to clarify a possible misconception that could arise from review of the Trial Staff's Answer.

Specifically, in Paragraph 5 of its Answer, the Trial Staff asserts that Section 331(e) of the Public Utility Code, 66 Pa. C.S. §331(e), only permits a stay of the entire proceeding as opposed to a single evidentiary ruling, and therefore, cannot be relied upon to support the Company's Petition. The Trial Staff further states that it would support a stay of the entire proceeding if PECO agrees not to implement a new tariff until after the material question currently before the Commission on the Trial Staff's Motion in Limine has been fully resolved. First, it must be emphasized that the Company is requesting only a stay of the December 20 ruling and its reliance on Section 331(e) does not constitute a request for a stay of the entire proceeding. Indeed, the Company avers that a stay of the entire proceeding is neither required nor appropriate.

Second, the Company denies that its reliance on Section 331(e) is misplaced. Although the Trial Staff correctly states that this section authorizes the presiding officer to "stay the proceeding", it is denied that this language precludes a stay of an interim ruling. It is well-established under prior Commission practice that the presiding officer may stay a portion of a proceeding despite the language contained in Section 331(e). For example, in the Company's 1979 electric rate proceeding at Docket No. R-79060865, the Company requested the certification and stay of an ALJ's ruling which granted the Trial Staff's Motion to Compel responses to certain interrogatories dealing with the reasonableness of Limerick construction. Despite the language of Section 331(e) and the Commission's prior regulations on certification which similarly authorized a "stay of proceedings" (52 Pa. Code §3.191, 7 Pa. Bulletin 2349 (August 20, 1977), deleted, 14 Pa. Bulletin 3819 (October 13, 1984)), the ALJ granted the Company's request for a stay of his ruling. Order of ALJ Klovekorn Granting, In Part, And Denying, In Part, Request for Certification, Docket No. R-79060865, pp. 5-6 (October 19, 1979). Thus, Section 331(e) clearly supports and does not preclude a stay of the December 20 ruling.

Sincerely,

Walter W. Hall II

WRH,II/cmb

cc: All Parties of Record
Secretary Jerry Rich

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA PUBLIC UTILITY COMMISSION
P. O. BOX 3265, HARRISBURG, Pa. 17120

January 14, 1986

IN REPLY PLEASE
REFER TO OUR FILE

R-850152

see 1/9/86 notice

Pennsylvania Public Utility Commission, et al.
vs.
Philadelphia Electric Company

N O T I C E

This is to advise that the schedule of further hearings to be held in the captioned proceeding has been amended to add Wednesday, February 26, 1986 to that scheduled for Tuesday, February 25, 1986, at 10:00 a.m., in available hearing room, Ground Floor, North Office Building, Harrisburg.

Additionally, the schedule for litigation of issues related to the energy cost rate revisions proposed in the Commission's October 30, 1985 order in the ECR No. 8 investigation docketed at M-840375, et al., is as follows:

January 28, 1986	- cross-examination of Company's supplemental direct testimony (Hill, Carroll, Brennan, Gallagher)
February 7, 1986	- filing of opposing party testimony
February 26, 1986	- Company cross-examination of opposing party testimony
March 3, 1986	- filing of Company rebuttal testimony
March 10, 1986	- filing of opposing party surrebuttal
March 13, 1986	- cross-examination of rebuttal and surrebuttal testimony and of oral sur-surrebuttal

The presiding officer in this proceeding is Administrative Law Judge Joseph P. Matuschak, 97 East Main Street, Uniontown, Pennsylvania 15401; telephone (412) 437-3409.

ccs: Judge Matuschak, Law Bureau, Bureau of Rates, Mr. Bramson, Ms. Dickson, Ms. Crouse, File

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA PUBLIC UTILITY COMMISSION
P. O. BOX 3265, HARRISBURG, Pa. 17120

January 15, 1986

IN REPLY PLEASE
REFER TO OUR FILE

Jerry Rich, Secretary
Pennsylvania Public Utility Commission
New Filing Section
P.O. Box 3265
Harrisburg, PA 17120

In re: Pennsylvania Public Utility Commission

v.

Philadelphia Electric Company

Docket No. R-850152

Dear Secretary Rich:

Enclosed for filing please find an original and nine copies of the Trial Staff's Reply Brief in Support of its Motion to Strike in the above captioned matter. Also enclosed is an original and three copies of Trial Staff's Amended Motion to Strike.

The Trial Staff does not anticipate filing a brief in support of the Amended Motion, as the Reply Brief and and its predecessor have already explained the Staff's position on the Amended Motion. Staff does anticipate that PECO will file some response.

Trial Staff has no objection to PECO's request for oral argument on the Motion to Strike.

Copies have been served upon the Administrative Law Judge and other parties.

Very truly yours,

D. P. Delaney

Daniel P. Delaney
Deputy Chief Counsel

Enc.

cc: The Honorable Joseph P. Matuschak
Administrative Law Judge
Parties of Record

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

THE HONORABLE JOSEPH P. MATUSCHAK PRESIDING

PENNSYLVANIA PUBLIC UTILITY COMMISSION	:	
v.	:	Docket No. R-850152
PHILADELPHIA ELECTRIC COMPANY	:	

AMENDED MOTION TO STRIKE

AND NOW, this 15th day of January 1986, comes the Trial Staff of the Pennsylvania Public Utility Commission (Trial Staff) and moves to strike portions of the evidence sponsored by the Philadelphia Electric Company (PECO) in the above-captioned matter and to correct its prior Motion to Strike. In reliance on the Presiding Officer's ruling on the Trial Staff's Motion in Limine (Tr. p. 1370-5), the Trial Staff moves that the following additional evidence be striken:

1. PECO Statement No. 3: Direct testimony of Joseph F. Paquette, Jr.--pp. 16-21 and Tables 8 and 9.

2. PECO Statement No. 11: Direct testimony of Dr. Lewis J. Perl.--pp. 5-10 and Schedules 1 and 2.

3. The following corrections should be made to the original Motion to Strike:

a. Paragraph 4(e) should read:

"4. PECO Statement No. 10...

e. Schedules 5, 6, 7, 8, 9, 10."

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Daniel P. Delaney
For Pennsylvania Public Utility Commission

CERTIFICATE OF SERVICE

I hereby certify that I am this 15th day of January, 1986, serving the foregoing documents, either personally or by first-class mail, upon the persons addressed below:

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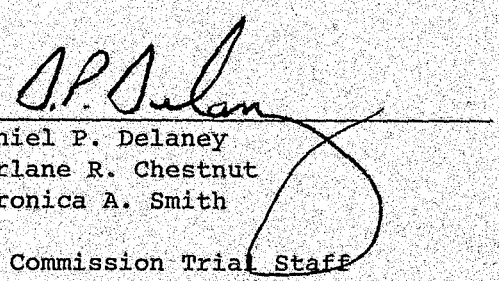
b. Paragraph 6(e) should read:

"6. PECO Statement No. 15. . .

e. Exhibits WHH-4, WHH-5, WHH-6, WHH-7, WHH-8, WHH-9."

WHEREFORE, the Trial Staff respectfully requests the Presiding Officer to strike the additional above described portions of the evidence and to note the corrections in this proceeding as required by the ruling on the Staff's Motion in Limine.

Respectfully submitted,



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Veronica A. Smith

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BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

THE HONORABLE JOSEPH P. MATUSCHAK PRESIDING

PENNSYLVANIA PUBLIC UTILITY COMMISSION	:	Docket No. R-850152
v.	:	
PHILADELPHIA ELECTRIC COMPANY	:	

REPLY BRIEF OF TRIAL STAFF IN SUPPORT OF ITS MOTION TO STRIKE

Reply Brief in Support of Trial Staff's Motion to Strike filed pursuant to the Presiding Officer's Ruling on the Staff's Motion in Limine.

Daniel P. Delaney
Marlane R. Chestnut
Veronica A. Smith

Counsel for Commission Trial Staff

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TABLE OF CONTENTS

STATEMENT OF THE CASE

On December 20, 1985, the Presiding Officer granted the Trial Staff's Motion in Limine holding that the Commission's prior conclusions concerning Philadelphia Electric Company's construction of the Limerick Generating Station stated in its order in Re Limerick Nuclear Generating Station, 56 Pa. PUC 47 (1982) were conclusive of the facts found and binding on the parties to this proceeding. Additionally, the ruling also directed that evidence relating to the reasonableness or unreasonableness of the Company's initial decision to construct the station or delay its construction in 1974, 1976 and 1978 would not be admissible in this proceeding. (Tr. p. 1374-5). On January 3, 1986, the Trial Staff filed its motion to strike portions of the testimony in this case which it believes are inadmissible as a result of the ruling on the Motion in Limine. On January 10, 1986, both the Trial Staff and the Company filed briefs addressing the admissibility of the testimony identified in the motion to strike. This reply brief is submitted in response to the arguments raised in the Company's brief in opposition to the motion to strike.

SUMMARY OF ARGUMENT

In concluding that the Company had been unreasonable or imprudent in delaying Limerick construction in 1976 and 78, both presiding Administrative Law Judge Klovekorn and the Commission applied a standard of reasonable care. As argued in the Staff's main brief in support of its motion to strike, the Company unsuccessfully advanced much of the same type of evidence in the Limerick Investigation as it has offered in the present proceeding. No reason exists to again admit that evidence here. Evidence which purports to demonstrate for any reason the reasonableness of the Company's actions is inconsistent with the Presiding Officer's ruling on the Motion in Limine and constitutes a collateral attack on the Commission's application of the reasonable care standard. Evidence which quantifies the results of the Company's imprudence should not also attempt to excuse PECO's prior actions. To the extent that the Company has chosen to inextricably intertwine its relitigation testimony with quantification evidence, it did so with the knowledge that such relitigation is barred by the Public Utility Code and therefore accepted the risk that all such testimony could be stricken. All of the evidence identified in the Trial Staff's motion to strike must be stricken from the record of the instant proceeding.

ARGUMENT

I. ALL OF THE EVIDENCE IDENTIFIED IN THE TRIAL STAFF'S MOTION TO STRIKE SHOULD BE DELETED FROM THE RECORD OF THE INSTANT PROCEEDING.

As predicted in the Trial Staff's Main Brief in support of its motion to strike (M.B. p. 10-11), the Company is now advancing the position that all of the evidence identified in the Staff's motion to strike is relevant to the quantification issue and must therefore remain undisturbed (Company brief p. 2, 8). Curiously inconsistent with this argument, however, is the Company's repeated admissions in its brief that portions of its evidence are directed specifically at the "reasonableness" issue. As support for its position, the Company argues that it is now uncertain of what the prior Commission orders concluded and that therefore none of its evidence can be stricken (p. 2-4). The Trial Staff submits that the Company's arguments are unsupportable and must be rejected by the Presiding Officer.

A. Evidence Previously Considered By The Commission Should Not Be Admitted In This Proceeding.

As developed in the Trial Staff's main brief (M.B. p.7-11), substantial parts of the Company's present Limerick case were previously considered and rejected by both Administrative Law Judge Klovekorn and the Commission in resolving the prior prudency of delay issues in the Limerick Investigation order at I-80100341 (1982). In view

of the Company's admissions in its brief that much of its present Limerick testimony is directed to the reasonableness of its delay decisions, it is useful to briefly review of prudence standard used by both Judge Klovekorn and the Commission to evaluate the Company's actions in 1974, 1976 and 1978.

In the trial briefs submitted to Judge Klovekorn, the parties to the Limerick Investigation argued which criteria should be used to evaluate the Company's conduct. This issue is discussed and resolved on pages 47-50 of the Limerick Initial Decision (contained in the appendix to the Staff's main brief). The Company argued that a rational basis test should be used; i.e. that as long as a rational basis existed for any of its actions, any decision that it makes cannot be criticized. Judge Klovekorn rejected this standard, chosing instead a reasonable care standard and cited this language from the New York Public Service Commission's decision in Consolidated Edison Company of New York, Inc.

> ... the company's conduct should be judged by asking whether the conduct was reasonable at the time, under all the circumstances, considering that the company had to solve its problems prospectively rather than in reliance on hindsight. In effect, our responsibility is to determine how reasonable people would have performed the tasks that confronted the company. Case 27123, Consolidated Edison Company of New York, Inc. (Opinion 79-1, issued January 16, 1979, pages 5-6). (N.Y.P.S.C.)

p. 49 of Initial Decision (citations omitted).

In its own Opinion and Order, the Commission cites this quote with approval and adopts Judge Klovekorn's reasonable care standard. 56 Pa. PUC 58, 59. The Staff submits that the Company's "reasonableness" testimony advanced in this proceeding constitutes a collateral attack on the Commission's prior conclusions and is violative of the ruling on the Staff's Motion in Limine.

It should again be noted that in reaching its conclusion of unreasonableness or imprudency in delaying Limerick construction in 1976 and 1978, both Judge Klovekorn and the Commission considered and rejected evidence similar to that now proferred by the Company in the instant case. Financial data on the Company's condition in the period of the delays is detailed on pages 30-42 of the Initial Decision. Specific evidence on the Company's ability to continue Limerick construction in this period is contained on pages 39-42 of the Klovekorn decision. This evidence is further reviewed by the Commission in its own opinion and found to be unpersuasive as an excuse for the Company's conduct. See 56 Pa. PUC 55-60. Similarly, all of the evidence concerning the Company's declining load growth, its decision-making process and the various considerations it examined and the circumstances surrounding its decisions are examined and found unpersuasive on those pages of the Commission's opinion. The Company has completely failed to identify any logical reason why this evidence should again be considered by the Presiding Officer and the Commission.

In applying its reasonable care test, the Commission examined these circumstances and found them unavailing. Evidence of this character should not be admitted into the record of this proceeding.

B. Quantification Of The Costs Of Delay Should Not Allow The Company To Relitigate The Reasonableness Of Its Decisions.

The Company has argued in its brief that the quantification issue is so generally defined in the Commission's Limerick order that all of its proferred evidence may be admitted for that purpose (p. 5-8). The Staff submits that this argument is based on an unsupportable interpretation of the Commission's order and must therefore be rejected.

Initially, the Company has cited language from Judge Klovekorn's initial decision which suggests that any subsequent examination of the construction delays would reexamine some of the Company's arguments on these issues (p. 5 of Company's brief). What the Company has failed to admit, however, is that Judge Klovekorn's discussion was adopted by the Commission only to the extent that it was consistent with the Commission's own conclusions. See ordering paragraph 6 of the Commission's Order, 56 Pa. PUC 71. The Commission however, took a much narrower view of what evidence should be considered in the subsequent rate proceeding in which Limerick was introduced into rate base.

Noting that the Staff and Consumer Advocate had presented estimates of delay costs in the proceeding, the Commission began its discussion of the construction delays with the following:

> We note at the outset of our discussion, that to adopt any proposed adjustments or calculations presented to us, at this time, would be inappropriate. The record presented is inadequate to accurately gauge the costs of delay. Nor is the issue ripe for decision. Only when the plants are complete and the attendant cost claimed will the costs of delay be susceptible to accurate assessment. Accordingly, we shall not attempt to quantify the costs of the various delays at this time.

56 Pa. PUC at 58 (emphasis added).

After reviewing the evidence and the parties' exceptions, the Commission reached the following conclusion:

> Considering the foregoing, we are of the opinion that PECO management did not exercise judgement sufficient to meet our reasonable man standard in delaying construction at Limerick in 1976 and 1978. Having so found, we are requested by staff and the OCA to quantify the cost of the delay to ratepayers. We are of the opinion that to do so at this time is inappropriate. We have not been presented, in this proceeding, with a claim for recovery of any of the costs associated with the construction of the plants. Consequently, we can make no adjustment to any claim. Further, should PECO sell all or part of the Limerick plant or its capacity to other utilities, the deduction of all or part of the costs of delay from PECO's claim, if any, would be materially affected. We therefore find it unnecessary to quantify, at this time and in this proceeding, the costs associated with the 1976 and 1978 delays.

56 Pa. PUC at 61 (emphasis added).

The Staff therefore respectfully submits that the Commission's prior order itself limits the issue in this proceeding to the quantification of the increased costs to the ratepayers resulting from the delays. The Company should not be permitted to introduce evidence to "interpret" this clear language of the Commission's order.

The Company has seized on a single paragraph of the Commission's 86 page brief to the Supreme Court in the Limerick appellate litigation as somehow clouding its understanding of the preclusive effects of the Commission's final Limerick Investigation Order. No such misunderstanding was present in the Company's Petition for Review, however, with which the Company initiated the appellate litigation in which is specifically challenged the Commission's delay conclusions. Moreover, the tenuous nature of the Company's assertions concerning the Commission's Supreme Court brief were immediately recognized in the Company's Answer to the Staff's Motion in Limine where the Company admitted that the Commission's brief argued that a finding of imprudence had been made.[1] The

---

[1] In a footnote at page 10 of its Answer, the Company admitted:

> Although at other locations in its Brief, statements are made which appear inconsistent with the above quotation, i.e. apparently asserting that a determination had been made, the significance of these statements is unclear and this position was clearly rejected by the Supreme Court.

Company's arguments concerning its use of appellate briefs to interpret language of regulatory orders is not worthy of serious consideration and in itself raises questions of managerial competency.

The Staff submits that evidence that supports in any way the Company's alleged reasonableness in delaying construction is inconsistent with the Commission's Limerick Investigation and the Presiding Officer's ruling on the Motion in Limine and must be excluded. The quantification evidence admitted in this proceeding should solely address the increased costs to the ratepayers resulting from the delays.

C. Any Question About What Caused Delays In The Limerick Construction Schedule Has Been Closed By This Commission's Finding That PECO Management Made Imprudent Decisions in 1976 and 1978.

A careful reading of the Commission Order and Initial Decision reveals lengthy discussions about record evidence which demonstrate that PECO delayed construction in 1976 and 1978 (1) without proper consideration of ratepayers' interest, (2) to bring the units on line at a time when growth forecasts indicated that they were needed, (3) to avoid an excess capacity adjustment and (4) to remedy financial problems which PECO was experiencing. Re Limerick Nuclear Generating Station, 56 Pa. PUC 47, 56-61. Initial Decision, pp. 15-55 (Appendix 1 in previous brief.) After considering this evidence, the Commission made an adverse

finding to PECO which was not disturbed upon appeal. Staff submits that each time PECO attempts to introduce evidence on the above noted subjects or to introduce evidence not previously considered as a cause for the delays, the proferred evidence should be stricken because it has been foreclosed by the granting of the Motion in Limine. Each of the portions of the 7 witnesses' testimony which Staff has moved to strike falls within the exclusion.

PECO is apparently unwilling to accept the fact that the financial reasons for the delay were fully litigated in the 1980 Investigation. Id. PECO's attempt to label financial constraints as an "independent" cause for delay should be stricken because the Commission previously considered and rejected the defense. Since each of the 7 witnesses, as noted in PECO's brief, tried to resurrect the financial constraints defense, those portions of their testimony should be excluded.

The same analysis should be applied to testimony which tries to resurrect defenses related to load growth forecasting (Paquette and Kononetz), excess capacity adjustment (Paquette and Kononetz and Hieronymus) and consideration of ratepayers' interests (Paquette, Perl and Hieronymus).

Evidence of changing NRC requirements and alleged unavailability of skilled labor should be evaluated for exclusion on a slightly different basis. To the extent that PECO knew or should have known during the prior 1980

Investigation that these were problems which could have caused delays, the Company should have made the Commission aware of these problems when it was litigating the prudency of its actions in that 1980 Investigation. PECO has waived its opportunity to assert these defenses and should not be permitted to reopen the record in the instant proceedings.

Having summarized its major arguments regarding PECO's proferred evidence above, Staff has a few specific reply comments for some of the 7 witnesses remaining.

1. Joseph F. Paquette, Jr.

Staff urges the Administrative Law Judge to read Mr. Paquette's comparison of PECO's financial condition in 1976 and 1978 to 1981. (St. 3, pp. 37-39). A fair reading will demonstrate that the purpose of the testimony is to show the reasonableness of the decisions in 1976 and 1978. This attempt at relitigation should not be permitted.

2. Basil P. Kononetz and Thomas J. Madden

Staff knows of no party in this case who wishes to litigate the issue of site selection for the Limerick Station. Consequently, Staff agrees with the Company (PECO Brief, pp. 14-15.) that the ALJ ruling can be amended to eliminate site selection as an issue. Thus the proferred evidence by Mr. Kononetz and Mr. Madden can be excluded. (St. 8, pp. 31-46).

3. William A. Abrams

Those portions of Mr. Abrams' testimony which are identified in Staff's Motion to Strike are classic examples of PECO's efforts to relitigate questions of financial constraints which resulted in construction deferrals in 1976 and 1978. PECO's brief pp. 18-20 repeatedly relates his testimony to the 1976 and 1978 deferral decisions. This evidence is historical in nature (i.e. it has not changed with the passage of time.) and is exactly the same issue as was litigated in the 1980 Investigation. 56 Pa. PUC at 56-61. Initial Decision, pp. 35-55 (Appendix 1). The proferred evidence should be struck.

4. Lewis J. Perl

The comparison of Limerick construction costs to the cost to construct other allegedly similar nuclear plants should be rejected. (T. 882-883, 886-891). Such comparison is really nothing more than an attempt to establish a "reasonable man" standard by which to judge PECO's performance. However, this Commission has already quite explicitly found PECO's judgement insufficient to meet that same standard for the 1976 and 1978 delay decisions. 56 Pa. PUC at 61.

5. William H. Hieronymus

Staff has the same criticism for comparison of Limerick construction schedules to the construction times

for other allegedly similar nuclear plants and recommends rejection of the material. (St. 15, pp. 57-65, Exhibits WHH 5-7, T. 698-704).

D. PECO Was Correct When It Noted That In Order To Be Consistent Staff Should Move to Strike Other PECO Evidence.

PECO has intimated at times in its brief that, in the interest of consistency, Staff should have moved to strike more evidence than is noted in the present motion. Accordingly, Staff has reviewed the material highlighted by PECO and will file an amended motion designating additional evidence concurrently with this Reply Brief.

In its Amended Motion to Strike Staff has designated additional evidence from Mr. Paquette which should be stricken. (St. 3, pp. 16-21 and Tables 8 and 9). As noted in PECO's brief p. 16, this portion of Mr. Paquette's testimony deals with financial problems which PECO experienced in the 1970's. Staff has consistently maintained that this issue was fully litigated in the 1980 Investigation. Therefore, this evidence should be rejected.

Also in its Amended Motion Staff has designated additional evidence from Dr. Perl which should be stricken. (St. 11, pp. 5-10 and Schedules 1 and 2.) As noted in PECO's brief, pp. 25-26, Staff has moved to strike cross-examination which deals with Perl's Schedule 1. Staff has emphasized in this Reply Brief that the comparison by Dr. Perl and Dr. Hieronymus of Limerick construction time

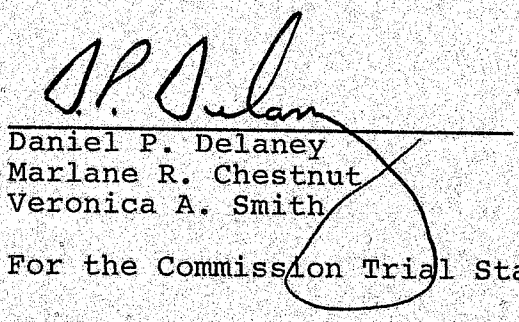
and costs to other alleged similar nuclear units is an improper attempt to relitigate the reasonable man standard. The additional pages of Dr. Perl's testimony (pp. 5-10 and Schedules 1 and 2) are simply the beginning of that comparison and should also be struck.

Staff recognizes that PECO should be allowed the limited opportunity to respond to the Amended Motion.

CONCLUSION

The evidence identified in the Staff's motion to strike is intended to relitigate the Company's liability for its prior imprudent actions and must be stricken. The Company should not be permitted to introduce evidence excusing its conduct under the guise of quantifying its prior imprudency. Evidence similar to that previously considered and rejected by the Commission should not be admitted in this proceeding. For the foregoing reasons, the Presiding Officer should grant the Trial Staff's motion to strike in its entirety.

Respectfully submitted,



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For the Commission Trial Staff

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CERTIFICATE OF SERVICE

I hereby certify that I am this 15thday of January, 1986, serving the foregoing documents, either personally or by first-class mail, upon the persons addressed below:

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January 14, 1986

VIA FEDERAL EXPRESS

Secretary
Pennsylvania Public
Utility Commission
P.O. Box 3265
North Office Building
Commonwealth & North Streets
Harrisburg, Pennsylvania 17120

Re: Pennsylvania Public Utility Commission
v. Philadelphia Electric Company
Docket No. R-850152

Dear Sir:

Enclosed please find the original plus three copies of a document entitled "Motion to Compel Responses to First Set of Interrogatories of Occidental Chemical Corporation". Also, enclosed find an additional copy of this document. We would appreciate it if your office would time stamp it and return it to us in the enclosed self-addressed envelope for our files.

Sincerely,

Merrill L. Kramer

Enclosures

COMMONWEALTH OF PENNSYLVANIA

BEFORE THE

PUBLIC UTILITY COMMISSION

In re:	
Pennsylvania Public Utility Commission	Docket No. R-850152
v.	
Philadelphia Electric Company	

MOTION TO COMPEL RESPONSES TO FIRST SET OF INTERROGATORIES OF OCCIDENTAL CHEMICAL CORPORATION

To: Honorable Joseph Matuschak
Presiding Administrative Law Judge

Pursuant to Rule § 5.103 of the Commission's Rules of Administrative Practice and Procedure, Occidental Chemical Corporation ("Occidental") herewith files this motion to compel compliance with certain data requests and interrogatories directed to Philadelphia Electric Company ("PECO"), and respectfully requests that the Presiding Administrative Law Judge enter an order requiring PECO to respond to such requests and interrogatories and for the additional relief requested below. The data requests and interrogatories which are the subject of this motion fall into two categories. The first category includes all data requests and interrogatories to which Occidental has received no response whatever from PECO. The second category covers one item, Interroga-

tory No. 47 (regarding PECO's target reserve margins) to which PECO has declined to supply the requested studies on the grounds that the studies are proprietary. These two categories will be discussed separately below.

I. BACKGROUND

1. On December 3, 1985, the Presiding Administrative Law Judge established a procedural schedule in the above-captioned proceeding requiring the parties to respond to interrogatories within 15 days of service. (Preh. Conf. Tr. at 14).

2. On December 23, 1985, Occidental timely served on PECO, by Federal Express mail, a document entitled "First Set of Interrogatories of Occidental Chemical Corporation." Pursuant to the Judge's order, PECO's responses to these interrogatories were due on or before January 7, 1986. PECO has not filed objections to any of Occidental's December 23 interrogatories and data requests. Pursuant to the Judge's order, the deadline for filing objections to interrogatories and data requests was set at five working days from receipt of such interrogatories and data requests. (Preh. Conf. Tr. at 8). Accordingly, objections to Occidental's interrogatories and data requests were due December 31, 1985.

II. DATA REQUESTS TO WHICH PECO HAS PROVIDED NO RESPONSE

3. As of this date, PECO has provided no response whatever to a substantial number of Occidental's interrogatories and data requests. A list of each of Occidental's data requests

to which PECO has provided no response is attached hereto as Attachment A.

4. Occidental has repeatedly, but unsuccessfully, attempted to obtain timely and complete responses to its interrogatories and data requests from PECO through informal consultation with PECO. In particular:

a) At the January 6, 1986, hearing in this proceeding, Occidental indicated to counsel for PECO (and to the Administrative Law Judge) the problems that had already surfaced at that time regarding PECO's action on Occidental's December 23 interrogatories and data requests. (Jan. 6 Hearing Tr., at 1625-1627). At that time, counsel for Occidental indicated his continuing but unavailing attempts to obtain the requested information from PECO.

b) On January 7, 1986, at its offices in Philadelphia, Pennsylvania, PECO made certain data available to Occidental for review in response to Occidental's December 23 data requests. After reviewing this data, Occidental agreed to accomodate PECO by narrowing certain of its data requests, i.e., by accepting only partial responses from PECO on certain data requests.

c) On January 10, 1986, counsel for Occidental telephoned counsel for PECO for information on the status of the 32 data requests (out of a total of 68) to which PECO had made no response as of that date. Counsel for Occidental was informed that of these 32 outstanding responses, only three had been completed and were en route to Occidental. Counsel for Occidental was also informed that an additional seven responses might be com-

pleted by January 13 or 14, 1986. At this time, Counsel for Occidental informed counsel for PECO that if all responses to Occidental's data requests were not delivered to Occidental by January 14, 1986, one week after the January 7, 1986 due date set by the procedural schedule established by the Administrative Law Judge, Occidental would have no choice but to file a motion to compel the responses.

As of the close of business on January 14, 1986, Occidental has received no response whatever to 28 of its interrogatories and data requests. Further, PECO has given Occidental no information as to when any of these responses will be made available.

III. CLAIM OF CONFIDENTIALITY AS TO INTERROGATORY NO. 47

5. In addition to the numerous data requests to which PECO has not responded at all, PECO has refused to supply certain studies in response to Occidental's Interrogatory No. 47 on the ground that the studies are proprietary. Occidental's Interrogatory No. 47 reads as follows:

(a) Please provide a copy of all studies relied upon by PECO to conclude that a 25% reserve margin is proper.

(b) When was the 25% reserve margin adopted by PECO?

(c) Please state whether PECO has had a target different than 25% in any of the last ten years. If yes, please state what the target was, the period in which PECO utilized that target, and provide any studies utilized to develop, support, or defend the target.

6. Initially, PECO had agreed to supply the above studies on the condition that Occidental sign a confidentiality agreement. Occidental consented to sign such an agreement, but when Occidental's consultant appeared in PECO's offices on January 7, 1986, to review and collect the studies and other responses to Occidental's data requests, Occidental's consultant was informed by PECO that the studies would not be provided.

7. PECO's response to Occidental Request No. 47 was as follows:

> a. The studies leading PECO to conclude that a 25% capacity reserve margin is proper were performed by the Pennsylvania-New Jersey-Maryland Interconnection (PJM). The associated reports are proprietary to PJM and, therefore, cannot be released by PECO or any other member of PJM.
>
> b. The 25% reserve margin was adopted by PECO in 1979.
>
> c. A reserve target of 20% was adopted by PECO in 1969 and was retained until 1979. The studies used to develop this target were performed by PJM. The associated reports are proprietary to PJM and cannot be released by PECO or any otehr member of PJM.

8. As indicated by PECO's response to Interrogatory No. 47, PECO claims to have maintained a reserve margin target of 20% until 1979, when PECO raised the reserve margin target to 25%. PECO is obliged to provide data to Occidental which allegedly supports this higher figure. The data on the reserve margin is highly relevant to this proceeding because Occidental intends to

present expert testimony contending that the rate for back-up power should be based on PECO's reserve margin target.

9. PECO has provided only a conclusory statement that the studies on the reserve margin sought by Occidental are proprietary. PECO has, however, provided no explanation as to why the studies should be considered proprietary, and has otherwise made no showing that the data in the studies contain trade secrets or sensitive commercial or financial information that should be considered privileged and confidential. The mere statement in PECO's response to Interrogatory No. 47 that the studies are proprietary is insufficient to support PECO's position.

10. Furthermore, PECO's claim that the studies are proprietary is implausible for two reasons:

a. First, it must be assumed that the studies contain information on planned additions, load forecast, generation performance, and the like. This is precisely the type of business data commonly available in rate proceedings;

b. Second, data is typically considered to be proprietary and entitled to protection if its release to <u>competitors</u> would place the firm to which the data pertains at a competitive disadvantage. In this case, however, PECO's competitors -- the other PJM members -- already have the data, by PECO's own admission. Thus PECO's claim that the studies are confidential vis-a-vis its own customers but not vis-a-vis its competitors runs directly contrary to the purposes for which protection is typically afforded to confidential business information.

11. PECO has recently consented to allow Occidental to review other documents containing proprietary and confidential information. As Attachment B indicates, on January 7, 1986, Occidental and PECO entered into a Confidentiality Agreement pertaining to PECO's documents concerning PECO's "ProdCost" model. PECO has provided no explanation as to why the studies sought by Occidental in Interrogatory No. 47 contain information which should be considered more sensitive than the information released to Occidental on the "ProdCost" model. Given PECO's past willingness to release proprietary and confidential information to Occidental under the terms of a confidentiality agreement, and also given Occidental's willingness to sign such an agreement regarding the studies sought by Interrogatory No. 47, there appears to be no reason why PECO should not release the studies sought by Interrogatory No. 47 to Occidental.

12. It should be observed that no claim of irrelevance has been raised by PECO, nor could it be since, at a minimum, the 25% reserve margin underlies PECO's proposed rates which are at issue in this proceeding and, to be discussed below, substantially prejudices Occidental's ability to properly prepare its rebuttal case. If PECO fails to provide the studies sought by Occidental's Interrogatory No. 47, then it would appear by negative inference that no supportable justification exists for PECO's selection of a 25% rather than a 20% reserve margin target.

IV. OCCIDENTAL IS SUBSTANTIALLY PREJUDICED BY PECO'S FAILURE TO TAKE APPROPRIATE ACTION

13. Occidental is substantially prejudiced both by PECO's failure to provide any responses to the 28 outstanding data requests, and by PECO's failure to provide the studies sought by Occidental's Interrogatory No. 47. In particular, PECO's failure to take appropriate action has hampered Occidental in its efforts to prepare its rate structure testimony -- due January 22, 1986 -- and will, in fact, prevent Occidental from presenting complete testimony on the January 22 due date. Occidental will, as a consequence, be burdened with the additional time and expense necessary to prepare and file supplemental testimony in order to include any information in response to its December 23 data requests which may subsequently be supplied by PECO.

WHEREFORE, for the foregoing reasons, Occidental moves as follows:

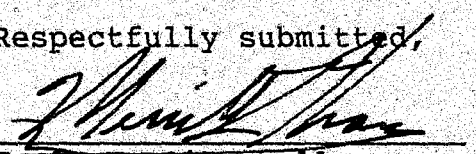
1. That the Administrative Law Judge grant Occidental's motion to compel responses to the unanswered data requests listed on Attachment A; and to compel release by PECO of the studies sought in Occidental's Interrogatory No. 47;

2. That the Administrative Law Judge set a date certain for PECO to take the action requested in the preceding paragraph;

3. That Occidental be accorded 15 days from the date it receives each of the unanswered data requests and the studies

sought in Occidental's Interrogatory No. 47 to supplement its testimony in this proceeding.

Respectfully submitted,



Earle K. O'Donnell
Merrill L. Kramer

Counsel for Occidental
Chemical Corporation

ATTACHMENT A

LIST OF DATA REQUESTS TO WHICH
PECO HAS SUPPLIED NO RESPONSE

Request Number	Data Requested
9.	For each month since January, 1983 to date, please provide the information required in FERC Form 1, Steam-Electric lines 1-44 for all generating units (both large and small plant).
13.	Please provide a copy of PECO's responses to all data requests tendered by other parties.
15.	Please provide a copy of PECO's most recent Form 133 (PURPA) filing with the FERC.
17.	Please provide a breakdown of PECO's monthly peak reserve margins for the last five years, both including and excluding scheduled maintenance and unscheduled maintenance, respectively. Provide all backup papers explaining 1) how the peak demand was measured in each instance, 2) any extraordinary occurrences in the system that may have affected reserve requirements in a particular month. Also indicate what off-system purchases and sales, if any, where made at the time of monthly peak.
26.	What are the estimated hour by hour incremental energy costs (in cents per KWH) for the rate year? Please identify the variable O&M included in that cost (in cents per KWH).
32.	For each month of the period January, 1983 to date, please list all of PECO's suppliers of power (energy or energy and capacity) other than its own generation, stating for each: (a) The maximum capacity and energy that can be supplied. (b) The amount of energy and capacity actually supplied. (c) The amount of energy and capacity expected to be supplied in each year through the PECO planning horizon.

Request Number	Data Requested
	(Suppliers include, but are not limited to, utilities, co-ops, municipals, qualifying facilities, and other industrial generators.)
33.	Please provide a copy of the contract or other agreement for each source of power identified in Item 32.
34.	Please identify other potential suppliers of power with whom PECO has had discussions or correspondence in the last three years concerning the future purchase of that supplier's energy or energy and capacity. State for each whether: (a) discussions have been concluded or on-going; (b) the amount of capacity offered or requested; (c) the pricing arrangements offered or requested; and (d) the term of the contract considered.
35.	For any potential supplier identified in Item 34 with which a contract resulted, please provide a copy of the contract.
36.	For each supplier identified in Items 32 and 34, state whether there is an associated wheeling contract and, if so, identify the parties to the wheeling contract.
37.	For each supplier in Item 36 for which there is an associated wheeling contract, please provide a copy of the contract.
38.	For each potential supplier identified in Item 34 with whom discussions have been concluded, but no purchase contract resulted, please state the reasons a contract did not result and provide copies of all correspondence, notes, or minutes of meetings pertaining to such discussions.
39.	For the last ten years, please state the extent that PECO has had discussions or correspondence with any of its existing or previous suppliers concerning renewal or extension of the current or previous contracts under which PECO purchases or purchased power.

Request Number	Data Requested
40.	For the period January 1983 to date, please furnish a copy of all correspondence, studies, notes or minutes pertaining to discussions or correspondence related to Item 39.
41.	Please furnish a copy of all studies done by or for PECO within the last ten years concerning the desirability of building power plants (base load, intermediate or peaking) versus other sources of supply.
42.	If not included in response to Item 41, please furnish a list of all alternatives to building a power plant considered by PECO in the last ten years.
43.	Please furnish a copy of any correspondence, notes of conversations, or minutes of meetings with any potential source of small power, cogeneration or industrial generation referenced in response to Items 41 or 42.
*44.	Please provide copies of all interchange agreements between PECO and other utilities.
*45.	Please provide a copy of the PJM agreement (including all appendices or other documents referenced in the agreement).
46.	If the interconnection agreements referenced in Items 44 or 45 encompass PECO wheeling power to other parties, please provide copies of the related wheeling contracts.
49.	Please provide a summary of the generating availability data supplied to the North American Electric Reliability Council for the years 1980-1984 for each of the generating units on the PECO system. Please provide the information in readily-interpretable form which includes, but is not limited to the following annual information: (a) Commercial operation date, (b) Nameplate rating,

Request Number	Data Requested
	(c) Maximum dependable capability,
	(d) Service hours,
	(e) Available hours,
	(f) Forced outage hours,
	(g) Planned outage hours,
	(h) Maintenance outage hours,
	(i) Forced outage rate,
	(j) Equivalent forced outage rate,
	(k) Availability factor,
	(l) Equivalent availability factor,
	(m) Scheduled outage factor,
	(n) Equivalent unplanned derated hours,
	(o) Equivalent planned derated hours,
	(p) Attempted starts, and
	(q) Successful starts.
53.	Please delineate and detail the criteria used to determine the normal rating and emergency ratings for the major elements of the PECO transmission and distribution system (specify, in particular, contingency criteria).
*54.	Please provide a legible one-line diagram of the PECO transmission system with the location of each auxiliary customer listed in Item 50 marked on the diagram and the interconnection voltage specified.
*59.	On Page 12 of Mr. Cary Rush's direct pre-filed testimony, he states at Line 24 that the amount of cogeneration capacity supplying internal load has declined from 205 MW to 110 MW. Please provide the breakdown of the 205 MW and the 110 MW by customer.
*60.	For the 95 MW decrease in cogeneration capacity, please provide the reason for the decrease.

Request Number	Data Requested
66.	Please provide a copy of the "schedule for load shedding priorities" mentioned in 12.2 of PECO's tariff. When was this schedule (a) filed with the PUC and (b) approved by the PUC? Please provide the docket number of the filing and a copy of any PUC order on the schedule. Which division within PECO (or PJM) decides which load will be shed?
67.	Please provide the monthly average economy rate, the monthly average on-peak rate, and the monthly average off-peak rate for each month during the last five years and PJM's projected monthly rate for the next five years. Please identify on-and off-peak hours during this period.
68.	Please provide PECO's avoided cost rates for the last five years and any updates filed by PECO during this period. Please provide any reports utilized by PECO in establishing avoided cost rates during this period.

MORGAN, LEWIS & BOCKIUS
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DAVID B. MACGREGOR
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January 7, 1986

Earle H. O'Donnell, Esq.
Sutherland, Asbill & Brennan
1666 K Street, N.W.
Suite 800
Washington, D.C. 20006-2803

Re: Pennsylvania Public Utility Commission
v.
Philadelphia Electric Company, Docket
No. R-850152

Dear Mr. O'Donnell:

As we have agreed, Occidental Chemical Corporation ("Occidental"), as an Intervenor in the above-referenced proceeding, will have the opportunity to review certain documents of Philadelphia Electric Company (the "Company") relating to the Company's ProdCost model. These documents will be reviewed at the Company's offices at 2301 Market Street, Philadelphia at a time and date to be mutually agreed. Because these documents contain proprietary and confidential information, it is necessary, as a condition to review the above-described information, that Occidental sign a Confidentiality Agreement.

Accordingly, by this letter agreement, Occidental and its consultants agree that any information obtained from its review of the above-described documents will be kept confidential, will be used solely in connection with the Limerick 1 rate proceeding, and will not be disclosed to any persons not directly involved in Occidental's participation in the Limerick 1 proceeding. Occidental and its consultants further agree to explore all reasonable alternatives to placing any confidential or proprietary information obtained from its review of Company documents into the record in this proceeding and to provide the Company prior notice and opportunity to object before such information is so used.

ATTACHMENT B

Finally, if confidential or proprietary information is to be made a part of Occidental's case, Occidental agrees to develop appropriate procedures to protect fully the confidentiality and proprietary nature of the information obtained from its review of comparing documents.

Please indicate your agreement on behalf of Occidental Chemical Corporation to the procedures set forth above by signing in the space provided below.

Sincerely yours,

David B. MacGregor
Counsel for Philadelphia
Electric Company

/paa

APPROVED:

Earle H. O'Donnell
Counsel for Occidental Chemical
Corporation

James A. Ross

James Ross
Drazen-Brubaker Associates

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing document upon parties of record in this proceeding in accordance with the requirements of Section 1.54 (relating to service by a participant).

Dated this 14th day of January, 1986.

Merrill L. Kramer

Counsel for
Occidental Chemical
Corporation

ORIGINAL

COMMONWEALTH OF PENNSYLVANIA

OFFICE OF CONSUMER ADVOCATE
1425 Strawberry Square
Harrisburg, Pennsylvania 17120

DAVID M. BARASCH
Consumer Advocate

(717) 783-5048

January 15, 1986

RECEIVED

JAN 15 1986

SECRETARY'S OFFICE
Public Utility Commission

Jerry Rich, Secretary
Pennsylvania Public Utility
Commission
P.O. Box 3265
Harrisburg, PA 17120

FOLDER

Re: Pennsylvania Public Utility
Commission v. Philadelphia
Electric Company,
Docket No. R-850152

Dear Secretary Rich:

Enclosed please find the original and three copies of the Reply Brief of the Office of Consumer Advocate on the Motion to Strike of the Commission Trial Staff in the above-captioned proceeding. Copies are being served on the ALJ and all parties in accordance with the attached Certificate of Service.

Respectfully submitted,

David Wersan

David Wersan
Assistant Consumer Advocate

2595P
Enclosure

cc: ALJ Joseph Matuschak
All parties of record

CERTIFICATE OF SERVICE

Re: Pennsylvania Public Utility Commission
v.
Philadelphia Electric Company
Docket No. R-850152

I hereby certify that I am this 15th day of January, 1986, serving either in person or by first class mail the foregoing document, Reply Brief Of The Office Of Consumer Advocate On The Motion To Strike Of Commission Trial Staff, in the above-captioned proceeding.

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David Wersan

David Wersan
Assistant Consumer Advocate

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PENNSYLVANIA PUBLIC UTILITY COMMISSION	:	
v.	:	Docket No. R-850152
PHILADELPHIA ELECTRIC COMPANY	:	

REPLY BRIEF OF THE OFFICE OF CONSUMER ADVOCATE ON THE MOTION TO STRIKE OF COMMISSION TRIAL STAFF

David Wersan
Irwin A. Popowsky
Susan Perkins Weston
Assistant Consumer Advocates

David M. Barasch
Consumer Advocate

Office of Consumer Advocate
1425 Strawberry Square
Harrisburg, PA 17120
(717) 783-5048

DATED: January 15, 1986

The Office of Consumer Advocate (OCA) presents this Reply Brief on the Motion to Strike in response to certain specific Philadelphia Electric Company (PECO or Company) arguments made by the Company in its Main Brief on this issue. As stated in Oral Argument, the Brief on Interlocutory Review and in our letter of January 10, 1986, the OCA supports the position of the Trial Staff on this issue. That is, the Company should not be permitted to relitigate in this proceeding the reasonableness of its decisions in 1976 and 1978 to delay construction of Limerick 1.

In its Brief of January 10, 1986, the Company raises a number of issues, including several references to testimony already filed by the OCA, which require a further response at this time.

First, the Company suggests at page 3 of its Brief that, to the extent certain Company testimony addresses both the issues of the reasonableness of its delay decisions and the quantification of the costs resulting from those decisions, then the ALJ should allow such testimony into the record, but only for the purpose of quantification. The OCA does not object to this proposal in principle, but would urge that, to the extent this proposal is adopted by the ALJ, that its application be carefully and strictly limited.

In particular, the OCA would urge the ALJ to reject the Company's extensive arguments that the issue of "financial constraints," addressed throughout the portions of testimony

that the Staff has sought to strike, go to the issue of quantification and not to the reasonableness of the Company's delay decisions.

The issue of financial constraints and the impact of those alleged constraints on the Company's delay decisions was thoroughly litigated in the first Limerick Investigation. The Commission did not find that the Limerick delay decisions were unreasonable in some totally abstract sense. Rather, the Commission found that the Limerick delay decisions were unreasonable in light of the circumstances that faced the Company at the time. Those circumstances included the Company's financial condition, which was the subject of extensive direct, rebuttal, and surrebuttal testimony by the Company and the Trial Staff. The Company may not now relitigate this issue under the pretense that evidence regarding financial constraints now goes to the cost, rather than the cause of the delay.

The Company's reliance in its Brief on a portion of the ALJ's Recommended Decision, as quoted in its Brief at pages 5 and 6, discussing future review of financial and other external constraints is misplaced. The questions on financial constraints left open by the ALJ were specifically resolved by the Commission in its Opinion and Order. The PUC characterized the ALJ's conclusions as follows:

> The ALJ concluded that PECO's 1974 delay was reasonable and that the 1976 and 1978 delays <u>may</u> have been unreasonable.

I-80100341, Order of August 27, 1982, at 14 (emphasis added).

The PUC then discussed the issues litigated regarding the 1976 and 1978 delays as raised on Exception by the parties. The Commission's discussion went as follows:

> It appears, from the record before us, that PECO's 1976 and 1978 construction delays were caused by PECO's financial difficulties, which in turn were caused by its ambitious construction program and its ever decreasing load growth; conditions similar to those causing the 1974 delay. While it is true that PECO's financial condition deteriorated from its 1974 levels, we are of the opinion that, at the least, PECO's ambitious construction plans exacerbated its financial difficulties. We are convinced that PECO's financial difficulties, proffered as a reason for delaying construction, would have been less acute if construction at Limerick had been terminated.
>
> PECO now argues that one of the prime considerations in delaying construction was a continued reduction in PECO's load growth. Although PECO's spring 1976 load forecast projected a lower load growth than earlier anticipated, it appears that even this projection was overly optimistic. We note that in PECO's 1977-78 rate proceeding, PECO reduced its forecasted growth rate from 5% to 3%. Pennsylvania Public Utility Commission v. Philadelphia Electric Company, R.I.D. 438 (February 5, 1979). Apparently, this 1978 reduction was an acknowledgment that the trend evidenced in 1974 was continuing. Despite this now obvious trend, PECO delayed construction in the hope that load would improve.
>
> PECO's final argument, that the relative economic benefits and detriments to ratepayers and shareholders of earlier versus later plant completion favored delay, is unpersuasive. We find this argument curious in light of the fact that PECO stresses that, because load growth has

> declined, the Limerick Units' main purpose is to replace oil fired generating capacity. If Limerick can be economically justified when compared to a combination of alternative sources of power and the retirement of oil fired plants, which by now have been extensively depreciated, the relative benefit to current ratepayers would have been greater if the oil capacity, and their associated costs, had been retired earlier by way of compressing rather than expanding the construction schedule. Further, as the nation as a whole experienced a period of double digit inflation and rising interest rates, delaying the necessary financing did and will continue to increase the ultimate costs of the plant financing.

Order at 16.

As can be seen, the PUC specifically reviewed and rejected PECO's arguments on load growth, financial constraints, and economic benefits of delay. The PUC then stated as follows:

> Considering the foregoing, we are of the opinion that PECO management <u>did not</u> exercise judgment sufficient to meet our reasonable man standard in delaying construction at Limerick in 1976 and 1978..

Order at 17.

By the Commission's language, it can be seen that the PUC went beyond the finding of the ALJ that the delays <u>may</u> have been unreasonable. The PUC specifically found unreasonableness. Further litigation of these issues is therefore properly precluded by ALJ Matuschak's ruling on Trial Staff's Motion <u>in Limine</u>.

The OCA would agree with the Company, however, that certain other testimony may fairly be considered to go to the issue of what portion of the delay could not have been avoided even if the Company had not intentionally delayed the plant. Here, the OCA submits that the Company may point to external factors, other than what it calls externally imposed financial constraints, such as NRC regulations imposed on Limerick and other plants, which would have delayed completion of the plant even if the Company had devoted adequate financial resources to complete the plant on its previously planned schedule. To the extent that this testimony goes to the issue of how long the plant was delayed as a result of the Company's decisions, rather than whether the delay decision was prudent or necessary, then the OCA would agree with the Company that such testimony may be admitted for this limited purpose.

With respect to the OCA testimony referenced by the Company in its Brief, the OCA would note that the testimony does not address whether the delay decisions were reasonable in light of the Company's load growth, capacity needs, or financial conditions--all issues which were litigated in the first Limerick Investigation. Rather the OCA testimony addresses the issue of whether the delays were consistent with prudent construction management practice and, when Limerick 1 could have been completed if the construction had not been unreasonably delayed. More particularly, the testimony specifically addresses the question of whether externally

imposed NRC or other technical safety requirements would have prevented an earlier fuel load at Limerick even if the Company had taken all prudent efforts to complete the plant on schedule.

In sum, the OCA would reply to the Company's arguments by stating that all testimony regarding the reasonableness of the Company's delay decisions--including testimony regarding PECO's financial constraints on construction--should be stricken. Testimony which goes to the length and cost of those delays may be admitted, subject to the requirement that such evidence not be permitted to be used for the purpose of justifying the reasonableness of the Company's decisions to delay.

Respectfully submitted,

David Wersan

David Wersan
Irwin A. Popowsky
Susan Perkins Weston
Assistant Consumer Advocates

DATED: January 15, 1986

COMMONWEALTH OF PENNSYLVANIA

OFFICE OF CONSUMER ADVOCATE
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DAVID M. BARASCH
Consumer Advocate

(717) 783-5048

January 15, 1986

Jerry Rich, Secretary
Pennsylvania Public Utility
Commission
P.O. Box 3265
Harrisburg, PA 17120

Re: Pennsylvania Public Utility
Commission v. Philadelphia
Electric Company,
Docket No. R-850152

Dear Secretary Rich:

Enclosed please find the original and three copies of the Reply Brief of the Office of Consumer Advocate on the Motion to Strike of the Commission Trial Staff in the above-captioned proceeding. Copies are being served on the ALJ and all parties in accordance with the attached Certificate of Service.

Respectfully submitted,

David Wersan

David Wersan
Assistant Consumer Advocate

2595P
Enclosure

cc: ALJ Joseph Matuschak
All parties of record

CERTIFICATE OF SERVICE

Re: Pennsylvania Public Utility Commission
v.
Philadelphia Electric Company
Docket No. R-850152

I hereby certify that I am this 15th day of January, 1986, serving either in person or by first class mail the foregoing document, Reply Brief Of The Office Of Consumer Advocate On The Motion To Strike Of Commission Trial Staff, in the above-captioned proceeding.

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JAN 16 1986

SECRETARY'S OFFICE
Public Utility Commission

December 31, 1985

Honorable Joseph P. Matuschak
Administrative Law Judge
Pennsylvania Public Utility Commission
97 East Main Street
Uniontown, PA 15401

Re: Pennsylvania Public Utility Commission v. Philadelphia Electric Company, Docket No. R-850152

Dear Judge Matuschak:

Enclosed is an original and 2 copies of Philadelphia Electric Company's Petition for Stay of the December 20, 1985 Order granting the Pennsylvania Public Utility Commission Trial Staff's Motion in Limine and excluding from the record certain evidence dealing with the reasonableness of the 1976 and 1978 Limerick construction deferral decisions.

As indicated in the attached Certificate of Service, copies of the enclosed Petition have been served upon all parties of record.

Sincerely,

DOCUMENT FOLDER

David B. MacGregor
Counsel for Philadelphia Electric Company

DBM/b
Enclosure
cc: All parties of record

1/16/86 - ph'd Judge Matuschak-he has the orig of PECO's pet for Stay of the 12/20/85 order and he said when he's in Hbg on 1/28/86, he'll send orig down to New Filing for official record. **mpk**

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PENNSYLVANIA PUBLIC UTILITY COMMISSION :

v. : Docket No. R-850152

PHILADELPHIA ELECTRIC COMPANY :

PETITION FOR STAY

NOW COMES Philadelphia Electric Company ("PECO" or the "Company"), by its Counsel, and files this Petition with the Administrative Law Judge ("ALJ") for a stay of the December 20, 1985 Order granting the Pennsylvania Public Utility Commission Trial Staff's ("Trial Staff") Motion in Limine and excluding from the record certain evidence dealing with the reasonableness of the 1976 and 1978 Limerick construction deferral decisions. In support of this Petition, the Company represents as follows:

1. On November 20, 1985, the Trial Staff filed a Motion in Limine which would limit the evidence admitted and issues addressed in this proceeding to preclude consideration of the prudency of the 1976 and 1978 Limerick construction deferral decisions. As the sole basis for its Motion, the Trial Staff asserted that these decisions were found to be unreasonable by the Commission in Re Limerick Nuclear Generating Station, 56 Pa. P.U.C. 47 (1982), aff'd, 501 Pa. 153, 460 A.2d 734 (1983) (hereafter referred to as "1980 Limerick Investigation") and that, under Section 316 of the Public Utility Code (66 Pa.C.S. §316), such a finding is conclusive in the instant proceeding and precludes further litigation of this matter.

2. The Company filed an Answer to the Motion in Limine on December 5, 1985 and the Trial Staff filed a Reply to the Company's Answer on December 16, 1985. Oral argument on the merits of Trial Staff's Motion was held on December 20, 1985. On the basis of these submittals and oral argument, the ALJ granted the Trial Staff's Motion and ruled that (a) the 1980 Limerick Investigation record as it relates to the initial decisions to construct Limerick and the 1974, 1976 and 1978 construction deferral decisions is incorporated into the record in this proceeding; (b) the Commission's finding in the 1980 Investigation that the 1976 and 1978 deferral decisions were unreasonable is conclusive upon the parties to this proceeding; and (c) all evidence previously admitted in this proceeding which relates to the reasonableness of the initial decisions to construct Limerick and the decisions to delay construction are stricken from the record and any further evidence relating to these matters will not be admissible (Tr. 1374-1375).

3. Pursuant to 52 Pa. Code §5.302, the Company, on December 26, 1985, filed with the Commission a Petition for review of the ALJ's ruling and answer to the following material question:

> "Whether, contrary to the determination of the Pennsylvania Supreme Court in Pa. P.U.C. v. Philadelphia Electric Company, 501 Pa. 153, 460 A.2d 734 (1983), the criticism of the Company's 1976 and 1978 deferral announcements in the 1980 Limerick Investigation constituted a final adjudication which precludes the submission of any evidence on the prudence of such action in the current

> proceeding, other than quantification of the consequences thereof."

It is the Company's position that this question should be answered in the negative in view of the Pennsylvania Supreme Court's clear holding that a final and binding adjudication was not rendered by the Commission. Moreover, to accord conclusive effect to the Commission's discussion of this matter would cause undue prejudice to PECO, violate the Company's right to due process and substantially disrupt the orderly conduct of this rate proceeding.

4. Where interlocutory review and answer to a material question is sought in a proceeding, Section 331(e) of the Public Utility Code specifically authorizes the ALJ to grant a stay, where necessary, to protect the substantial rights of the parties involved, as follows (66 Pa.C.S. §331(e)):

> "Interlocutory appeals - A presiding officer may certify to the commission, or allow an interlocutory appeal to the commission on any material question arising during the course of a proceeding, where he finds that it is necessary to do so to prevent substantial prejudice to any party or to expedite the conduct of the proceeding. The presiding officer or the commission may thereafter stay the proceeding if necessary to protect the substantial rights of any of the parties therein." (emphasis added)

5. A stay of the ALJ's ruling pending final resolution by the Commission should be granted in order to protect the substantial rights of both the Company and other parties to this proceeding. If a stay is not granted, opposing parties will not develop and file testimony on this matter in accordance with the schedule previously established for litigation of this

proceeding, and in the event that the Commission answers the material question presented to it by the Company in the negative and reverses the ALJ's determination, unnecessary delay and substantial prejudice to the rights of all parties will result.

Specifically, under the current schedule, the testimony of opposing parties on Limerick issues is scheduled to be filed by January 14, or in less than two weeks, and cross-examination of opposing party witnesses supporting that testimony will occur during the first two weeks of February. Rebuttal testimony by the Company on Limerick issues must be filed by February 19, Limerick-related surrebuttal must be filed on February 28, and Limerick-related sur-surrebuttal must be filed on March 7. All rebuttal, surrebuttal and sur-surrebuttal testimony will be subject to cross-examination on March 12-14 and the record in this proceeding will be closed on March 14. During the next 2 months, briefs must be prepared and filed and the ALJ must issue a recommended decision, after which exceptions and replies to exceptions will be submitted. The 7-month suspension period in this proceeding ends June 27, 1986, and a final Commission Order must be issued prior to that time.

As shown above, an extremely demanding schedule has been established which must be met to permit the efficient development of a complete and accurate record if a final Commission Order is to be issued within the time constraints of this proceeding. If a stay is not granted and the ALJ's ruling is ultimately reversed by the Commission, this schedule will be substantially and unnecessarily delayed to the prejudice of all parties. The

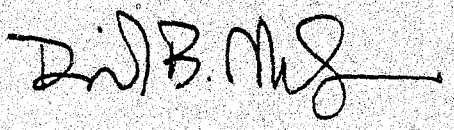
filing and development of rebuttal and surrebuttal testimony regarding the reasonableness of the construction deferral decisions as well as related cross-examination will be substantially delayed beyond the dates set forth above. As a result, all parties will be forced to accomplish these activities on an extremely compressed schedule in order to complete this proceeding within the statutory suspension period. Such delay and compression of the time needed for preparation of this testimony and cross-examination will substantially prejudice both the Company's and opposing parties' ability to fully and adequately develop the record on this important issue. Moreover, a delay in the submission of such significant evidence will disrupt the efficient and orderly conduct of this proceeding.

In contrast, if a stay is granted, then a full and complete record on the reasonableness of the deferral decisions can be developed in an orderly manner under the agreed upon schedule set forth above. Such a record is required if the Commission is to fully understand and resolve this issue in the event that the ALJ's ruling is reversed. However, even if the ALJ's ruling is ultimately upheld by the Commission, no party will have suffered because such a record has been developed. At most, additional evidence will have been prepared by all parties as was presumably contemplated in establishing the above schedule, which was established substantially before the Trial Staff's filing of the Motion in Limine and the ALJ's ruling. Clearly, the issuance of a stay will ensure that a complete and expeditious resolution to this matter is achieved, while denial

of a stay may result in substantial and avoidable prejudice and administrative burden.

WHEREFORE, for the reasons set forth above, the Company respectfully requests that its Petition for Stay be granted.

Respectfully submitted,



Walter R. Hall, II
David B. MacGregor
Jack E. Jerrett

Counsel for Philadelphia Electric Company

OF COUNSEL:

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2301 Market Street
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Robert H. Young
William E. Zeiter
Jay H. Calvert, Jr.
MORGAN, LEWIS & BOCKIUS
2000 One Logan Square
Philadelphia, PA 19103

DATED: December 31, 1985

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing document upon all parties of record in this proceeding in accordance with the requirements of 52 Pa. Code §1.54.

Dated this 31st day of December, 1985.

DAVID B. MACGREGOR

Counsel for Philadelphia Electric Company

OF COUNSEL:

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Services Administration General Counsel Washington, DC 20405

ORIGINAL

January 16, 1986

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JAN 17 1986
SECRETARY'S OFFICE
Public Utility Commission

Mr. Jerry Rich, Secretary
Pennsylvania Public Utility Commission
Room G-18, North Office Building
North & Commonwealth Avenue
Harrisburg, Pennsylvania 17120

Dear Mr. Rich:

Re: Pennsylvania Public Utility Commission, et al.
v.
Philadelphia Electric Company
Docket No. R-850152

Enclosed for filing with the Commission are three (3) copies of the Errata Sheet for Direct Testimony of Philip R. Winter, Cost of Capital, General Services Administration on behalf of the Federal Executive Agencies..

Sincerely,

Mildred E. V. Pitts

MILDRED E.V. PITTS
Senior Trial Attorney
Information Resources & Utilities Division

Enclosures

cc: Honorable Joseph P. Matuschak
Administrative Law Judge
Pennsylvania Public Utility Commission

Mr. Joseph Brennan
Associated Utility Services
155 Gaither Drive
Mt. Laurel, New Jersey 08054

All Parties

DOCUMENT FOLDER

CERTIFICATE OF SERVICE

Re: Pennsylvania Public Utilities Commission, et al.
v.
Philadelphia Electric Company
Docket No. R-850152

I hereby certify that I am, this 16th day of January, 1986 serving either by special messenger or by first-class mail, the foregoing document, Errata Sheet for Direct Testimony of Philip R. Winter, Cost of Capital, General Services Administration, upon the persons listed below:

Honorable Joseph P. Matuschak
Administrative Law Judge
Pennsylvania Public Utility Commission
97 E. Main Street
Uniontown, Pennsylvania 15401

Walter R. Hall, II, Esquire
David B. MacGregor, Esquire
Robert H. Young, Esquire
Morgan, Lewis & Bockius
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MILDRED E. V. PITTS

Errata Sheet
for Direct Testimony of Philip R. Winter
in
Philadelphia Electric Company Docket #850152
Before the Philadelphia Public Utility Commission

References	Correction
p. 19, lines 14 and 23	Change "Moody's" to: "Value Line's"
p. 20, line 1	Change "1.3" to: "1.2"
line 2	Change "Moody's" to: "Value Line's"
line 12	Change "Moody's Electrics." to: "Value Line's Electrics until 1984."
lines 12-15	Change "Some relative improvement in PECO's ROE was, however, recorded during this period with a 1984 shortfall from the Moody's average of 2.8%, compared with a shortfall in 1981 of 4.2%." to: "In 1984, PECO's ROE exceeded the Value Line average by 1.4%."
line 22 and 25	Change "Moody's" to: "Value Line's"
line 26	Change "2.8% below" to: "1.4% above"
p. 21, lines 1-4	Change "... Moody's average in 1984. This shortfall was due to a lower turnover rate (Revenues/Total Capital), and lower pre-tax profit margin (Pre-Tax Profits/Revenues) than that recorded for Moody's Electrics" to: "... Value Line average in 1984. This above average ROE was due to higher leverage (Total Capital/Book Equity) and a higher tax flow-through rate (1-tax rate) than that recorded for Value Line's Electrics."
lines 4 and 5	Change "PECO's turnover ratio is 21.7% below the Moody's figure." to: "PECO's ROE would be higher if not for their turnover ratio which is 23% below the Value Line figure."
lines 12 and 13	Change "PECO's pre-tax profit margin, which is 8.49% below the Moody's average, ... " to: "PECO's 1984 pre-tax profit margin, which is 4.74% below the Value Line average, ..."
Schedule 7	Change all references to: "Moody's Electrics" to: "Value Line's Electrics"
	In the column labeled "1984" of Part I, change "12.7" to: "13.5" and "14.5" to "13.9"
	In the row labeled "Moody's Electrics (1984)" of Part II, change ".4847 x 2.4390 x .1887 x .650 = .145" to: ".4932 x 2.4510 x .1814 x .634 = .139"
	In the row labeled "% Difference (PECO vs Moody)" of Part II, change "-21.66 +11.41 -8.43 +21.69 -2.76 " to: "-23.01 +10.87 -4.74 +24.76 +1.44"

5026 W Clapier St
Phila PA 19144

Jan 15, 1986

Dear PA PUC:

I'd like to testify in Phila
Tuesday Feb 4th 1986 at
the 1:30PM hearing at
the Sanctuary Arch St.
United Methodist Church
at Broad and Arch.

Thank You
Jan Lane

To Secty
PUC

This 22 day of Jan / 86
the undersigned hereby acknowledges receipt of

COPY COPY OF AN OPINION AND ORDER

rendered by the Commission in Docket No. R-850152

Under Date of January 17, 1986 and accepts service

in behalf of Senator clarence D. Bell .

Lew Bell

Senator

HEARING REPORT

DOCKET NO. R-850152

CASE NAME PUC, et al. vs. Philadelphia Electric Company

HEARING LOCATION Philadelphia, PA.

HEARING DATE Jan. 6, 7, 8 & 9, 1986

ALJ Matuschak

CHECK THOSE BLOCKS WHICH APPLY:

Hearing concluded yes

Record closed no

Briefs to be filed

Further hearing yes

Estimated add'l days

BENCH DECISION

REMARKS: Hearing scheduled for January 9 Cancelled

RECEIVED JAN 10 1986 Office of the A.L.J. Public Utility Commission

DOCKETED JAN 2? 1986

DOCUMENT FOLDER

Names and addresses of parties or counsel of record
Please Print Clearly
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Cancel also hearing scheduled for Jan. 2/1 (only)

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David Wersan	1425 Strawberry Sq. City: Hbg State: Pa Zip: 17120	Office of Consumer Advocate
David M. Kleppinger McNees, Wallace & Nurick	100 Pine St. P.O. Box 1166 City: Hbg State: Pa Zip: 17108	Phila Area Industrial Energy Users Group
MARLANE R Chestnut	P.O. Box 3265 City: Hbg State: Pa Zip: 17120	Commission Trial Staff

Check this box if additional parties of counsel of record appear on back. [X]

Sandra J. ... Robert J. ... Judith A. ... (CRC)

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January 17, 1986

Jerry Rich, Secretary
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North Office Building
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P. O. Box 3265
Harrisburg, PA 17120

Re: Pennsylvania Public Utility Commission
v.
Philadelphia Electric Company
Docket No. R-850152

Dear Secretary Rich:

Enclosed are three copies of PECO Statement No. 30 (Revised) with attached Schedules 1 (Revised) and 2, which contain corrections to, and update, the originally-submitted Statement No. 30 and Schedule 1, which were previously distributed. Such revisions typically would be made orally at the time the sponsoring witness is offered for cross-examination. However, for the convenience of the parties, the prepared statement has been modified and redistributed. Also, for the parties' convenience, there are attached hereto summaries of the revisions.

Very truly yours,

Anthony C. DeCusatis

ACD:vo
ENC:
cc: Honorable Joseph Matuschak
All Parties of Record

Revisions to Schedule 1

Table 1:

Page 1: Explanation of the "cold reheat water induction protection system" clarified.

Page 3: Explanation of "water induction protection" clarified.

Table 3:

Throughout: The caption of the "Cost" column was revised to clearly indicate that the indicated amount is PECO's share of the total-plant cost.

Page 1: The explanation of "off-gas system improvements" was revised and the recombiner mod. eliminated because it is part of the off-gas system improvement

Clarification that main steam drain valve was replaced and not a new installation

Page 1: Revision to refueling platform mod., that project has been completed.

Page 1 & 2: Clarification of the number of L.P. Turbine Rotors replaced and scheduled for replacement, and updating costs.

Page 2: The plant simulator is not yet a completed project. The cost has been updated and the explanation clarified.

Page 2: Replacement of plant process computer added.

Table 4:

Throughout: Caption of "Cost" column revised.

Page 3: Explanation of "upgrade plant simulator" clarified.

"Turbine-generator supervisory instrumentation"; correct typographical error.

Revisions to Schedule 1 (Continued)

Table 5:

Throughout:	Caption of "Cost" column revised.
Page 1:	"Replace intermediate reheaters" added.

Revisions to Statement 30

References are to
Statement 30 (Revised)

Page	Line	
8	24	added "generally"
9	1	added "generally"
11	7	deleted "safety-related" added "availability"
11	11-12	clarified to indicate design changes
11	16	deleted "changes in" added "installation"
11	17-18	Revised
11	18-23	The last two sentences of the Answer were added.
12	21-23	Revised to indicate that refueling platform mods. are completed
12	22	"replacements" (made plural)
12 13	24 1	Clarification of the number of rotors replaced at each unit.
13	2	added "the possible"

TESTIMONY OF JOSEPH W. GALLAGHER

Q: Please state your name and business address.

A: Joseph W. Gallagher, 2301 Market St., Philadelphia, PA.

Q: By whom are you employed, Mr. Gallagher, and in what capacity?

A: I am employed by the Philadelphia Electric Company and, since January 1984, I have served as Manager of the Engineering and Research Department. For six years prior, I was Manager of the Electric Production Department.

Q: What is your educational background?

A: I graduated from Villanova University in 1949 with a degree of Bachelor of Electrical Engineering. In 1967, I completed the Executive Development Program at Cornell University and have taken graduate courses at Northwestern and Drexel Universities.

Q: What are your professional affiliations?

A: I am a licensed professional engineer in Pennsylvania, License #02358E. I was a member of the Operating Committee of the Pennsylvania, New Jersey, Maryland ("PJM") Interconnection for eleven years and was a member of the North American Power Systems Interconnection Committee for four years. I have served on the U.S.-U.S.S.R. Committee on Power System Planning and Operation since 1974 and also

serve on the Prime Movers Committee of the Edison Electric Institute, which is concerned with power generation matters. I am also a senior member of the Institute of Electrical and Electronics Engineers and have served on several technical committees of that organization.

Q: Please outline your work experience with the Philadelphia Electric Company.

A: I started with Philadelphia Electric in 1950 as an electrical engineer in the System Planning Division where I worked for approximately 12 years. My duties included planning of the distribution system and the generation and transmission systems and, later, supervision of the long-range generation and transmission branch. After that, I was assigned to the General Administration Department as a staff engineer for about six and one-half years. I was promoted to Assistant Superintendent of the System Operation Division in the Electric Production Department where I worked for five years and was then promoted to Superintendent in the same division for three years. During that time, I was responsible for scheduling production at Philadelphia Electric plants, assuring that they were on-line when needed, directing the load at which the plants were being operated, coordinating plant maintenance and releasing equipment for maintenance, directing the switching and blocking on the transmission system; monitoring transmission

line loadings, coordinating generation and transmission outages, and managing service restoration. I served as General Superintendent of the Maintenance Division for one year before being promoted to Manager of the Electric Production Department in April, 1978. My responsibilities, as General Superintendent of Maintenance, included management of the maintenance program of all generating stations, substations, and steam heating system facilities on the Philadelphia Electric Company system.

Q: Please briefly describe the Engineering and Research Department and your responsibilities as Manager of that Department.

A: The Engineering and Research Department is responsible for the planning, engineering, design and construction of all new facilities of the Philadelphia Electric Company. It is responsible for capital modifications of all facilities, load estimating, system planning, and research projects, also. As Manager of the Engineering and Research Department, I administer all of the functions of the Department, subject to the direction and supervision of the Vice President, Engineering and Research. In addition, I review the budgets and cost control systems for all capital work at all facilities, including those partially owned by Philadelphia Electric, but not operated by the Company.

Q: Previously you indicated that, prior to January, 1984, you were the manager of the Electric Production Department. Please briefly describe the Electric Production Department and the responsibilities you had in your prior position as Manager of that Department.

A: The Electric Production Department operates and maintains all of the electrical production facilities operated by Philadelphia Electric, including the Company's nuclear, coal, oil and hydroelectric facilities. It also operates and maintains the Company's steam heating supply stations. The Department is responsible for maintenance work on all generation and supply equipment under Philadelphia Electric's control and coordinates the Company's operations with the PJM Interconnection. As Manager of the Electric Production Department, I administered all of the functions of the Department, subject to the direction and supervision of the Vice President, Electric Production. In addition, I reviewed the operations, budgets, and cost control systems for the electrical production facilities including those partially owned by Philadelphia Electric, but not operated by the Company. These include the Salem nuclear plant, which is operated by Public Service Electric & Gas Company and two coal-fired generating stations (Keystone and Conemaugh) operated by Pennsylvania Electric Company.

Thus, in my positions as the former Manager of the Electric Production Department and now as Manager of the Engineering and Research Department I have had responsibility for, and exercised oversight of, the planning, engineering and implementation of both capital modifications and maintenance work. As I will explain below, these two categories -- capital modifications and maintenance work -- represent the classifications into which all major improvement projects at generating stations are divided for cost approval and implementation purposes.

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to explain improvements Philadelphia Electric Company has made or intends to make in the near future to its baseload generating units to enhance their performance. This information is provided to comply with the following data requirements which are contained in Appendix B to the Pennsylvania Public Utility Commission's Order entered October 30, 1985 at Docket Nos. P-830453, M-840375 and M-FACE8408:

> "The following information and data shall be supplied by the Company ...
>
> (4) Generating Unit Performance Improvements
>
> (i) A report detailing all Company efforts designed to improve system generating efficiency ..."

The Order further explained this data requirement by stating that the information to be provided should focus upon

"Prudent and projected generating unit performance improvements planned or anticipated by the Company."

I also explain major procedure-oriented and personnel-oriented changes and programs as well as capital and maintenance improvements that can have a positive effect on baseload generating performance. I also describe generally the processes and procedures employed by the Company to identify, authorize and implement capital modifications and maintenance work.

I have provided information principally with regard to baseload units. These consist of nuclear units (Peach Bottom 2 and 3 and Salem 1 and 2), the Philadelphia-Area coal-fired units (Eddystone 1 and 2 and Cromby 1), and the mine-mouth coal-fired units (Keystone 1 and 2 and Conemaugh 1 and 2). I should mention that, while the Philadelphia-Area coal-fired units have been categorized as baseload units, they are used by the Company for load-following at times.

Of course, the Company also has oil-fired units, combustion turbines and hydroelectric capacity. However, I have presented information principally for nuclear and coal-fired baseload units because, due to the duration of their operation throughout a year and relatively lower energy costs, "performance improvements" in these units generally have a greater effect on system energy costs.

For purposes of the information I have provided, I interpreted the criteria "system generating efficiency" and "unit performance improvements" as encompassing, in the case of nuclear units, unit availability and, in the case of coal-fired units, unit availability and thermal efficiency. By thermal efficiency, I mean net unit output relative to the fuel input.

Q: Explain how capital modifications and needed maintenance at generating stations is identified, authorized and implemented.

A: As I previously described, the Company's Electric Production Department is responsible for the operation and maintenance of all the Company-operated generating facilities. The Superintendent and Assistant Superintendent at each station, who are typically referred to as "Station Management", are members of that Department. Station Management originates requests for investigation of systems or components that either have failed or are exhibiting what station personnel consider to be deteriorated or unsatisfactory performance. Such investigations are conducted by the Engineering and Research Department's Mechanical or Electrical Engineering Divisions, with input from station personnel or other divisions of the Electric Production Department, as required or deemed desirable. Such investigation is directed to establish the probable cause of the identified failure or

unsatisfactory performance, to develop the necessary plan for fixing or improving the system or component studied, to estimate the costs to implement the fix, to make necessary cost-benefit analyses to determine if implementing the design fix is cost-justified and will provide an overall "economic" benefit, and to make a recommendation to Station Management.

If the recommendation is to proceed with the work identified as necessary and cost-justified, Station Management makes a request for authorization to expend funds for the project. If the work entails a capital modification, a Capital Authorization or "CA" is requested. If the necessary work represents maintenance, an Expense Authorization or "EA" is requested. PECO management reviews and approves the requested CAs and EAs, the expenditures for which must be integrated into PECO's overall capital and operating budgets.

After a CA or EA is approved, implementation requires completion of final engineering, scheduling (work that can be done only when a unit is shut down must be fit into the schedule for planned outages), procurement of necessary materials, and preparation of specifications and requests for bids or proposals if outside contractors are to be used.

Work authorized by a CA is generally implemented by the Engineering and Research Department's Construction Division,

and work authorized by an EA is generally implemented by the Maintenance Division of the Electric Production Department. However, engineering design and technical supervision is generally provided, in both cases, by the Engineering and Research Department.

Q: What is the Company's participation in the process of authorizing capital and maintenance work at jointly-owned plants that are operated by a joint-owner other than PECO?

A: For jointly-owned plants operated by others, PECO participates in the work review and approval process at the level of the owners' groups, consisting of representatives of each utility having an ownership share in the plant. The operating utilities have procedures similar to PECO's for identifying, analyzing, cost-justifying and approving capital and maintenance work. The strategic decisions for major capital or maintenance programs are submitted to the owners' group for review and approval.

Q: Please describe the information you are submitting in response to the data requirements of the Commission's October 30, 1985 Order.

A: The information is set forth in Schedules 1 and 2 attached to this Statement. Each Schedule corresponds to the categorization of work projects I identified before. That is, Schedule 1 lists capital modifications and Schedule 2 lists maintenance projects. Additionally, Schedule 2

describes personnel-oriented and procedure-oriented changes that are intended or expected to have a beneficial effect on unit performance.

Q: Please refer to Schedule 1 and explain what it shows.

A: Schedule 1 consists of five tables, each containing information about one or more units, as follows:

Table 1	Eddystone 1 and 2
Table 2	Cromby 1
Table 3	Peach Bottom 2 and 3
Table 4	Salem 1 and 2
Table 5	Keystone 1 and 2 and Conemaugh 1 and 2

Each Table shows, for the units it comprehends, capital modifications that will have a positive impact on unit performance. The modifications have been broken out among those completed within the last three years and those projected for substantial completion within the three-year period ending in 1988. Some of the projected work is already in progress.

The first column identifies the project, the second column shows the approximate cost, the third column indicates the area of performance anticipated to be enhanced (availability and/or efficiency), and the last column provides additional information explaining the need for or likely benefit of the work.

I should note that, because the number of modifications for each unit is voluminous, I have shown the cost only for those that exceeded or are anticipated to exceed $1 million.

Some of the projects listed were necessitated for environmental, safety-related, or regulatory compliance. However, the work was included on the schedule because, if not done, the performance of the unit would have been adversely affected. Thus, for example, RHR and recirculation pipe replacement at Peach Bottom 2 was necessitated by availability concerns associated with the generic problem of Intergranular Stress Corrosion Cracking in large-bore piping of Boiling Water Reactors, which was present at Peach Bottom. By replacing the piping with non-susceptible material and by using a design resulting in fewer welds, a potential future reduction in inspections could be expected, which should reduce outage time, reduce the risk of shut-downs due to IGSCC-related problems, and exert a positive effect on future availability. Similarly, installation of SO2 scrubbers at the Philadelphia Area Coal plants have permitted continuation of operation of these units in compliance with environmental standards. It should also be noted that Company efforts to improve performance are not limited to existing operating units. Many of the items identified for Peach Bottom (Table III) have been reflected in the design of the Limerick units or appropriately addressed before operation.

Q: Please refer to Schedule 2 and explain what it shows.

A: Schedule 2 consists of two parts. Part I contains a description of major maintenance work in progress or scheduled for completion within approximately three years that is expected to have a positive effect on unit performance. In lieu of itemization of work packages, to which the maintenance work does not readily lend itself, a brief narrative description of the work to be performed on a system or component is provided.

Part II contains, also, a brief description of major procedure-oriented and personnel-oriented programs implemented by the Company that are expected to enhance or avoid deterioration of unit performance by reducing outage time or that are expected to reduce the cost of operation and maintenance by permitting needed work to be done in a more time and/or cost efficient manner.

Q. Please provide an overview of significant planned improvements affecting performance at the Company's coal and nuclear plants which are intended to address major contributors to unit unavailability.

A. For Peach Bottom, such significant planned improvements include increasing spent fuel storage capacity, -- which together with the refueling platform replacements that are already completed should improve refueling performance, replacing the feedwater heaters, replacing the low pressure turbine rotors on Peach Bottom 2 and 3 (two of three rotors

in Peach Bottom 2 were replaced during the outage which ended in July, 1985), and the possible replacement of recirculation and RHR piping in Peach Bottom 3. More detail as to the effect of these improvements is set forth in Schedule 1, Table 3.

For Salem, such significant planned improvements include various pump improvements and replacements, heat exchangers' modifications, and major control and instrumentation modifications, as detailed in Schedule 1, Table 4.

For the Philadelphia-area coal plants such significant planned improvements include, at Cromby 1, replacing the low pressure rotor, modifications to the fly ash disposal system, and installation of micro-processor-based controls, and, at Eddystone, replacing the feedwater heaters at Unit 2, completion of the comprehensive boiler rehabilitation program at Unit 2, installation of micro-processor-based controls at both units, and implementation of computer analysis to identify availability impacting problems with the SO2 scrubbers on both units. More detail as to these items is set forth in Schedule 1, Tables 1 and 2.

For the mine-mouth coal plants, such significant improvements include, at Keystone, replacing economizers, balanced draft conversion, and replacing low pressure feedwater heaters, and, at Conenaugh, replacing the low

pressure and high pressure feedwater heaters, replacing air preheater coils, and obtaining spare low and intermediate pressure turbine rotors. In addition, major replacements and modifications of steam generator components (casings, ductwork and pressure vessels) have been in progress and are continuing. These and additional items are explained in Table 1, Schedule 5.

Q. In addition to the specific equipment-based projects you have described, please describe PECO's preventive maintenance program.

A. PECO has in place an extensive preventive maintenance program applicable to all of its generating stations. For example, during each legally-mandated boiler inspection, the boiler is extensively inspected both visually and by non-destructive testing to detect and correct developing problems that could result in forced outages or decreased capacity. Each major steam turbine-generator is totally inspected over a six-year cycle, on a component-per-year basis. All unit generators, major electric motors, and transformers are inspected and subjected to electrical testing on a periodic basis to detect incipient failures. Periodic inspections and overhauls of all major auxiliary systems are made on schedules reflecting the Company's experience in maintaining central generating station equipment. The goal is to reduce the forced outage rate to

the maximum feasible and cost-effective extent, considering resource limitations, and to reduce scheduled outages to a minimum cost-effective duration and frequency.

Q. Explain the general principles and criteria that guide PECO's approach to making "unit performance improvements".

A. PECO's general approach is to implement practicable capital or maintenance projects and programs that, based on appropriate analysis and engineering judgment, are reasonably projected to result in overall economic benefit. The pursuit solely of the highest standard of unit performance to the exclusion of other concerns can produce uneconomic results. That is, the capital and maintenance costs incurred to achieve an incremental increase in operating performance can exceed the marginal reduction in energy costs they might produce. In short, work to be done solely to achieve increased unit performance must be cost-justified on the basis of total costs.

These principles are taken into account by PECO in the work authorization procedures I explained before. Specifically work -- other than that mandated by regulatory requirements or health and safety concerns -- is analyzed on a cost benefit basis before expenditures are authorized. The cost-benefit analysis can be more or less formal or sophisticated depending upon the nature, scope and total cost of the work. In some cases, the cost-benefit is

clearly justified or unjustified without substantial, written analyses.

Q. Can you explain briefly the quantifiable effects on unit performance of unit improvements and modifications.

A. The effects on total unit performance are difficult to quantify, because unit performance is a function of the dynamic interaction of numerous complex engineering systems. There is one important factor to be remembered, however. Improvements in the performance of a given system or component are not translated into improvements in total unit performance of equal magnitude. Thus, if problems in a given system or component contributed 2 percentage points to the unit's total forced outage rate, correcting those problems will not result in a 2 percentage point reduction in the forced outage rate. The improvement in unit forced outage rate is, generally, less than the improvement in the system's or component's performance. Moreover, as a unit ages and new problems arise, no absolute improvement in performance from past capital modifications and maintenance activities may occur. Rather, capital modifications and maintenance achieve a continuation of existing performance levels or of levels above those that would otherwise be obtained absent those efforts.

Q. Does this conclude your statement?

A. Yes, it does.

SCHEDULE 1

(Revised)

TABLE 1

EDDYSTONE UNITS 1 AND 2

TITLE/DESCRIPTION OF MODIFICATION	COST (1000s) ($)	Reason and Effect on Performance A = Availability E = Efficiency	Notes and Discussion
COMPLETED DURING LAST 3 YEARS			
Rotor stress indicators		A	Guide to operator to prevent misoperation that ultimately would result in shortened turbine life
Cold reheat water induction protection system (Unit 2)		A	To prevent equipment damage would result in forced outag
Chlorine injection modifications		A/E	Prevents organic contaminati of condenser--thus improving efficiency--while complying with stricter environmental regulations
Electrostatic precipitator rappers		A/E	Replace and upgrade rappers; reduces particulate scrubbin
Water discharge system modifications		A/E	Improvements to turbine bypa reduces start-up time, impro availability and reduces start-up fuel
Auxilliary steam back-up		A/E	Improvements that shorten start-up time, improve avail ability and reduce start-up fuel
Fire protection modifications		A	Localizes and minimizes dama in the event of a fire, ther reducing possibility of long forced outage due to fire an resulting damage
SO_2/particulate scrubbers	147,430	A/E	The only alternatives to com with the Clean Air Act were retire the unit or convert t units to oil. Installation scrubbers was the most econo cal choice to retain that ca pacity.

TABLE 1

EDDYSTONE UNITS 1 AND 2

TITLE/DESCRIPTION OF MODIFICATION	COST (1000s) ($)	Reason and Effect on Performance A = Availability E = Efficiency	Notes and Discussion
COMPLETED DURING LAST 3 YEARS			
Replace main steam piping (Unit 1)	8,575	A	Piping was at the end of life; in order to retain this unit's capacity, piping had to be replaced.
Coal pile runoff system	1,650	A	Due to environmental law requirements, if this system were not added, the plant would have to be retired or converted to oil.
Turbine stop and control valves	6,420	A	Same as MSP replacement
PROJECTED TO BE COMPLETED WITHIN 3 YEARS			
Replace superheater outlet headers (Unit 1)	4,110	A	Material at end of life; to retain this capacity, replacement required.
Develop and implement program to assess high pressure piping integrity		A	To identify possible incipient problems so that effective planning can be developed and repair or replacement coordinated with scheduled outages
Wastewater treatment modifications	1,046	A	To avoid breakdowns that result in environmental violations requiring shutdowns
Feedwater, steam temperature, CC, PD and H.P. boilerfeed pump controls	1,790	A/E	Initial phase of long-term program to upgrade major control systems using microprocessor distributed system technology. To maintain steam pressure and temperature within design parameters. Shortens start-up time and improves thermal performance

TABLE 1

EDDYSTONE UNITS 1 AND 2

TITLE/DESCRIPTION OF MODIFICATION	COST (1000s) ($)	Reason and Effect on Performance A = Availability E = Efficiency	Notes and Discussion
PROJECTED TO BE COMPLETED WITHIN 3 YEARS			
Water induction protection (Units 1 and 2)	$2,740	A	Expanded application of water induction protection to prevent turbine damage
Soot blower control panel replacement		A/E	Replacement and upgrade to al low closer control of steam temperature
ATC (combustion air) drive and control replacement		A/E	Replace and upgrade. Provide more efficient burning of fue by giving operator control of combustion air
Auxilliary boilers (convert from No. 6 fuel oil to gas firing)	1,500	A/E	Increases availability (because lower maintenance) and improves efficiency
Replace igniters (Units 1 and 2)	1,000	A/E	Reduces start-up time, reduce start-up fuel, increases avai ability
Replace air tempering coils		A/E	Improves thermal performance
Replace feedwater heaters (Unit 2)	2,135	A/E	Recoup availability and therm efficiency lost due to tube failures
Air dryers		A	Reduces moisture in compresse air-powered controls; avoids freeze-up
Vibration monitoring		A	Upgrade monitoring of rotatin equipment to avoid in-service failures

TABLE 2

CROMBY UNIT 1

TITLE/DESCRIPTION OF MODIFICATION	COST (1000s) ($)	Reason and Effect on Performance A = Availability E = Efficiency	Notes and Discussion
COMPLETED DURING LAST 3 YEARS			
SO_2/particulate scrubbers	77,032	A	(see explanation of similar item in Table 1)
Replace ignitors		A/E	(see explanation of similar item in Table 1)
Replace economizer		A/E	Improves availability; avoids forced outage due to tube failures
Bag house by-pass duct		A	Allows operation while bag-house is out of service
Replace No. 4 feedwater heater		A/E	(see explanation of similar item in Table 1)
Feedwater, steam temperature, CC controls		A/E	(see explanation of similar item in Table 1)
PROJECTED TO BE COMPLETED WITHIN 3 YEARS			
Chlorine injection system		A/E	(see explanation of similar item in Table 1)
Demineralizer regeneration pump suction modifications		A	Pump modification to reduce in-service failures
Fire protection modifications		A	(see explanation of similar item in Table 1)
Coal pile run-off system		A	(see explanation of similar item in Table 1)
Purchase of replacement L.P. rotor		A/E	Permits replacement during scheduled outage; updated blade design

TABLE 3

PEACH BOTTOM UNITS 2 AND 3

TITLE/DESCRIPTION OF MODIFICATION	PE COST (1000s) ($)	Reason and Effect on Performance A = Availability E = Efficiency	Notes and Discussion
COMPLETED DURING LAST 3 YEARS			
Off-gas system improvements	6,526	A	Eliminated need for pressurized hold-up and compression; increases reliability and decreases maintenance.
Rad-waste storage facility	6,100	A	Increase storage.
Main steam drain valve replacement		A	Facilitates moisture removal from main steam lines; reduces risk of damage to turbine.
Replace recirculation and RHR piping (Unit 2)	31,100	A	Replacement with nonsusceptible material and fewer welds; reduces down-time for future weld ISI and other IGSCC related problems.
Replace safe ends (Unit 2)	4,840	A	Replacement with nonsusceptible material; reduces future IGSCC problems.
Refueling platform modifications		A	Improves efficiency and reliabil of fuel handling to reduce critical-path outage time.
Replace 2 of 3 L.P. Turbine Rotors (Unit 2)	12,365	A	Improve reliability, reduce maintenance and inspection requirements.

TABLE 3

PEACH BOTTOM UNITS 2 AND 3

TITLE/DESCRIPTION OF MODIFICATION	PE COST (1000s)	Reason and Effect on Performance A = Availability E = Efficiency	Notes and Discussion
PROJECTED TO BE COMPLETED WITHIN 3 YEARS			
Replace all three L.P. turbine rotors (Unit 3)	5,048	A	Improve future reliability, reduce maintenance; restore performance capability.
Reactor feed pumps recirculation valves		A	
Increase capacity of spent fuel racks	3,830	A	Increases number of cycles of operation with existing spent fuel pool.
Install new recirculation and RHR piping (Unit 3)	30,170	A	(See the explanation of similar item for Unit 2). Decision pendin on this major item.
Replace 1 of 3 L.P. turbine rotors (Unit 2)	2,150	A	(See the explanation of similar item above).
Replace feedwater heater		A	(See explanation of similar item in Table 1).
Control room and instrumentation modifications		A	Partially NRC-required; increases operating efficiency.
Plant simulator	4,200	A	Improved operator training will provide greater operator efficiency and reduce errors, improving unit availability and performance. (This facility may be leased rather than Company-owned).
Replace plant process computer	8,400	A/E	Monitors plant conditions providing continuous guidance for plant operation. (This item may be leased rather than Company owned).

TABLE 4

SALEM UNITS 1 AND 2

TITLE/DESCRIPTION OF MODIFICATION	PE COST (1000s) (s)	Reason and Effect on Performance A = Availability E)= Efficiency	Notes and Discussion
COMPLETED DURING LAST 3 YEARS			
Rewind generator (Unit 1)	2,252	A	Generator failed; rewind increases reliability and availability.
Replace generator (Unit 2)	10,350	A	Generator failed, replacement necessary to restore unit availability; increases reliability.
Upgrade moisture separator reheater shells	2,428	A	Improves moisture removal; reduces risk of damage to turbine.
Condensate pump mod. (Unit 2)	1,313	A	Increase reliability, reduces maintenance and increases cycle efficiency.
Retube component cooling heat exchanger		A	Experiencing numerous tube failures; retubing increases reliability and availability.
Upgrade circulating water screen wash.		A	Improves operation and reduces maintenance.
Upgrade H.P. feedwater heater internals		A	Experiencing failures and degraded performance; interna upgrade increases reliability and performance.

TABLE 4

SALEM UNITS 1 AND 2

TITLE/DESCRIPTION OF MODIFICATION	PE COST (1000s) ($)	Reason and Effect on Performance A = Availability E = Efficiency	Notes and Discussion
COMPLETED DURING LAST 3 YEARS			
Reactor coolant pump motor resistance rings		A	Improve availability, reduce maintenance.
Replace turbine by-pass steam valves		A	Reduces start-up time; improves availability.
PROJECTED TO BE COMPLETED WITHIN 3 YEARS			
Replace moisture separator tube bundles	5,473	A	(See the explanation for MSR shell replacement).
Replace RHR sump pumps		A	Old pumps were experiencing high level of failures affecting availability.
Upgrade circulating water pump bearing lubrication pump		A	Improved bearing cooling capability which had become a high maintenance item.
Reactor vessel head quick disconnect tensioner		A	Facilitates head removal; reduces outage time.
Replace service water strainer		A	Existing strainer experiencing high maintenance and poor availability due to corrosion.

TABLE 4

SALEM UNITS 1 AND 2

TITLE/DESCRIPTION OF MODIFICATION	PE COST (1000s) ($)	Reason and Effect on Performance A = Availability E = Efficiency	Notes and Discussion
PROJECTED TO BE COMPLETED WITHIN 3 YEARS			
Replace chiller condensers		A	Existing condensers experiencin high rate of tube failures; replacement increases reliabi- lity and performance
Replace primary system flow transmitters		A	Existing transmitters were high maintenance items and spare parts not available; replacemer increases reliability and performance.
Replace turbine area sump pumps		A	Old pumps experiencing failures affecting availability.
Upgrade plant simulator		A	To reflect plant changes in th important operator-training tool. (Enhance operating performance and minimize operating errors).
Upgrade circulating water pump internals		A	High maintenance and effect o availability; upgrade increase reliability.
Replace service water piping to component cooling heat exchanger		A	High maintenance item -- leak and failures -- operating availability; upgrade increase reliability.
Turbine-generator supervisory instrumentation		A	Temperature and vibration monitoring; identifies incipi problems; avoids failures, reduces trips during start-up

TABLE 5

KEYSTONE UNITS 1 AND 2
CONEMAUGH UNITS 1 AND 2

TITLE/DESCRIPTION OF MODIFICATION	PE COST (1000s) ($)	Reason and Effect on Performance A = Availability E = Efficiency	Notes and Discussion
COMPLETED DURING LAST 3 YEARS			
(Keystone)			
Turbine water induction protection modifications		A	Guide to operator to prevent misoperation that ultimately could result in shortened turbine life
Develop East Valley ash and coal refuse disposal site	1,520	A	Adequate, environmentally-approved waste disposal site required for continued operatio
PROJECTED TO BE COMPLETED WITHIN 3 YEARS			
(Keystone)			
Replace economizers	4,000	A/E	(see explanation of similar item in Table 2)
Convert boilers to balanced draft	10,745	A/E	Increase availability by reducing casing leaks and hot spots
Replace station computers	1,880	E	To monitor operating parameters and highlight losses that can be corrected
Develop additional ash disposal sites		A	(see similar item explained above)
Electrostatic precipator modification		E	Improve collecting efficiency; avoids load reductions due to air pollution violations
Replace L.P. feedwater heaters		A/E	(see explanation of similar item in Table 1)
Purchase spare boiler circulating pump		A	Long lead time item; purchased in advance for orderly integration of repair/replacement in scheduled outage and less down-time in event of in-service failure
Replace intermediate reheaters	3,145	A/E	Increase availability by reducing leaks

TABLE 5

KEYSTONE UNITS 1 AND 2
CONEMAUGH UNITS 1 AND 2

TITLE/DESCRIPTION OF MODIFICATION	PE COST (1000s) ($)	Reason and Effect on Performance A = Availability E = Efficiency	Notes and Discussion
PROJECTED TO BE COMPLETED WITHIN 3 YEARS			
Wastewater treatment system improvements		A	(see explanation of similar item in Table 1)
Purchase spare boiler feed pump coupling elements		A	Reduce risk of extended outage due to in-service failure or inspection that discovers problem. Long lead-time for procurement.
(Conemaugh)			
Replace H.P. and L.P. Feedwater heaters	1,312	A/E	(see explanation of similar item in Table 1)
Replace station computers	1,852	E	(see explanation of similar item for Keystone)
Develop additional ash disposal sites	1,140	A	(see explanation of similar item for Keystone)
Electrostatic precipitator gas flow improvements		A	(see explanation of similar item for Keystone)
Purchase spare boiler circulating pump		A	(see explanation for similar item for Keystone)
Heat rate monitoring equipment		E	Adjunct to computers and extension of their capabilities

SCHEDULE 2

SCHEDULE 2

I. EQUIPMENT-CENTERED EFFORTS

Rehabilitation of Eddystone 1 and 2 steam generators' pressure vessel parts is being pursued to improve availability. The program on Unit 1 was completed earlier than planned because of the opportunity afforded by the forced outage for replacing main steam piping in 1983-84. The Unit 2 program is scheduled for completion in 1989.

In addition to the rehabilitation programs described above, a comprehensive program was initiated in 1984, in cooperation with the original equipment manufacturer, to study and improve the availability and thermal efficiency of the Eddystone Unit 1 steam generator and auxilliaries. This program includes a review of operating practices and procedures. Results obtained from the Unit 1 program will be applied to Unit 2. Resources permitting, the program is anticipated to be completed by 1989.

A proposal is being considered to apply UNIRAM (computer based) analysis to identify availability problems in Eddystone Unit 1 and 2 scrubbers. A similar program was completed on Cromby Unit 1 scrubber in 1985. Once the problems are identified, a cost-benefit analysis will be performed to determine if and what action should be taken.

Redesign of the boiler feed pump seals on Eddystone Units 1 and 2 is continuing in cooperation with the original equipment manufacturer to minimize forced reductions and to incorporate design improvements growing out of experience.

Major replacements and modifications have been in process since 1982 and are continuing for Conemaugh Units 1 and 2 and Keystone Units 1 and 2 steam generators including castings, ductwork and pressure vessels, intended to improve availability. This work is being done pursuant to a major study performed by a consulting engineering firm to identify areas for improvement. Allied work on controls is also scheduled for the Conemaugh units.

Development and implementation of a comprehensive quality assurance manual and program is in progress at Keystone and Conemaugh. This is expected to result in assurance of high quality workmanship and better reliability of equipment which supports the objectives of better station performance.

Begun in 1985, improvements continue to core/fuel element mechanical/nuclear design leading to economies in fuel cost and increased availability at Peach Bottom. Improved core monitoring is being implemented as well as proposed changes in control rod systems, which are expected to have a positive effect on availability and capacity factor. All these improvements are scheduled in stages, with final completion anticipated in the 1990-1991 time frame. (Additional detail can be provided).

New maintenance tools and equipment are being purchased to improve productivity. Increased use of NDE is designed to improve availability of units through early detection of incipient failures.

II. PERSONNEL-CENTERED EFFORTS

Training of operating and maintenance personnel for Eddystone, Cromby, Keystone and Conemaugh has been upgraded and intensified. An example is the expansion of the training program for fossil and hydro plant operators begun in 1985. The improved and heightened training is designed to reduce operating errors and improve maintenance productivity, leading to increased unit availability and thermal performance.

At PECO, new maintenance mechanic training facilities have been in operation for approximately four years. Improved productivity is expected to result, and the effects should be evident in the near future. PECO is currently undergoing self-evaluation for IMPO accreditation.

III. PROCEDURAL-CENTERED EFFORTS

Planning, scheduling and management of unit outages and routine maintenance, including refueling outages at Peach Bottom and Salem, is being improved by increased use of

computer-aided programs, such as CHAMPS (a preventive maintenance program) and MOMS (Maintenance outage managment system) to schedule resources, PICOM (project information and cost management) to track costs and PREMIS (project resource evaluation and management information system) to minimize outage length and levelize manpower requirements. Maintenance planning and scheduling is assisted by MAINPLAN, a computer program designed to optimize resource needs while minimizing outage costs. All the programs utilize procedures and techniques designed to improve site management of outages. The outage planning and management reinforcement began at Peach Bottom in 1980, and 1981 at Eddystone.

The program for tracking and monitoring plant performance and equipment degradation is being intensified at Peach Bottom and increasing emphasis is being placed upon maintaining and improving thermal efficiency.