

experience in terms of lives of plants, additions to plants and other similar matters. These certainly are not the types of changing conditions that apply to a construction program that entailed various management practices that either did or did not occur over a fixed period of time.\*

In citing certain earlier U.S. Supreme Court cases for the general proposition that the doctrine of res judicata does not apply to ratemaking, Brief at 43-44, the Company fails to mention two important points. First, the general doctrine has been limited. Equally importantly, the cases cited refer to types of issues such as overall level of rates and going concern value which are factually different in important ways from the type of determination appealed here.

The U.S. Supreme Court has more recently stated, as follows:

Occasionally courts have used language to the effect that res judicata principles do not apply to administrative proceedings [footnote omitted], but such language is certainly too broad. When an administrative agency is acting in a judicial capacity

---

\* Of the two Commission decisions PECO cites as evidence of the Commission's verdict that res judicata does not apply in any circumstances to its determinations, one is quasi-judicial determination: rate base deduction for faulty ring girder pour. As to that issue, in the second proceeding the Commission agreed with the staff and the Consumer Advocate that the first determination should be followed. The Company did not except. The second issue cited by the Company--capitalization or expensing of employee benefit costs--is the type of accounting policy decision that is properly subject to reconsideration. The existence of the costs and their reasonableness is not an issue; the proper accounting treatment for the expenditure, i.e., whether it should be recorded as a capital expenditure or as an operating expense, is a policy determination that may change as the level employee benefit costs vary, the capitalization of the Company varies, or many other factors change.

and resolves disputed issues of fact properly before it which the parties have had an adequate opportunity to litigate, the courts have not hesitated to apply res judicata to enforce repose. [Citations omitted.]

United States v. Utah Construction & Mining Co., 384 U.S. 394, 421-422, 86 S. Ct. 1545, 1559-1560 (1966). The Supreme Court in that case considered the many factors that are relevant to a determination of whether res judicata should or should not apply to any decision. The Court noted that the Board of Contract Appeals was acting in its judicial capacity when it considered a contract claim and that all parties ~~had had a full and fair opportunity to litigate the issues and to seek~~ court review of any adverse findings. The Court held that there was neither need nor justification for an additional evidentiary hearing on the matters.

The recognized administrative law scholar, Kenneth Culp Davis, supports the view that application of the doctrine should be tailored to the particular determination:

The unsound idea that res judicata does not apply to administrative determinations is gradually being replaced by the sound idea that res judicata properly applies to some administrative determinations and that degrees of relaxation of res judicata are often appropriate. The movement is toward a recognition that the reasons behind the doctrine of res judicata are fully applicable to some administrative proceedings, partially applicable to some, and not at all applicable to others.

Davis, Administrative Law, §18.12 (Supp. 1965)

Similarly, language in this jurisdiction that res judicata principles do not apply to decisions by the Pennsylvania Public Utility Commission should not be applied to the instant proceeding in a wholesale manner but should be applied only in the context where it

constitutes sound policy. The finding of imprudent construction management practices at the Salem site by the Commission in the last electric rate proceeding was a factual dispute resolved by the Commission at that time after full and adequate opportunity for all parties to litigate their position. There is neither a need nor a justification for a second evidentiary hearing in this matter.

A close review of the cases relied upon by PECO will demonstrate their failure to support an application of the prohibition to the instant issue.

Mr. Justice Brandeis, speaking for the Court in Tagg Bros. & Moorhead v. U.S., 280 U.S. 420, 14 L.Ed. 524 (1930), upheld the Secretary of Agriculture's determination of a certain rate level for stockyard activities, finding a lower court's gathering of new evidence an improper usurpation of administrative authority. The Court observed that the livestock owners could apply for rehearing or institute a new proceeding and stated: "A rate order is not res judicata. Every rate order made may be superseded by another." 280 U.S. at 445, 14 L.Ed. at 537. This is the broad principle the Company would have this Court adopt without thoughtful tailoring. The very evidence improperly allowed in Tagg Bros. --evidence to show that "the charges prescribed. . . would result in injury to the livestock business...that they will be unable to continue in business" demonstrates the different applicability of the doctrine to overall rate levels, that are based on changing conditions, and to specific factual determinations based on past events. Many of the variables that effect the proper overall level of revenues change as conditions change. The construction management practices found to result in unreasonable costs have not and will not change.

International Telephone and Telegraph Corp. v. American Telephone and Telegraph Company, 444 F. Supp 1148 (S.D. NY 1978), quoted by the Company in its Brief at 17 to the effect that collateral estopped does not apply, is inopposite. The proceeding referred to in the IT&T case, was of a non-adjudicatory nature. As observed by the appellate court: "What began as a straightforward ratemaking review... expanded into a broad investigation into the economic structure of the Bell system and the telecommunication industry as a whole." IT&T, supra, at 1155. The New York appellate court specifically cited the Utah Construction & Mining Co., supra, noting that there and elsewhere res judicata has been found to apply "[w]hen the agency made the findings while acting in a judicial capacity and the parties were given a full and fair opportunity to litigate the issues in the administrative proceeding. [Citation omitted.]" IT&T, supra, at 1156. The New York court went on to delineate why the prior proceeding was not adjudicatory, but legislative, stating, inter alia, "[s]pecific findings that past acts did or did not occur were essentially unnecessary to a reasoned conclusion about what was necessary or desirable for the future." Id. at 1158. The Court further observed of the non-adjudicatory proceeding, that it was unclear "whether effective judicial review" could have been obtained. Id. at 1157.

Although the Public Utility Commission was created by the legislature it does perform quasi-judicial functions. Cage v. PSC, 125 Pa. Super. 330, 189 A. 896 (1937). The determination here appealed is quasi-judicial in nature. It is an adjudication of the rights of the parties after full litigation and from which the parties have the right of appeal.

The Company's reliance on Judge Leventhal's concurring opinion in Federal Trade Commission v. Texaco, Inc., 555 F.2d 862 (D.C.C.A. 1977), cert denied, 97 S. Ct. 2939 (1977) fails to note the sound reasoning in the majority opinion, by Chief Judge Bazelon, and its explicit refusal to embrace the broad principle propounded by Judge Leventhal. The issue on appeal was the propriety of the district court's restriction of the Federal Trade Commission's (FTC) discovery of gas reserve information from certain gas producers. The Federal Power Commission (FPC) had earlier accepted a particular producer's estimates of "proved reserves" in a rate proceeding. The gas producers argued that the FPC's earlier decision precluded relitigation of that issue. The producers also argued that the current investigation was only as to the accuracy of the estimates of reserves and conspiracy in reporting those reserves not broader issues of the amount of reserves including comparisons of different reports of the reserves in the same geographical areas by different parties. The district court had restricted the scope of the FTC's subpoenas on "a variety collateral estoppel" and thereby required the FTC to take as a "given" the accuracy of the reserves. 555 F.2d at 879.

The reason that the majority found collateral estoppel could not be invoked to preclude discovery was not the broad rationale offered by Justice Leventhal and relied upon by PECO. On the contrary, the majority found "the assertion of collateral estoppel in this enforcement proceeding... premature [and did] not reach the issue, discussed in Judge Leventhal's concurring opinion, of whether a determination in an essentially rate making proceeding can be ever given preclusive effect." 555 F.2d. at 880, footnote 42.

The North Carolina Utilities Commission action that was the subject of decision cited by PECO, dealt with gas exploration incentive costs. State Ex Rel. Utilities Commission v. Edmisten, 242 S.E. 2d 862, 866 (N.C. 1978) Gas development is clearly a legislative issue, disposition of which would depend on varying conditions such as gas supply and demand, alternative fuel supplies and a myriad of other factors.

The interest in repose does not apply to overall rate levels or to policy questions the resolution of which depends on many factors ~~that can vary at any time. The interest of repose does apply to~~ quasi-judicial determinations such as the reasonableness of certain past management practices. The latter is more akin to a contract action than to a policy determination. For this reason the Commission properly refused to allow relitigation of these issues at bar. It is also for this reason PECO's quote from Professor Davis (Brief at 49-50) that "[a] rate order is not res judicata" is inapposite. The resolution of whether res judicata should apply to a particular public utility determination depends on the nature of the determination.

All of the requisites conditions of res judicata have have been satisfied. The Company's argument that PSE&G's construction management at the Salem site was not decided in the prior proceeding is without merit. The bulk of the audit addresses practices of PSE&G at the site. The Company had full opportunity to litigate the issue and did litigate the issue. Counsel for the Company extensively cross-examined the auditors on practices of PSE&G at the site.

The Commission's adjustment to the value of Salem was not based entirely on PECO's role in the construction of Salem. Rather, it

was based on the failure by PSE&G and PECO to implement certain practices in the actual construction of the plant, including PECO's failure to intervene and direct so that the more active constructor, PSE&G, would implement cost saving practices.

Several of the management practices cited by the Commission in its Order, as areas wherein savings could have resulted, were:

Improved control and resolution of rework;

Increased control over and higher utilization of the work force;

Improvement in management of warehousing and inventories;

Better management of constructing equipment;

Improved planning; scheduling, estimating and cost control;

Pa. PUC, et al. v. Philadelphia Electric Company, R.I.D. 438, Order of December 28, 1978 (Mimeo at 16). These were failures of PSE&G and PECO. Four other areas were mentioned in this list addressed PECO's relationship to PSE&G.

Sound policy and fairness require this Honorable Court to uphold the Commission's application of res judicata to its quasi-judicial determination of imprudent construction practices in the construction of Salem. PECO has full and fair opportunity to litigate this issue in the prior proceeding and has offered no sound reason that would override the interest for which res judicata is applied: putting an end to litigation.

C. The Commission Reduction Of PECO's Working Capital Requirement For Accrued Interest On Bonds Followed Recent Practice Accepted By The Courts Of Pennsylvania And Was Supported By Substantial Evidence.

The Commission in R.I.D. 865 made downward adjustments to PECO's cash working capital claim to reflect accrued bond interest.

The Company challenges this adjustment as not supported by substantial evidence in the record.

The Commonwealth Court of Pennsylvania has, in 1980, upheld three Commission decisions reducing a utility's cash working capital claim for failure to recognize the accrued bond interest available to the Company, collected from ratepayers through rates, prior to the actual payment of that interest on a semi-annual basis. See UGI Corp., supra, Pennsylvania Electric Company v. Pennsylvania Public Utility Commission, Pa. Cmwlth, 417 A.2d 819 (1980), and Peoples Natural Gas Co. v. Pennsylvania Public Utility Commission, Pa. Cmwlth, 415 A.2d 937 (1980). These cases apply directly to the case at hand.

Mr. Michael Arndt testified on behalf of the Consumer Advocate as to the working capital effect of interest on bonds and dividends on preferred stock. See CA Statement No. 5, pp. 9-11, R. ). That testimony established that a utility's revenue requirement includes an allowance for the costs of long-term debt and preferred stock which are paid at a later date, namely on a semi-annual and quarterly basis.

Trial Staff witness George Markovci testified, as follows, in Trial Staff Statement GFM-1, p. 2, R. :

The rates paid by PECO customers include a revenue requirement to service debt and preferred obligations. These rates are collected on a continuous basis throughout the year. In the case of bonds, the interest is paid semi-annually and preferred dividends are paid quarterly. If revenues collected from customers but not yet paid to bondholders and preferred stockholders are not recognized as a source of working capital contributed by the ratepayer and correspondingly offset against the cash working capital requirement, the equity holders will earn on capital not supplied

by them and receive a supplemental return or windfall profit. PECO recognizes this principle in its revenue-expense lag study for tax revenues received in advance of payment. There is no valid basis for ignoring the same principal and application to funds collected to service debt and preferred instruments.

I believe that an adjustment should be made on the basis that the mid-point of semi-annual interest payment and quarterly preferred dividend payments are proper in determining the adjustment to cash working capital requirement for debt service and preferred obligation. (Emphasis original).

Mr. Arndt's calculations as to his adjustment to reflect these accrued funds appears at CA Statement No. 5, Exhibit MLA-1, R. while Mr. Markovci's adjustment appears at Trial Staff Exhibit Nos. GFM-1A and 1B, R.

Record evidence exists, as it did in the above-cited cases, that funds are accrued from ratepayers prior to payment and that working capital should reflect this in order to prevent a double payment. This Court's opinion, as expressed in the above-cited cases, that cash working capital is properly reduced to reflect accruals applies with equal force in this case.

PECO attempts to distinguish this case from the prior cases by arguing that, indeed, there is no accrual of these funds present. In so doing, it reargues its case before this tribunal since that factual opinion is based upon its own witnesses testimony. As noted above, there is substantial evidence supporting the Commission's decision to make the adjustment. The fact that Company witness Rimerman's testimony was not accepted does not render the decision as being against the substantial evidence test.

However, there was excellent reason on the Commission's part for rejecting Mr. Rimerman's testimony.

Mr. Rimerman testified at PECO St. 7-A, pp. 1-2, that a lag in collection can exist between a new issuance of bonds and the embedded cost of debt reflected in rates at that time if the cost of the new bond issue exceeds said embedded cost of debt. However, as Mr. Rimerman testified, that lag only applies to the increment between the debt costs and only applies pending the next rate case.

The Company, at pages 60 and 61 of its Brief, takes this testimony and suggests that the increment being considered, at least over the last ten years, has effectively eliminated the accrued payments and its positive contribution to working capital. The record does not support this conclusion and the Commission exercised proper restraint in not accepting an unsupported fact.

Nowhere in the record does Mr. Rimerman, or any other witness, demonstrate that the alleged effect is any more than a short-term one on the total accrual as a whole. There is no testimony presented that demonstrates that the incremental impact alleged effectively obviated the known ongoing accrual through rates for all of the outstanding issues. The Advocate submits that the Company has failed to demonstrate the "fact" it alleges, namely that the incremental impact alleged but not quantified by Mr. Rimerman would come anywhere near reducing the total accrual to a lag posture.

On an ongoing basis, the Company was granted rates in R.I.D. 438, which rates went into effect around March of 1979, with the most up-to-date calculation of PECO's embedded cost of debt. Therefore, in measuring any incremental effect, one would be left with the future test year period March 1979 to March 1980. Since PECO is an ongoing entity, the Commission has properly weighed the record and

decided accordingly. It used proper discretion in rejecting the unsubstantiated fact presented by the Company that an alleged incremental increase in debt cost for one issue, which is built into rates and contributed in total by ratepayers in the next rate case, somehow removes entirely the accrued interest on total bond debt being contributed by ratepayers through rates and available as working capital. There is no record evidence that establishes this "fact."

As a last attempt at overturning accepted regulatory practice, PECO argues that accrued interest doesn't represent customer contributed capital because it belongs to investors. This Court has rejected this assertion in UGI, 410 A.2d 923 at 930.

In light of the above, the Commission's decision is based upon substantial evidence and is in conformity with existing law. As such, it should stand.

#### IV. CONCLUSION

For the above-enumerated reasons, those portions of the Public Utility Commission's Orders of February 28, 1980 and May 9, 1980 challenged by the appeal of the Philadelphia Electric should be affirmed as supported by substantial evidence and consistent with law. The Appeal of PECO should be dismissed.

Respectfully submitted,

*Martha W. Bush /cwb*  
Martha W. Bush  
Assistant Consumer Advocate

*Craig R. Burgraff*  
Craig R. Burgraff  
Assistant Consumer Advocate

Dated: December 22, 1980

CERTIFICATE OF SERVICE

I hereby certify that I have this day posted by first class mail two copies of Intervenor Consumer Advocate's Designation of Reproduced Record and advanced text of Brief of Consumer Advocate in the matter docketed at No. 1415 C.D. 1980 to:

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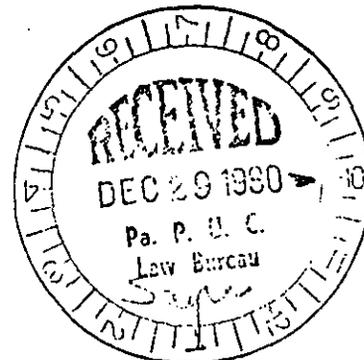
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Craig R. Burgraff  
Assistant Consumer Advocate

DATED: December 22, 1980

December 23, 1980

M E M O R A N D U M



TO: ALL PARTIES OF RECORD IN  
  
PHILADELPHIA ELECTRIC CO. v.  
PA PUBLIC UTILITY COMMISSION  
NO. 1415, C.D. 1980

RE: SECOND COPY OF BRIEF IN THE ABOVE-REFERRED CASE

As stated in our previous letter dated December 22, 1980, addressed to G. Ronald Darlington, Esq., Prothonotary, Commonwealth Court, we enclose a second copy of the Brief in the above-referred case. We inadvertently mailed one copy instead of two copies earlier.

Please excuse this delay. Thank you.

MBS:njp

Enclosure

DOCUMENT  
FOLDER

DOCKETED  
DEC 30 1980  
ajb



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

B-80062683

January 16, 1981

IN REPLY PLEASE  
REFER TO OUR FILE

Francis C. Barbush, Chief Clerk  
Commonwealth Court of Pennsylvania  
Sixth Floor, South Office Building  
Harrisburg, Pennsylvania 17120

In re: Petition of Philadelphia Electric Company  
No. 1415 C. D. 1980  
Commonwealth Court of Pennsylvania

Dear Mr. Barbush:

It has come to my attention that the certification of the record, filed July 21, 1980, in the above-captioned case is incorrect because Industrial Statement No. 2 was omitted from the certification. The error appears on page 5, the second item from the bottom. Please note that the Statement is included in the filing; it was omitted only in the certification.

In order to correct this situation, I have attached a new page 5 reflecting this addition. A copy of this corrected page is being sent to all parties involved in this proceeding and related proceedings. Thank you for your attention to this matter.

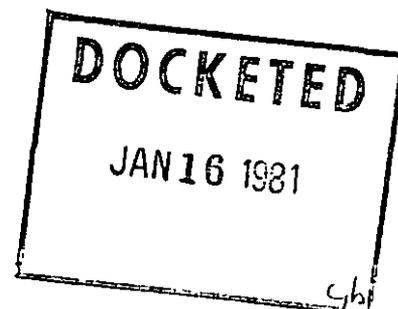
Very truly yours,

*Carol J. Barnes*  
Carol J. Barnes  
Appeals Clerk



Attachment

cc: Walter R. Hall, Esq.  
Martha W. Bush, Esq.  
Mark B. Segal, Esq.  
Charles J. Streiff, Esq.  
Andre C. Dasent, Esq.  
Edward J. Riehl, Esq.  
Kenneth R. Pepperney, Esq.  
Michael P. Kerrigan, Esq.



Transcript of testimony taken at hearing held  
November 13, 1979, including PECO Exhibit No. DPS-4;

Order by Judge Klovekorn, docketed November 13, 1979;

Governor's Energy Council's Motion for Clarification  
and Establishment of a Deadline, received November 13, 1979;

Direct Testimony of William H. Greene, Ph.D. (Statement  
No. 1 of Consumer Education and Protective Association,  
et al.), received November 14, 1979;

Transcript of testimony taken at hearing held  
November 15, 1979, including PECO Statement No. 11;

Transcript of testimony taken at hearing held  
November 20, 1979, including Consumer Advocate's  
Statement No. 1, PECO Exhibit Nos. 2, 3;

University of Pennsylvania's Petition to Intervene,  
received November 20, 1979;

University of Pennsylvania's Protest, received  
November 20, 1979;

Drexel University's Petition to Intervene, received  
November 21, 1979;

Drexel University's Protest, received November 21, 1979;

Transcript of testimony taken at hearing held  
November 21, 1979, including Trial Staff Statement  
Nos. MPB-1, RAR-1 and Trial Staff Exhibit Nos.  
MPB-1, RAR-1;

Transcript of testimony taken at hearing held  
November 27, 1979, including Consumer Advocate  
Statement No. RJR-2, Consumer Advocate Exhibit  
No. RJR-1 through 11, CANE Exhibit No. 1;

Transcript of testimony taken at hearing held  
November 28, 1979, including Thompson Statement  
No. 1, CEPA Statement No. 1, Industrial Statement  
Nos. 1 & 2, CSA Statement No. CSW-1, Thompson Exhibit  
Nos. 1, 2, 3, 4, Industrial Exhibit No. JP-1, and  
GSA Exhibit No. CSW-1;

Transcript of testimony taken at hearing held  
November 29, 1979, including CEPA Statement No. 3,  
GSA Exhibit No. CSW-2, GEC Exhibit Nos. 1, 2, 3;

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IN THE

**Commonwealth Court of Pennsylvania**

No. 1415 C. D. 1980

PHILADELPHIA ELECTRIC COMPANY,  
*Petitioner,*

vs.

PENNSYLVANIA PUBLIC UTILITY  
COMMISSION.

**REPRODUCED RECORD**  
**Volume I — Pages 1a-610a**

Petition for Review of the Order of the Pennsylvania  
Public Utility Commission, Entered May 9, 1980  
at Docket No. R-79060865.

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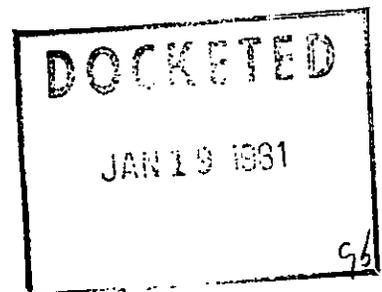
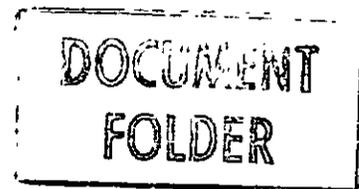


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PHILADELPHIA ELECTRIC COMPANY,	:	IN THE COMMONWEALTH COURT OF
Petitioner	:	PENNSYLVANIA
	:	
v.	:	
	:	
PENNSYLVANIA PUBLIC UTILITY	:	No. 1415 C. D. 1980
COMMISSION,	:	
Respondent	:	

CERTIFICATION OF THE RECORD

TO THE HONORABLE, THE PRESIDENT JUDGE AND JUDGES OF THE COMMONWEALTH COURT:

PENNSYLVANIA PUBLIC UTILITY COMMISSION DOES HEREBY CERTIFY THAT the attached is the record of said Commission in the matter of the Petition for Review filed by Philadelphia Electric Company from the findings, determination and order of the Commission in the Rate Investigation of Philadelphia Electric Company, Docket No. R-79060865, said record consisting of the following:

Order of the Commission dated August 9, 1979, including acknowledgment thereof;

Corrected Order of the Commission dated August 9, 1979, including acknowledgment thereof;

Memorandum from Chairman Goode addressed to Chief Administrative Law Judge Shane, dated August 9, 1979;

Letter from William P. Thierfelder, Secretary, addressed to J. L. Everett, President, Philadelphia Electric Company, dated August 10, 1979, including acknowledgment thereof;

Letter from C. K. Grubb addressed to Jack J. Aloff (acknowledging Aloff's formal complaint), dated August 21, 1979;

Letter from J. L. Everett, Philadelphia Electric Company, addressed to W. P. Thierfelder, Secretary, received August 22, 1979;

Letter from R. C. Williams, Philadelphia Electric Company, addressed to W. P. Thierfelder, Secretary, received August 31, 1979;

Transcript of testimony taken at hearing held  
September 5, 1979;

Philadelphia Electric Company Pre-Hearing Conference  
Memorandum, received September 11, 1979;

General Services Administration Prehearing  
Conference Memorandum, received September 11, 1979;

Commission Trial Staff Prehearing Memorandum,  
received September 11, 1979;

Pre-Hearing Order of ALJ Klovekorn, received  
September 24, 1979;

Testimony of witness: Henry E. Kastell, received  
October 1, 1979;

Transcript of testimony taken at hearing held  
October 2, 1979, including PECO's Statement Nos.  
13 (w/PECO Exhibit Nos. FEJ-1 through FEJ-7) and  
6, and PECO Exhibit No. FEJ-8;

Transcript of testimony taken at hearing held  
October 3, 1979, including PECO Statement No. 8  
and PECO's Exhibit Nos. HTW-1, HTW-2, HTW-3  
(Volumes I & II), HTW-4 (Volumes I & II), and  
HTW-5;

Transcript of testimony taken at hearing held  
October 4, 1979, including PECO Statement No. 14  
and PECO Exhibit No. JFB-1;

Order Consolidating Additional Complaints by  
ALJ Klovekorn, received October 5, 1979;

Transcript of testimony taken at hearing held  
October 9, 1979, including PECO Statement No. 7  
and PECO Exhibit No. 1 (Appendix A + Volume I,  
II, III (Book 1 & 2), IV);

Transcript of testimony taken at hearing held  
October 10, 1979, including PECO Statement Nos.  
2, 2-A, 4, and PECO Exhibit Nos. RCW-1 and  
RCW-1-A;

Letter from Jack J. Aloff addressed to ALJ  
Klovekorn, received October 12, 1979;

Order Consolidating Additional Complaint by  
ALJ Klovekorn, received October 15, 1979;

Transcript of testimony taken at hearing held October 16, 1979, including PECO Statement No. 9 and PECO Exhibit Nos. VSB-1, VSB-2;

Motion by Respondent for Order Determining Relevance of Proposed Testimony and Exhibit Material, received October 16, 1979;

Respondent's Request for Certification, received October 16, 1979;

Respondent's Answer to Complaint of Consumer Action in the Northeast, received October 16, 1979;

Transcript of testimony taken at hearing held October 17, 1979, including PECO Statement No. 10 and PECO Exhibit Nos. WCH-1, RCW-2;

Transcript of testimony taken at hearing held October 18, 1979, including Consumer Advocate's Exhibit No. 1;

Governor's Energy Council Petition to Intervene, dated October 18, 1979;

Transcript of testimony taken at hearing held October 23, 1979, including PECO Statement No. 5 and PECO Exhibit Nos. RCW-3, RCW-4;

Consumer Advocate's Motion to Strike, received October 23, 1979;

Memorandum in Support of Motion to Strike, received October 23, 1979;

Letter from George X. Schwartz, City of Philadelphia, addressed to W. Wilson Goode, Chairman, (w/Council Resolution No. 550), received October 23, 1979;

CEPA, et al. Motion to Strike, received October 23, 1979;

Letter from Gregg C. Sayre, Assistant Counsel, addressed to William P. Thierfelder, Secretary, received October 23, 1979;

Transcript of testimony taken at hearing held October 24, 1979, including PECO Statement No. 3 and PECO Exhibit Nos. DPS-1, DPS-2, DPS-3;

Memorandum of Lukens Steel Company, Celotex Corporation and Union Carbide Corporation, received October 24, 1979;

Letter from William P. Thierfelder, Secretary, addressed to All Parties of Record (w/Order of ALJ Klovekorn Granting, in part, and Denying, in part, Request for Certification), dated October 24, 1979;

Transcript of testimony taken at hearing held October 25, 1979, including PECO Statement No. 1 and PECO Exhibit No. JFP-1, Consumer's Exhibit No. 1;

Order Granting Motions to Strike by ALJ Klovekorn, received October 29, 1979;

Transcript of testimony taken at hearing held October 30, 1979, including PECO Exhibit No. DPS-3;

Transcript of testimony taken at hearing held October 31, 1979, including PECO Statement Nos. 12, 12-A, PECO Exhibit Nos. KWS-1, KWS-2, KWS-3;

Order Permitting Intervention of Governor's Energy Council by ALJ Klovekorn, received October 31, 1979;

Order of the Commission dated November 1, 1979, including acknowledgments thereof;

Respondent's Request for Certification, received November 2, 1979;

Memorandum of United States Steel Corporation, received November 5, 1979;

Memorandum of CEPA, et al. in Opposition to Request for Certification of Salem I Issue, received November 7, 1979;

Motion for Admission of Nicholas J. Scobbo, Jr., Pro Haec Vice, received November 7, 1979;

Petition for Clarification and Reconsideration of Order Granting Motions to Strike by Respondent, received November 7, 1979;

Response to CEPA, et al. to PECO's Petition for Clarification and Reconsideration, received November 8, 1979;

Consumer Advocate's Response to Petition for Clarification and Reconsideration of Order Granting Motions to Strike, received November 9, 1979;

Letter from Walter R. Hall, II, Esquire addressed to William P. Thierfelder, Secretary, received November 9, 1979;

Transcript of testimony taken at hearing held  
November 13, 1979, including PECO Exhibit No. DPS-4;

Order by Judge Klovekorn, docketed November 13, 1979;

Governor's Energy Council's Motion for Clarification  
and Establishment of a Deadline, received November 13, 1979;

Direct Testimony of William H. Greene, Ph.D. (Statement  
No. 1 of Consumer Education and Protective Association,  
et al.), received November 14, 1979;

Transcript of testimony taken at hearing held  
November 15, 1979, including PECO Statement No. 11;

Transcript of testimony taken at hearing held  
November 20, 1979, including Consumer Advocate's  
Statement No. 1, PECO Exhibit Nos. 2, 3;

University of Pennsylvania's Petition to Intervene,  
received November 20, 1979;

University of Pennsylvania's Protest, received  
November 20, 1979;

Drexel University's Petition to Intervene, received  
November 21, 1979;

Drexel University's Protest, received November 21, 1979;

Transcript of testimony taken at hearing held  
November 21, 1979, including Trial Staff Statement  
No. DHM-1 and Trial Staff Exhibit No. DHM-1A;

Transcript of testimony taken at hearing held  
November 26, 1979, including Trial Staff Statement  
Nos. MPB-1, RAR-1 and Trial Staff Exhibit Nos.  
MPB-1, RAR-1;

Transcript of testimony taken at hearing held  
November 27, 1979, including Consumer Advocate  
Statement No. RJR-2, Consumer Advocate Exhibit  
No. RJR-1 through 11, CANE Exhibit No. 1;

Transcript of testimony taken at hearing held  
November 28, 1979, including Thompson Statement  
No. 1, CEPA Statement No. 1, Industrial Statement  
No. 1, GSA Statement No. CSW-1, Thompson Exhibit  
Nos. 1, 2, 3, 4, Industrial Exhibit No. JP-1, and  
GSA Exhibit No. CSW-1;

Transcript of testimony taken at hearing held  
November 29, 1979, including CEPA Statement No. 3,  
GSA Exhibit No. CSW-2, GEC Exhibit Nos. 1, 2, 3;

Respondent's Memorandum Opposing Motion to Reject PECO Exhibits RCW-5&6, MWR-1 and JJC-1, received November 30, 1979;

Letter from Walter R. Hall, II, Esquire, addressed to ALJ Klovekorn, received December 3, 1979;

Consumer Advocate's Motion to Strike, received December 4, 1979;

Transcript of testimony taken at hearing held December 5, 1979, including Trial Staff Statement Nos. DLB-1, HJH-1, GFM-1, Trial Staff Exhibit No. HJH-1-A, PECO Exhibit No. 5;

Order by ALJ Klovekorn, received December 5, 1979;

Letter from William P. Thierfelder, Secretary, addressed to Walter R. Hall, II, Esquire, dated December 5, 1979;

Letter from Walter R. Hall, II, Esquire, addressed to William P. Thierfelder, Secretary, (w/Respondent's Request for Certification), received December 7, 1979;

Memorandum and Order by ALJ Klovekorn, received December 7, 1979;

Transcript of testimony taken at hearing held December 10, 1979, including Consumer Advocate Statement Nos. 2, 3, Consumer Advocate Exhibit Nos. JS-1, JS-2, JS-4, JS-5;

Letter from ALJ Klovekorn addressed to William P. Thierfelder, Secretary, received December 10, 1979;

Transcript of testimony taken at hearing held December 11, 1979, including Consumer Advocate Statement Nos. 5, 6, 7, Trial Staff Statement Nos. RWS-1, HJH-2, JMK-1, Consumer Advocate Exhibit Nos. THW-1, THW-2, THW-3, THW-4, THW-5, RGT-1, RGT-2, RGT-3;

Petition of the Delaware Valley Hospital Council, Frankford Hospital, and Children's Hospital of Philadelphia to Intervene, received December 11, 1979;

Respondent's Petition for Reconsideration of Commission Intention to Take Official Notice of CRESAP Management Audit, received December 11, 1979;

Order Granting Request for Certification by ALJ Klovekorn, received December 11, 1979;

Transcript of testimony taken at hearing held December 12, 1979, including Trial Staff Statement Nos. DMD/EMB-1, JTC-1, DWG/DH-1, EKW/REN-1, Trial Staff Exhibit Nos. DMB/EMB-1, JTC-1, DWG/DH-1-A through 1-F, EKW/REN-1(a) through 1(c), PECO Exhibit Nos. 6, 7;

Transcript of testimony taken at hearing held December 13, 1979, including Trial Staff Statement Nos. WFC-1, DLB-2, REN-2, DLB/RLP-1, CAS-1, Trial Staff Exhibit Nos. DLB-1-B, EKW/REN-1(d), WFD-1-A, DLB-2-A, REN-2-A, JWD/REN-2-B, DLB/RLP-1-A, CAS-1-A;

Motion to Introduce GSA Statement and Exhibits Into Evidence, received December 18, 1979;

Order by ALJ Klovekorn, received December 18, 1979;

Transcript of testimony taken at hearing held December 19, 1979, including Keystone Alliance Statement Nos. 1, 2, PECO Statement Nos. 14-A, 15, 15-A, 4-A, PECO Exhibit No. JFB-2, Keystone Alliance Exhibit No. 2-A;

Transcript of testimony taken at hearing held December 20, 1979, including Trial Staff Statement Nos. RWS-2, 2-B, PECO Statement Nos. 1-A, 1-B, 8-A, 7-A, CEPA Statement No. 1-A, Trial Staff Exhibit Nos. RAR-2, RAR-3, RAR-4, MPB-4, MPB-5, MPB-6, MPB-7, MPB-8, MPB-9, MPB-2, MPB-10, MPB-11, MPB-3, PECO Exhibit No. RCW-7;

Transcript of testimony taken at hearing held December 21, 1979, including University of Pennsylvania Statement No. 1, Limerick Ecology Action Statement No. 1, Consumer Advocate Statement No. 3-A, 4-A, 1-A, Trial Staff Statement Nos. DLB-3, GFM-2, SCB-1, PECO Statement Nos. 10-A, 10-B, 9-A, 12-B, 5-A, 6-A, 16, Limerick Ecology Action Exhibit No. LD-1, PECO Exhibit Nos. 4, JJC-1, RCW-5, MWR-1, DPS-5, JJC-2, Trial Staff Exhibit Nos. GFM-1-D, GFM-1-E, unidentified, Consumer Advocate Exhibit Nos. THW-6, 1 through 37, CEPA Exhibit Nos. 2 through 27;

Letter from William Shane, Chief ALJ, to All Parties of Record (notice of oral argument), dated January 2, 1980;

Letter from Walter R. Hall, II, Esquire, addressed to William P. Thierfelder, Secretary (w/Respondent's Request for Certification), received January 2, 1980;

Order Nisi of the Commission dated January 4, 1980, including acknowledgments thereof;

Letter from Walter R. Hall, II, Esquire, addressed to ALJ Klovekorn, received January 9, 1980;

Letter from ALJ Klovekorn addressed to All Parties of Record, received January 10, 1980;

Order of the Commission dated January 11, 1980, including acknowledgments thereof;

Letter from William P. Thierfelder, Secretary, addressed to All Parties of Record, dated January 23, 1980;

Letter from William P. Thierfelder, Secretary, addressed to Whom It May Concern, dated January 29, 1980;

Order of the Commission dated February 15, 1980, including acknowledgments thereof;

Recommended Decision of ALJ Klovekorn, dated February 29, 1980;

Exceptions of Jack J. Aloff to the Proposed Initial Decision Dated February 29, 1980, Prepared by Administrative Law Judge Joseph J. Klovekorn, received March 10, 1980;

Exceptions of Respondent Philadelphia Electric Company to the Recommended Decision of Administrative Law Judge Joseph J. Klovekorn, received March 12, 1980;

Exceptions of Lukens Steel Company, The Celotex Corporation and Union Carbide Corporation to Recommended Decision of Administrative Law Judge Joseph J. Klovekorn, received March 12, 1980;

Exceptions of David C. Thomsen, Complainant, received March 12, 1980;

Exceptions of United States Steel Corporation, received March 12, 1980;

Consumer Advocate's Exceptions to the Administrative Law Judge's Recommended Decision, received March 12, 1980;

Exceptions of Commission Trial Staff to Recommended Decision of the Administrative Law Judge, received March 12, 1980;

Errata Notice by ALJ Klovekorn to his Recommended Decision, received March 13, 1980;

Exceptions of Complainant City of Philadelphia to the Recommended Decision of Administrative Law Judge Joseph J. Klovekorn, received March 14, 1980;

Exceptions of the General Services Administration to the Recommended Decision of Administrative Law Judge Joseph J. Klovekorn, received March 14, 1980;

Exceptions of Complainants Consumer Education and Protective Association, et al., received March 14, 1980;

Reply to Exceptions on Behalf of Lukens Steel Company, The Delotex Corporation, and Union Carbide Corporation, received March 20, 1980;

Replies of Respondent Philadelphia Electric Company to Exceptions to the Recommended Decision of Administrative Law Judge Joseph J. Klovekorn, received March 20, 1980;

Reply Exceptions of the Office of Consumer Advocate, received March 20, 1980;

Reply Exceptions of Commission Trial Staff to Recommended Decision of the Administrative Law Judge, received March 21, 1980;

CEPA, et al. Motion to Strike, received March 21, 1980;

Philadelphia Electric Company, Actual Experience in the Future Test Year, Quarter Ended December 31, 1979, received March 24, 1980;

Reply of Complainants Consumer Education and Protective Association, et al. to Exceptions to the Recommended Decision of the Administrative Law Judge, received March 24, 1980;

Respondent's Answer to Motion to Strike, received March 25, 1980;

Letter from David C. Thomsen addressed to ALJ Klovekorn, received April 7, 1980;

Letter from Walter R. Hall, II, Esquire, addressed to Pennsylvania Public Utility Commission, received April 25, 1980;

Letter from J. L. Everett, Philadelphia Electric Company, addressed to W. P. Thierfelder, Secretary, received April 25, 1980;

Letter from Charles J. Streiff, Esquire, addressed to William P. Thierfelder, Secretary, received May 6, 1980;

Letter from Edward J. Riehl, Esquire, addressed to William P. Thierfelder, Secretary, received May 6, 1980;

Letter from Walter R. Hall, II, Esquire, addressed to Pennsylvania Public Utility Commission, received May 7, 1980;

Letter from Gregg C. Sayre, Assistant Counsel, addressed to William P. Thierfelder, Secretary, received May 9, 1980;

Order of the Commission dated May 9, 1980, including acknowledgments thereof;

Letter from J. L. Everett, Philadelphia Electric Company, addressed to W. P. Thierfelder, Secretary, received May 9, 1980;

Letter from William P. Thierfelder, Secretary, addressed to Whom It May Concern, dated May 9, 1980;

Jack J. Aloff's Comments in Regard to the Proposed Compliance of Supplement No. 15 with the Commission Order Adopted and Entered May 9, 1980, received May 19, 1980;

Letter from William P. Thierfelder, Secretary, addressed to Walter R. Hall, II, Esquire, dated May 28, 1980;

Lukens Steel Company, et al. Petition for Reconsideration, received May 30, 1980;

B. F. Goodrich Petition in Support of Industrial Complainants' Petition for Reconsideration and Petition to Intervene in Proceeding on Reconsideration, received June 2, 1980;

Scott Paper Company Petition in Support of Industrial Complainants' Petition for Reconsideration and Petition to Intervene in Proceeding on Reconsideration, received June 2, 1980;

Letter from Albert W. Johnson, III, Assistant Counsel, addressed to William P. Thierfelder, Secretary, received June 4, 1980;

Order of the Commission dated June 5, 1980, including acknowledgments thereof;

Letter from William P. Thierfelder, Secretary, addressed to All Parties of Record, dated June 10, 1980;

Letter from William P. Thierfelder, Secretary, addressed to Edward J. Riehl, Esquire, dated June 26, 1980;

IN TESTIMONY WHEREOF, PENNSYLVANIA PUBLIC UTILITY COMMISSION  
has caused its seal to be hereunto affixed, duly attested by its Assistant  
Secretary this twenty-first day of July, 1980.

PENNSYLVANIA PUBLIC UTILITY  
COMMISSION

ATTEST:

  
*Jeanne Ross*  
Assistant Secretary

## ORDER

PENNSYLVANIA  
PUBLIC UTILITY COMMISSION  
Harrisburg, PA 17120

Public Meeting held December 28, 1978

Commissioners Present:

W. Wilson Goode, Chairman, concurring  
Robert K. Bloom  
Louis J. Carter, dissenting  
Helen B. O'Bannon  
Michael Johnson, dissenting

R.I.D. 438	PENNSYLVANIA PUBLIC UTILITY COMMISSION
C. 22500 and C-R 0438008	MEENAN OIL COMPANY AND PENNSYLVANIA PETROLEUM ASSOCIATION
C. 22551	MARK P. WIDOFF, CONSUMER ADVOCATE
C. 22562	LEE FRISSELL, MAX WEINER AND CONSUMERS EDUCATION AND PROTECTIVE ASSOCIATION
C. 22588	JOHN DeMANIO
C. 22592	WILLIAM L BAUER, III
C. 22597	FRANK K. JONES
C. 22598	CLYDE SIEGFRIED
C. 22599	NICHOLAS B. KUHN
C-R 0438001	ROBERT A. CRIST
C-R 0438002	JACK J. ALOFF
C-R 0438003	CITY OF PHILADELPHIA
C-R 0438004	MIRIAM KAUTERMAN, ET AL
C-R 0438005	ADMINISTRATOR OF GENERAL SERVICES (GSA)
C-R 0438006	EMIL SABATINI AND ACTION ALLIANCE OF SENIOR CITIZENS OF GREATER PHILADELPHIA
C-R 0438007	MRS. DORCAS D. McCLELLAND
C-R 0438009	LUKENS STEEL COMPANY, THE CELOTEX CORPORATION, SCOTT PAPER COMPANY, STAUFFER CHEMICAL COMPANY, UNION CARBIDE CORPORATION
C-R 0438010	MS. FRANCES SMITH AND PENNSYLVANIA ASSOCIATION OF COMMUNITY ORGANIZATION FOR REFORM (ACORN)
C-R 0438011	GEORGE C. BACH
C-R 0438012	EDWARD A. SCHWARTZ
C-R 0438013	UNITED STATES STEEL CORPORATION
C-R 0438014	CONCETTA HENSLEY
C-R 0438015	PARK TOWNE AND MADWAY ENGINEERS AND CONSTRUCTORS (PARK TOWNE)

v.

PHILADELPHIA ELECTRIC COMPANY

The Full Text of the Commission's February 5, 1979 Order at R.I.D. 438 and Relevant Portions of the Commission's Opinion Accompanying the February 5, 1979 Order are attached to Petitioner's Brief at Appendix C.

BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission	:	
	:	
v.	:	R-79060865
	:	
Philadelphia Electric Company	:	

ORDER GRANTING MOTIONS TO STRIKE

On October 23, 1979, counsel for the Consumer Advocate and counsel for CEPA, et al., filed motions to strike PECO statement, No. 11 (testimony of Stephen A. Mallard) and all supporting exhibits and schedules and that part of PECO Statement No. 9 (testimony of Vincent S. Boyer) beginning with the last answer on page 6 and continuing up to the first question on page 9. A brief in opposition to these motions was filed by Philadelphia Electric Company. Oral argument on the motion was held October 25, 1979. The testimony sought to be stricken relates to management practices during the construction of Salem Unit No. 1.

Section 332(b) of the Public Utility Code permits the exclusion of irrelevant, immaterial or unduly repetitious evidence. After considering these motions, I conclude that the testimony in question should be stricken. In the last Philadelphia Electric rate case (R.I.D. 438) the Commission fully considered PECO's management practices with regard to

the construction of the Salem No. 1 project. The Commission after an extended discussion (see mimeo, pp. 15-17) made the following finding of fact: "that PECO exercised unacceptable imprudent management practices in regard to its engagement in, and its total abdication of responsibility for the management of the construction of the Salem No. 1 project." The Commission held PECO accountable for \$10.5 million of the costs of Salem No. 1, costs which would not have been incurred had prudent management been exercised.

The movants point to these findings and conclusions and argue that the doctrine of res judicata stops the company from relitigating this point. The doctrine of res judicata precludes the same parties from relitigating controversies which have already been finally determined by a court of competent jurisdiction. Since there is no question that the Commission has already considered this matter in R.I.D. 438, strict application of the doctrine was seem to support the movants' arguments. The company argues, however, that the doctrine of res judicata does not apply to rate cases. The company's statement is overly broad. It is true that the courts in this jurisdiction have held that certain elements of a rate case are not subject to the principles of res judicata, e.g. Duquesne Light Co. v. Pa. P.U.C., 176 Pa. Super 568 (1954); Pennsylvania Gas and Water Co. v. Pa. P.U.C., 33 Commw. Ct. 143 (1977). It makes

sense certainly that the fair value finding in one proceeding should not be binding on a subsequent proceeding; so also a rate of return finding should not preclude relitigation of this question in a subsequent proceeding. These items are constantly changing due to changed circumstances.

But when, as here, the Commission makes a finding involving certain definite factual issues, which are not subject to change, there is no reason why the doctrine should not apply. See Allegheny Steel Co. v. N.Y.C.R. Co., 324 Pa. 353 (1937). As Professor Davis states in his treatise on Administrative Law, the doctrine of res judicata should apply in varying degrees to administrative determinations. Davis, Administrative Law, §18.12. As noted above a fair value or rate of return finding should not be subject to res judicata. A policy determination, such as whether the effective tax rate or the statutory tax rate should be used in computing the tax liability of a utility which is part of a corporate entity filing a consolidated tax return, similarly is an inappropriate area to apply this doctrine. The flexibility essential to the administrative process would be lessened if policy determinations were frozen in time. But here we are dealing with a limited number of past events. The Commission considered these facts and concluded that PECO's management was unsatisfactory. The policy considerations underlying the doctrine of res judicata, i.e. finality to litigation, prevention

## 16a

of needless litigation, avoidance of unnecessary burdens of time and expense, make this specific case an appropriate one for the application of this doctrine. There is no claim of changed circumstances; indeed, much of the testimony sought to be stricken was considered and rejected by the Commission in R.I.D. 438. The company's claims, however, that it did not have time to present an adequate case in that proceeding. This argument should have been addressed to the Administrative Law Judge and the Commission in R.I.D. 438. <sup>1/</sup>

The company also claims that it must relitigate this issue in order to preserve its rights to appeal the Commission's earlier decision. This argument is unpersuasive. Since it has been held that a judgment may be final for res judicata purposes even though the time to appeal that judgment has not yet run, Reed v. Allen, 286 U.S. 191 (1932), I find no basis to support the company's position.

This decision is limited solely to those parts of the testimonies of witnesses Boyer and Mallard which involve PECO's management practices in connection with the construction of Salem No. 1. Since this question has already been considered by the Commission in R.I.D. 438, it is not at issue in this proceeding. The testimony and supporting data are, therefore, immaterial to this proceeding.

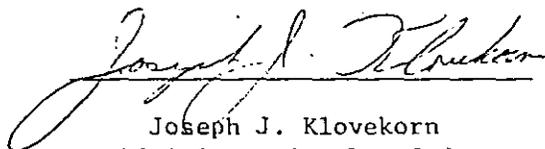
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<sup>1/</sup> It is also to be noted that there were no statutory time constraints on the parties in that case.

Therefore,

It is Ordered:

That to the extent consistent with the above Order the motions to strike filed October 23, 1979 by the Consumer Advocate and CEPA, et al., are granted.



Joseph J. Klovekorn  
Administrative Law Judge

Dated: October 29, 1979

BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission	:	R-79060865
	:	
v.	:	
	:	
Philadelphia Electric Company	:	

ORDER  
GRANTING REQUEST FOR CERTIFICATION

JOSEPH J. KLOVEKORN  
ADMINISTRATIVE LAW JUDGE

BACKGROUND

As a result of increases in the cost of constructing the nuclear units at Salem, the Consumer Advocate and the Public Advocate of New Jersey engaged Theodore Barry & Associates (TB&A), a management consulting firm, to evaluate the construction practices of Public Service Electric and Gas Company (PSE&G) on the Salem Project. PSE&G was the utility responsible for the design, construction and operation of the Salem Units. Philadelphia Electric, with a 42.59 percent interest in the units, is one of four utilities owning Salem.

The report filed by TB&A concluded that if the preferred management procedures had been adhered to in the construction of the Salem Project, a savings of from \$22 million to \$70 million could have been achieved and that PECO's possible savings on Salem No. 1 would be from \$5.9 to \$15.2 million. In addition, the report was critical of PECO's level of involvement in the project.

The report was in issue in PECO's last rate case (R.I.D. 438). Administrative Law Judge Joseph Matuschak, who presided at that investigation and heard the evidence and testimony, concluded that TB&A had showed a lack of prudent management by PECO in connection with the construction of Salem No. 1. Judge Matuschak's extended discussion is appended to this Order (Appendix A).

At the Commission's Public Meeting of December 28, 1978, Judge Matuschak's recommendation and the company's exceptions thereto were considered. Chairman Goode, Commissioner Carter, Commissioner O'Bannon and Commissioner Johnson found Judge Matuschak's recommendations to be proper. Commissioner Bloom did not. The final order of the Commission include almost verbatim

the language contained in Judge Matuschak's report.

On July 27, 1979, PECO filed for a new rate increase. As part of the supporting evidence for that rate increase PECO included testimony of Stephen A. Mallard (Statement No. 11) and Vincent S. Boyer (Statement No. 9). The purpose of Mr. Mallard's testimony<sup>1/</sup> is to "comment on the report 'Construction Management Audit of Salem Nuclear Generation Station Unit No. 1' prepared by Theodore Barry & Associates (TB&A)". Mr. Boyer, Vice President, Engineering and Research Department for PECO, testified in general on the company electric system, its need for increased generating capacity and its reserve capacity requirement. On Page 6 up to the first full paragraph of Page 9 in his prepared testimony, Mr. Boyer specifically testified concerning (a) whether the Salem No. 1 service date was deliberately delayed; (b) the cost per kilowatt of the construction of Salem No. 1; (c) the cost per kilowatt of equivalent units; (d) the reason why Philadelphia Electric did not establish an on-site presence to monitor construction of the Salem No. 1 Unit; and (e) the conclusions of the TB&A report.

On October 23, 1979, counsel for the Consumer Advocate (Appendix B) and CEPA, et. al. (Appendix C) filed motions to strike the above-mentioned testimonies. These parties argued that the Commission already considered the issue of PECO's management practices in the construction of Salem No. 1 in R.I.D. 438. The Commission found there that PECO exercised unacceptable imprudent management practices in regard to its engagement in, and its total abdication of responsibility for the management of the construction of the Salem No. 1 project. The Commission held PECO accountable, based upon the TB&A evidence and its own judgement, for \$10.5 million of expenditures in the cost of Salem No. 1 which would not have been had prudent management been

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<sup>1/</sup> Mr. Mallard is Vice President - System Planning of Public Service Electric and Gas Company.

exercised. (Order entered February 5, 1979, mimeo, P.17). The movants noted that the doctrine of res judicata is normally not applied in those areas of administrative discretion which involve resolution of issues that are based on facts and conditions that vary with time, such as rate of return or fair value. But where, as here, there has been a finding of imprudent management practices in the construction of a facility, the doctrine of res judicata should be used to eliminate from this rate case an issue which has been litigated, considered, and decided only ten months before.

The company filed a brief in opposition to the motion (Appendix D). The company argued that the doctrine of res judicata is not applicable to rate making proceedings and that it should not be foreclosed from relitigating its position before the Commission. PECO noted that the Commission has never considered itself foreclosed from reexamining earlier determinations. The company also argued that it did not have time in the last case to rebut the findings of the TB&A Report. The final report was not provided to it until late May and cross-examination of TB&A witnesses could not be scheduled until June 29, 1978, and one day prior to the close of the record.

Oral Argument was held before the undersigned Administrative Law Judge (Appendix E) and on October 29, 1979, an Order was entered granting the motions to strike (Appendix F). A request for certification was filed by the company on November 2, 1979 (Appendix G). A brief in support of the request was filed by PECO (Appendix H) and a brief in opposition was timely filed by the Consumer Advocate (Appendix I). A late-filed memorandum in opposition to the request was received from CEPA, et. al., (Appendix J).

On November 7, 1979, PECO filed a petition for clarification and reconsideration of the October 29th Order (Appendix K). An Order denying this petition is attached and made part of this Order.

REQUEST FOR CERTIFICATION

In abbreviated form the question requested to be certified is the following:

"Should the Company be precluded from introducing testimony relating to the construction of the Salem Generating Station No. 1 on the grounds of res judicata".

Under the provisions of 52 Pa. Code §3.191(b)(2) the presiding officer's responsibility when presented with a request for certification is limited. He must announce his decision giving reasons why certification has been granted or denied and stating whether a stay of these proceedings has been granted. My function therefore is limited to addressing, not the merits of the parties' positions, but simply the questions of whether this is an important question, and whether Commission resolution will prevent substantial prejudice or expedite the conduct of the proceedings. The obvious answer to both questions is yes. This certainly is a material question which will affect the conduct of this proceeding. The basic question is whether where, certain events (the circumstances surrounding the construction of Salem Unit No. 1 during the period 1968 to 1977) have been the subject of litigation in a proceeding and the Commission makes specific findings of fact on the basis of the record in that proceeding, should those same events be the subject of relitigation in a subsequent proceeding ten months later.

This will affect the conduct of this proceeding since if these events are to be relitigated, time must be spent rebutting,<sup>2/</sup> arguing, briefing and resolving this issue; time the parties, the Administrative Law Judge and the Commission could spend investigating the myriad of new issues presented in this proceeding. For these same reasons resolution of this issue by the Commission at this time would expedite the conduct of this proceeding.

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<sup>2/</sup> Unfortunately, due to time restrictions, cross-examination on the testimony which is the subject of these motions, must be held. Otherwise, in the event the October 29th Order is reversed by the Commission, the time schedule set up for this hearing would have been seriously disrupted.

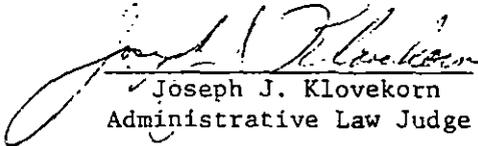
THEREFORE,

IT IS ORDERED:

1. That the following question be certified to the Commission  
for resolution:

"Should the Company be precluded from introducing  
testimony relating to the construction of the Salem  
Generating Station No. 1 on the grounds of res judicata."

2. That, pending resolution of the question certified in  
Ordering Paragraph 1, the effect of the October 29, 1979 Order granting  
Motions to Strike is stayed.

  
Joseph J. Klovekorn  
Administrative Law Judge

Dated: Dec. 11, 1979

Pennsylvania Public Utility Commission  
v.  
Philadelphia Electric Company

Order Denying Request for  
Clarification and Reconsideration

On October 29, 1979, the undersigned Administrative Law Judge granted motions filed by the Office of Consumer Advocate and CEPA, et al. to strike certain testimony and supporting data relating to PECO's management practices during the construction of the Salem Unit No. 1. The company filed a request to certify the question of whether this testimony should be stricken to the Commission. While this request was pending, the company filed a petition for clarification and reconsideration. Answers to that petition have been received from the Consumer Advocate and CEPA.

Petition for Clarification

The petition notes that the October 29th Ruling is limited to those parts of the testimonies of witnesses Boyer and Mallard which involve PECO's management practices in connection with the construction of Salem No. 1. The company attempts to distinguish between PECO's part in the management of the project's construction and PSE&G's management of the Salem project's construction. The company argues that it is precluded by the ruling from presenting testimony as to PECO's management practices, not from presenting testimony as to the management or construction practices of PSE&G on the Salem Project.

PECO states that it does not contend that it did not have full and adequate opportunity to litigate issues related to its own management of the Salem construction project. It contends, however, that it did not have an opportunity to present testimony on PSE&G's management of the project.

The Consumer Advocate points out that as co-owner of the station, PECO is and was responsible for the acceptability of the construction management practices of PSE&G as well as itself. The Consumer Advocate also notes that both aspects of the construction management were fully litigated in R.I.D. 438 and that PECO did not object to the audit in that case on the grounds that PSE&G could not prepare a response.

CEPA takes the position that the quality of PSE&G's management is not and has never been an issue before the Commission. As co-owner PECO had the responsibility to ensure proper management safeguards for efficient operation. CEPA argues that PECO failed to exercise the management responsibility of a joint owner by ensuring that PSE&G fulfilled its responsibility under the joint ownership agreement and that this was the finding of the Commission in R.I.D. 438. This finding is res judicata here.

After reviewing the petition and the responses thereto, as well as Judge Matuschak's initial decision and the Commission's Order in R.I.D. 438, I conclude that the company's requested clarification should not be made. A plain reading of the Commission's Order in R.I.D. 438

shows that the Commission considered the evidence presented there and concluded that there was a lack of prudent management in connection with the construction of Salem No. 1; that PSE&G was in charge of the construction; and that PECO, as a co-owner, exercised unacceptable imprudent management practices in regard to its engagement in, and its total abdication of responsibility for the management of the construction of Salem No. 1. In other words the Commission considered both aspects of this question - the construction practices of PSE&G and the supervisory role of PECO. Since, however, the Commission's only interest in this matter involves PECO's action or rather inaction, the Commission in R.I.D. 438 referred to this entire matter in a short-hand way as involving PECO's management practices.

#### Petition for Reconsideration

The company also requests that, for the reasons stated in its brief supporting its request for certification, the October 29th ruling be reconsidered.

In that brief the company ably and extensively argues that the rule of res judicata is inapplicable in rate proceedings. Before turning to a discussion of the principles involved, we should first examine the material which is the subject of this controversy. Section 332 of the Public Utility Code (66 Pa. C.S. 1332) provides that the Commission shall as a matter of policy provide for the exclusion of irrelevant, immaterial or unduly repetitious evidence.

## Testimony of Witness Boyer

The part of Witness Boyer's testimony that is at issue here consists of a series of questions concerning Salem No. 1. The first question concerns whether or not the service date of Salem No. 1 was deliberately delayed. In R.I.D. 438 the Commission was unable to conclude, based upon the evidence, that there has been any deliberate delay in the completion (mimeo, pp. 17-20).

Mr. Boyer then compares the cost per kilowatt of the construction of Salem No. 1 and one-half of the common plant (\$670 per kilowatt) with the unit costs of other pressurized water reactor units that were completed at or about the same time as Salem No. 1, as shown below:

- Q. Have you compared that unit cost with the unit costs of other pressurized water reactor units that were completed at or about the same time as Salem No. 1?
- A. Yes. For purposes of comparison we selected large generating units which were first units of a multiple unit plant and went in service about the same time as Salem. The costs are for the first unit and one-half of common plant.

The 906 MW Davis-Bessie Unit No. 1 went into commercial operation November 17, 1977 with a cost of \$772 per kilowatt.

The 861 MW Farly Unit No. 1 went into commercial operation August 9, 1977 with a cost of \$880 per kilowatt.

The 852 MW Beaver Valley Unit #1 went into commercial operation on November 1, 1976 with a cost of \$686 per kilowatt.

The 777 MW St. Lucie Unit No. 1 went into commercial operation on December 21, 1976 with a cost of \$630 per kilowatt.

In comparison with these four plants, Salem No. 1 cost is reasonable for construction of a large PWR which went into service about the same time as the other four plants. Only one unit had a lower cost per kilowatt.

In R.I.D. 438, this same information involving the same plants was made part of the record in Exhibit PT-22, p. 1. The Commission considered this evidence and found it unpersuasive on the issue of PECO's management practices (mimeo, p. 17) as shown below:

In our view, the evidence presented by TB&A shows a lack of prudent management in connection with the construction of Salem No. 1. PECO offered no testimony through PSE&G to rebut TB&A's findings. Instead, in defense, PECO offered evidence of a comparison of the Salem No. 1 per kilowatt cost to other nuclear projects in Northeast United States, as proof that the overall installed costs per kilowatt generated by Salem No. 1 were within the range of other comparable plants. TB&A admits that such comparison shows that Salem No. 1 costs are in line with other Northeast plants, but avers that such comparison does not provide the best evidence of the appropriate and proper cost for Salem No. 1. While such comparable evidence submitted by the Company has some probative value, it is not of sufficient weight to override the TB&A evidence. Such comparisons do not reflect the unique costs of environment protection, labor and other variable aspects in building a particular nuclear plant.

Mr. Boyer next discusses the reasons why PECO did not establish an on-site presence to monitor construction of the Salem No. 1 Unit:

- Q. Did Philadelphia Electric establish an on-site presence to monitor construction of the Salem No. 1 Unit? If not, why not?
- A. No. Such a presence would have served no purpose and would have yielded no information not otherwise being obtained from our monitoring the progress and cost of Salem's construction. Since only one organization can be in charge, such a presence would have had a disruptive effect on the Public Service Electric and Gas Company construction organization. In addition, a number of highly trained personnel would have been required. Our skilled personnel were engaged in the construction and management of Peach Bottom for which we are responsible.

In R.I.D. 438 Witness Edward Kistner, Chief Mechanical Engineer in PECO's Engineering and Research Department was asked the following question and gave the following response (Resp. Statement 14, p. 9):

- Q. In their report concerning the Company's monitoring of the Salem project, TB&A asserts that the Company should have established a continuing presence at the Salem construction site. Please comment upon this opinion.
- A. As noted in the TB&A report, we considered but rejected the establishment of an on-site presence at the Salem construction site. In our view, such a presence would have served no purpose and would have yielded no information not otherwise being obtained in our monitoring of the progress and cost of Salem construction. Further, we believe such a presence would have had a disruptive effect on the PSE&G construction organization. Only one organization can be in charge. Moreover, an effective presence would have required a significant number of highly trained construction personnel. PE's personnel were, of course, engaged in the management of the plant for which we were responsible. It was also our view that the establishment of an internal audit function as proposed by TB&A would have served no useful purpose.

As can be seen, these statements are virtually identical. The company's reasons for rejecting an on-site presence to monitor construction of the Salem No. 1 Unit were, therefore, before the Commission in R.I.D. 438.

Finally, Mr. Boyer discusses the conclusions of the Theodore Barry & Associates, Inc. report:

- Q. In the spring of 1978 Theodore Barry & Associates, Inc. (TB&A) reviewed and evaluated the construction of Salem No. 1 from a management point of view. Are you familiar with the report of TB&A?
- A. Yes. The report asserted that had the "preferred management practices" identified by that consultant been employed in Salem's construction, savings in a range of between \$22 million and \$70 million out of a total Salem station cost of \$1.21 billion could have been realized (i.e. between approximately 1.8% and 5.8% of

the total cost). PE's share of these savings according to TB&A range from \$5.9 million to \$19.25 million.

Q. Do you agree with these conclusions?

A. No. TB&A's findings are not significant. I would be surprised if a consultant who spent as much as 150 man days reviewing the construction of a billion dollar plant over an extended period of time had failed to find methods for saving at least a few percent of the projects' costs. Hindsight is always better than foresight. At the time the plant was under construction, Management extended every effort to minimize the cost. To expect perfect management of a construction project of this size is unreasonable. The Public Utility Commission of New Jersey agrees with me and has summarily rejected the report.

PECO's Exceptions to the Commission in R.I.D. 438, pp. 21-22, contains the following statement:

An initial reaction to these recommendations is that it would have been extremely surprising if a paid consultant, who had expended as asserted 150 man days reviewing the construction of a billion dollar plant whose planning and construction extended over a twelve year period, had failed to find savings of from 1 to 5% of the project's cost.

The purpose of this exercise is to show that the Commission had before it when it decided R.I.D. 438 the facts which Mr. Boyer seeks to present here.

*Testimony of Mr. Mallard*

Mr. Mallard, Vice President - System Planning of Public Service Electric and Gas Company is being presented by PECO to comment on the Theodore Barry report. It is obviously presented in response to the

response to the comment in Judge Matuschak's recommended decision and in the Commission's Order that PECO offered no testimony through PSE&G to rebut TB&A's findings.

#### Application of Res Judicata Principles

Simply stated the doctrine of res judicata holds that when ultimate and controlling issues have been decided in a prior proceeding in which the parties actually had an opportunity to appear and assert their rights, then these issues ought not to be litigated again. See, e.g., Wallaces' Estate, 316 Pa. 148 (1934).

Professor Davis in his treatise on administrative law notes that this principle arose from judicial proceedings where the facts involved are static and contrasted this with administrative proceedings where fluid facts and shifting policies are more the norm. Davis, Administrative Law 118.01. He also noted that administrative proceedings are often summary and the parties unrepresented by counsel. Ibid.

These are some of the reasons why the doctrine has not and should not be applied full-blown to administrative proceedings. But they are not reasons for excluding the doctrine in all cases. Rather, as Davis states "the sound view is therefore to use the doctrine of res judicata when the reasons for it are present in full force, to modify it when modification is needed, and to reject it when the reasons against it outweigh those in its favor". Davis, §118.02 (footnote omitted).

The questions which must be considered therefore are: (1) whether the requirements for res judicata are present here and, if so, (2) whether this is a proper case for application of this principle.

With regard to the first question, the active parties litigating this issue are the same: Philadelphia Electric and the Consumer Advocate actively contested this issue in both R.I.D. 438 and in this proceeding. The cause of action is the same, i.e., a rate proceeding. The subject matter is the same: whether PECO exercised unacceptable, imprudent management practices in regard to its engagement in the construction of the Salem No. 1 project. The issue was fully litigated. In this respect, however, there is some controversy. PECO states in its petition that it "does not contend that it did not have full and adequate opportunity to litigate issues related to its own management of the Salem construction project." (p. 3). PECO argues, however, that due to the unavailability of necessary PSE&G personnel at R.I.D. 438, PECO has not had a full and fair opportunity to litigate the question of PSE&G's management activities.

PECO made no such argument to the Administrative Law Judge in R.I.D. 438. The first statement which would indicate that PECO did not have an opportunity to litigate this issue can be found in its Exceptions to the Commission. In footnote 13 on page 25 of that document PECO states:

"The ALJ states that "it is significant that PECO offered no testimony through PSE&G to rebutt TB&A's findings." (ALJ Order, p. 36). The only significance which would be attached to this fact is the lateness with which the TBA audit was provided to PECO and PSE&G, i.e. late-May. The TBA report is also the subject of a proceeding before the New Jersey Commission involving PSE&G. Due to the late date upon which the TBA report was provided and the hearing schedule in the New Jersey proceeding which did not require the presentation of PSE&G rebuttal testimony prior to August, 1978, a PSE&G witness could not be offered without approximately a month's delay in the then scheduled June close of the record in this case. Such a delay was considered unjustified in light of the lack of substantially to the TBA findings."

From that statement, I conclude that PECO was not prevented from answering TB&A's charges, but rather made a conscious decision not to ask for a delay in the hearings because it did not believe the report's recommendations had merit. <sup>1/</sup> The doctrine of res judicata applies even in this situation. See, e.g. Fleming v. Strayer, 367 Pa. 284 (1951).

Having found that the requirements of res judicata are met, the next question is whether this is an appropriate case to apply them. The cases cited by the company correctly point out that the doctrine is

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<sup>1/</sup> Under the Public Utility Law at that time, PECO would not have suffered any financial detriment by asking for an extension of time to reply to TB&A's allegations. Any rate increase would have been retroactive to July 4, 1978.

inappropriate for such aspects of ratemaking as determining fair value, level of revenues or rate of return. These are issues the determinations of which are based on constantly fluctuating facts. Similarly the doctrine is inappropriate for those aspects of ratemaking which are basically policy determinations such as whether to allow compensating bank balances in working capital calculations or whether to flow through the state tax benefits of liberalized depreciation. The genius of the administrative system is that such policy questions may be constantly re-examined. In this respect, the agency is acting in a quasi-legislative manner.

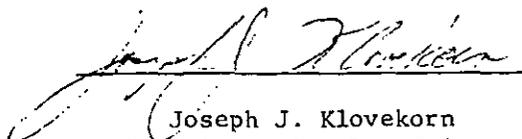
But here, as explained in the October 29th order, we are not dealing with any policy issues or with a constantly changing set of fact. We are dealing solely with past events - the management practices of PECO during the period 1968-1977. The Commission, acting as a finder of fact, determined less than a year ago that PECO exercised unacceptable, imprudent management practices and as a result PECO is responsible for \$10.5 million of expenditures in the cost of Salem No. 1 which would not have been made had prudent management been exercised. This should not be the subject of relitigation.

The purpose of this doctrine is to prevent endless litigation of the same set of facts. If that be the case, this is a perfect opportunity to apply it. We are faced with a limited amount of hearing

time, but with much to do. The Commission has required detailed investigation into a myriad of issues. In addition to the issues into which the Commission has requested an inquiry, we are also required to investigate and consider the rate structure issues set forth in the Public Utility Regulatory Policies Act. If we are to deal adequately with these issues affecting the future, we must be content to let past determinations rest. The issue here is narrow and limited should a recent Commission finding of fact based on a thorough analysis of a limited set of past events be binding in this proceeding or should this finding be ignored - treated as if it were never made - and valuable time spent rearguing the import of these same events. Reason compels that we forego relitigation in favor of analyzing and reflecting on new manners. For these reasons, the company's request for reconsideration is denied;

THEREFORE,

IT IS ORDERED: That the Petition for Clarification and Reconsideration filed on November 7, 1979 by Philadelphia Electric Company is denied.

  
Joseph J. Klovekorn  
Administrative Law Judge

Dated: Dec. 10, 1979

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PENNSYLVANIA  
PUBLIC UTILITY COMMISSION  
Harrisburg, PA 17120

Public Meeting held February 15, 1980

Commissioners Present:

Susan M. Shanaman, Chairman  
Michael Johnson  
James H. Cawley  
Linda C. Taliaferro

Pennsylvania Public Utility Commission  
v.  
Philadelphia Electric Company

R-79060865

O R D E R

The Full Text of the Commission's Order of February 28, 1980  
is attached to Petitioner's Brief at Appendix B.

BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission	:	R-79060865
Jack J. Aloff	:	C-R0865001
United States General Services Administration	:	C-R0865002
Consumer Education and Protective Association	:	C-R0865003
Joseph Fierstein	:	C-R0865004
Arthur Schwartz	:	C-R0865005
David C. Thomsen	:	C-R0865006
ACORN	:	C-R0865007
Walter W. Cohen, Consumer Advocate	:	C-R0865008
William J. Coopersmith	:	C-R0865009
United States Steel Corporation	:	C-R0865010
First Chester Corporation	:	C-R0865011
The City of Philadelphia	:	C-R0865012
Lukens Steel Company, et al	:	C-R0865013
Consumer Action in the Northeast	:	C-R0865014
Action Alliance for Senior Citizens of Greater Philadelphia, Inc. and Lillian Holliday	:	C-R0865015
Louise Dufour	:	C-R0865016
Eleanor W. Inouye, et al.	:	C-R0865017
	:	
v.	:	
	:	
Philadelphia Electric Company	:	

Recommended Decision

(Subject to Commission Approval)

JOSEPH J. KLOVEKORN

Administrative Law Judge

February 29, 1980

VII. LIMERICK NUCLEAR GENERATING STATION

In the late 1960's PECO began planning the construction of the Limerick Nuclear Generating Station (Units 1 and 2), a 2110 MW facility located near Pottstown, Pennsylvania. At that time it was anticipated that the units would be in service in 1975 and 1977 (Tr. 3801). In mid-1974, PECO received its permit enabling it to begin construction of the plant. As a result of the delay in obtaining the construction permit, the estimated service dates of Units 1 and 2 were pushed back to 1981 and 1982 respectively. In 1975 the company pushed back the in-service date of Unit 2 until 1983. In 1976, the in-service dates of both units were slipped until 1983 and 1985. In 1978, a further delay, until 1985 and 1987 was announced.

In its Order of August 9, 1979 the Commission directed that the question of whether PECO has been imprudent in its actions in constructing new generating plants be explored. Since the only major generating plant under construction is Limerick, <sup>21/</sup>the question resolves itself into whether the delays associated with Limerick have been prudent.

First, and foremost, for purposes of this proceeding, it should be noted that Limerick has no impact on the rates to be set here except as far as the need to raise money in the capital markets affects

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21/ Salem No. 2 is expected to go on line in the fall of 1980.

PECO's overall capital costs. <sup>22/</sup> Second, the controversy over Limerick has been divided into three aspects: (1) have the delays associated with the construction of Limerick been the result of improvident management decisions; (2) should the Limerick plants be completed; and (3) if they are to be completed should the construction be accelerated so as to put these plants in service by 1983 and 1985.

PECO witness Paquette testified that the first delays in the construction schedule were due to delays in receiving the necessary construction permits. <sup>23/</sup> This set back the time of completion from 1976-1977 to 1979-1980 (PECO Statement 1-B, p.1). Beginning in 1974 and through 1978, changes in this time schedule were made due to the combination of financial constraints and reduced load forecasts. The financial constraints were generally related to PECO's claimed inadequate earnings and interest coverage ratios and the reduced load forecasts were caused generally by increased energy prices. PECO states that its decision of May 1978 to extend the construction schedule by 2 years was made primarily because it was management's judgment that the near-term reduction in the required rate increases for present customers justified the higher costs which would result from the delay. Data at that time, according to

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<sup>22/</sup> No party has been able to quantify this impact, if any (Tr.3406).

<sup>23/</sup> The dates of and reasons for the various delays are shown in Appendix F to this decision.

Mr. Paquette, indicated that a postponement of one year would save customers about \$189 million in the first year and would increase rates \$40-\$50 million per year for the next six years and by a lesser amount thereafter. It would take, therefore, between 4-5 years to affect the first year's saving. He noted that earlier decision to delay the estimated service dates of the plant were also based on comparable data which indicated that the short run economics benefitted the customer (PECO Statement 1-B, p.2).

The decision to delay Limerick by two years reduced PECO's construction spending by \$270 million over the period 1979-1981, which kept the level of new financings down. PECO notes that if it had kept to the 1974 schedule, this rate case would include Limerick No. 1 in rate base and PECO would be asking now for \$300-\$325 million instead of \$123 million. Another increase would have to be sought in 1980 to reflect Unit No. 2, amounting to \$200 million (PECO Statement 1-B, p.3).

Trial Staff presented Dr. Birx who reviewed the history of Limerick and concluded that it was not prudent to delay operations at Limerick (Trial Staff Statement No. DLB-2, p.4). He disputed the company's contention of savings to present ratepayers, relying on a study prepared by the Pennsylvania Power & Light Company (PP&L) in March 1978 based on 1977 data. The report was eventually included as an addendum to PP&L's Susquehanna Environmental Report filed with the NRS (tr. 3404). This report shows that for the PP&L Susquehanna plant, the short term saving

over the first years is far exceeded by the additional costs over the life of the plant. Dr. Birx noted that without the delays ordered by management, Limerick Unit No. 1 would have been projected to come on line in 1981 at a total cost for both units ranging from \$1.29 billion to \$1.74 billion. The plant is now scheduled to cost \$3.118 billion (Trial Staff Statement DLB-2, p.6). Dr. Birx states that management is responsible for the delay and resultant cost increases and, therefore, the costs created thereby should be borne by the stockholders. He recommended that the AFDC charges associated with these delays, amounting to \$554 million (Trial Staff Statement No. REN-2, Schedule 5), be eliminated from the rate base at the time Limerick becomes part of the plant in service. He also recommended that the increased energy cost caused by the delays be eliminated as part of the allowed revenue requirement and/or energy clause and that the effects of the extended investment period on the cost of capital be quantified and also eliminated as part of the allowed revenue requirement (Trial Staff Statement No. DLB-2, p.7).

PECO criticizes Dr. Birx' recommendation as based on a misunderstanding of the basis of the company's 1976 and 1978 decisions. The decision was based, the company states, on both a lower projected load growth, as Dr. Birx notes, and because of the company's weak financial position (PECO Brief, p. 25-26). It also criticizes Birx' reliance on the PP&L study to support his contention that there can never be

benefits to ratepayers as the result of delay in the construction of a generating unit. PECO points out that the situation apparently existing at the time of PP&L's report, that the fuel cost savings as a result of maintaining Susquehanna's then scheduled in-service dates would offset the additional capital costs required when the plant went into commercial operation, is the same situation as exists now in 1980 with respect to Limerick. But, PECO states (PECO Brief, pp. 26-27), that was not the situation in May 1978 when the plant's present construction schedule was established. At that time, according to the company, the first year carrying charges on Limerick exceeded estimated fuel cost savings by some \$189 million. The PP&L study is not probative, the company states, as to the reasonableness of PECO's decision in light of the differences between the two companies with respect to Interconnection sales. PP&L is a substantial seller on the interchange; PECO is not. <sup>24/</sup>

Upon reviewing the record in this proceeding I recommend that the Commission defer any decision on whether PECO's decisions to push back completion of Limerick, taken during the period 1975-1978, were

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<sup>24/</sup> The PP&L study states that the delay would result in more generation from higher cost generating units, increased purchases and a reduction in interchange sales. In the delay case, the nuclear capacity provided by the Susquehanna units would not be available to augment PP&L's base load. PP&L would have less other generation available which, even though more expensive than nuclear for PP&L, would still have an economic advantage in the power for interchange sales (Trial Staff Statement No. DLB-2, Schedule 3).

prudent until such time as the plants are ready to assume commercial operation. This recommendation is based on two primary grounds. First, the benefits and the detriments of accelerated versus delayed construction would require substantial economic cost studies. Such studies have not been done here due, no doubt, to the time constraints imposed by the seven month statutory period (Tr. 3395-97, 3405). In addition, the adjustments proposed by Trial Staff cannot be quantified with the precision necessary to warrant adoption. For example, the proposed elimination of \$554 million from rate base when the plant goes into service in 1987 relies on estimates of inflation rates for the period 1981-87 (Trial Staff Statement No. REN-2, Tr. 3399) and, therefore, is speculative. The second recommendation, elimination of any increased energy cost due to the delays, cannot be calculated at this time (Tr. 3398-99). Similarly, the proposed adjustment reflecting the effects of the extended investment period on the cost of capital has not been quantified (Tr. 3406-07).

Finally, these adjustments, as previously noted, are all prospective and would not affect the rates set here. At the most any Commission decision would simply be advisory and not binding on any future Commission. That future Commission would accept or reject these advisements in light of conditions existing then. Any decision now would serve no useful purpose, but rather might be perceived as a cause for instability in the capital markets. This would only result in higher costs to PECO's present ratepayers without necessarily benefitting future ones.

The second issue concerning Limerick is whether work on the plant should continue. It should be noted again that this Commission lacks jurisdiction over the planning and siting of electric generating stations. As a result a utility may plan and construct a generating station such as Limerick without the need for the express approval of this Commission. The first time that the utility must seek this Commission's approval of the used and useful nature of a facility is in the rate proceeding subsequent to its being placed in service. While this Commission also has no specific jurisdiction also over the selection of the type of fuel used to generate the electricity, four witnesses testified that Limerick should not be completed as a nuclear plant.

The first witness, Alan J. Noguee is an employee of and a witness for the Keystone Alliance (Keystone Alliance Statement No. 1).<sup>25/</sup> Mr. Noguee's formal educational training was in the field of psychology. After leaving graduate school in 1973, he edited a magazine until 1977. At that time he became interested in the energy field (Ibid., p.2). The purpose of his testimony is to question whether PECO's decision to construct and to continue to construct the Limerick nuclear station was prudent. Mr. Noguee concludes that the project should be cancelled. Mr. Noguee calls for independent studies to investigate what combination

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<sup>25/</sup> The Keystone Alliance is an organization of citizens opposed to nuclear power.

of conservation, wind, solar and coal generation would be most feasible for the PECO service area (Ibid., p. 5). As the basis for his conclusion Mr. Nogee uses data from a 1978 PECO publication <sup>26/</sup> which shows an estimated capital cost for nuclear power of \$1340 per kw in 1988. This would indicate a capital cost of Limerick of \$3.2 billion (Tr. 3487).

Mr. Nogee, however, notes that in his opinion the cost is likely to approach \$3.5 billion. He also points out that safety changes required as a result of the nuclear accident at Three Mile Island may result in even higher costs (Keystone Statement No. 1, supra, p.7). The witness also attacked PECO's estimate of fuel costs in 1988 and its assumption that a nuclear unit will attain and operate at a 70% capacity factor (Ibid, p. 9-11). As a result of his criticisms of PECO's estimated 1988 cost of nuclear generation, Mr. Nogee, using a variety of assumptions more congenial to his point of view, calculates the cost of nuclear generation to be between 8.0 cents per kwh to 10.7 cents per kwh. This, he compares to the company's estimate of wind generated electricity at 8.0 cents per kwh (Ibid., p. 12). <sup>27/</sup> He believes, however, that PECO's estimate of wind generation costs may be too high since it does not

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<sup>26/</sup> This document is entitled "Electric Power Generation Economics" by V. S. Boyer.

<sup>27/</sup> Mr. Nogee believes that even his revised estimate of the cost of nuclear generation may be too high since it does not include government subsidies to the nuclear industry and health costs (Ibid, p.13).

consider technological advances. In addition, Mr. Noguee suggests that, alternatively, Limerick be cancelled and the remainder of the funds which would have been spent on the project be used for conservation and solar investment (Ibid., p. 16). He admitted, however, that he has not developed such a plan or calculated its economic ramifications (Ibid., p. 17). Finally he suggested a referendum in the PECO service territory on whether work on Limerick should be continued.

Mr. Noguee's testimony would be of primary interest if this Commission were determining how Limerick should be built. <sup>28/</sup> But we are not. In addition Mr. Noguee's figures fail to reflect certain basic elements necessary to make a proper comparison. For example, the costs of a storage system for the generation powered by wind have not been included (Tr. 3495). Finally, Mr. Noguee did not know the average wind flow in the Philadelphia area (Tr. 3498). Mr. Noguee's testimony, while interesting, lacks the probative value needed to make an adjustment of the magnitude proposed. But this assumes, however, the authority to direct PECO to halt work on Limerick, an assumption which is not based on any cited provisions of the Public Utility Law. <sup>29/</sup> Mr. Noguee's testimony does not show that the company's initial decision to go nuclear, made approximately a decade ago, was in error, much less an abuse of management discretion.

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<sup>28/</sup> As noted above, however, the Commission lacks such jurisdiction.

<sup>29/</sup> Trial Staff apparently questioned whether we have authority to direct PECO to accelerate construction (Tr.3407).

Marc Breslow, a teacher at the Community College of Philadelphia, also testified for the Keystone Alliance (Keystone Alliance Statements No. 2 and No. 2-A). He also called for the halt of construction at Limerick, attacking the plant on safety and cost grounds (Keystone Statement No. 2-A, p.2). Instead, he argued that the funds be spent for conservation.

Louise Dufour, Executive Coordinator of Limerick Ecology Action, testified for that group (Limerick Ecology Action Statement No. 1). Limerick Ecology Action is an organization opposed to PECO's decision to build the nuclear facility at Limerick. Its objectives include seeing that Limerick never operates as a nuclear plant and phasing out all nuclear plants. Much of Ms. Dufour's testimony is a general attack on nuclear energy. Ms. Dufour stated that she has no direct involvement either in capacity planning for an electric utility or with respect to the operations of a nuclear plant. Her statement is based on knowledge acquired from reading periodicals, journals and reports (Tr. 4072-4073). Ms. Dufour states that PECO has excess capacity, that due to delays Limerick is becoming more expensive to construct and that it is poorly sited (Limerick Statement, supra, pp. 16-20).

Finally, OCA witness Shakow testified that the Limerick project was not cost effective and should be cancelled. The OCA apparently does not believe that the action recommended by its witness is fully warranted

on this record since, on brief, it requests not the suspension of the project but rather a further investigation into the whole area of generation planning, especially as it relates to Limerick, to see whether PECO's construction program is appropriate (OCA Brief, pp. 44-46).

Before discussing the positions of these parties, one fact should be made clear in our minds - at this point over \$1.2 billion has been invested in the facility. Limerick is there; it cannot be ignored.

Dr. Shakow's position is that PECO has an excessive proportion of baseload relative to cycling and peaking facilities and, within the baseload category, a preponderant emphasis on nuclear plants. He also claims that PECO has excessive levels of reserve capacity (OCA Brief p. XV; OCA Statement No. 4, p.3). He estimated that by 1992 three 300 MW coal-fired units and a 600 MW coal-fuel plant would be necessary in place of Limerick (OCA Statement No. 4, p. 4). <sup>30/</sup> This assumption was based also on a reserve capacity level of between 14 and 22 percent (OCA Statement No. 4, p.4). <sup>31/</sup>

Dr. Shakow detailed in tabular form eight possible cases making various assumptions as to load growth, plant cost and capital costs. The purpose of each of these cases as can be seen below is to

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<sup>30/</sup> PECO notes that Dr. Shakow's conclusion that PECO's plan is based in favor of base load generation is "curious" in that he recommends the addition of 1500 MW of base load coal plant (Tr.1982, PECO Brief, p.47, fn.14).

<sup>31/</sup> The appropriate reserve capacity will be discussed below.

include various assumptions and determine what the optimal new capacity would be under those assumptions (Tr. 2935). This table is shown on page 69. As Dr. Shakow testified the load growth assumptions here do not affect the selection of the appropriate plant (OCA Statement No. 4, p.19; Tr. 2909, 2936). Under the incremental capital costing analysis, decisions would be made on the basis that certain investments have been made and cannot be reversed. As PECO notes, this requires recognition that it has already invested \$1.2 billion in Limerick (PECO Brief, p.50; Tr. 2936). Under this methodology, we would consider whether to go ahead with Limerick on the basis of which would be cheaper given the fact that Limerick now is half-completed.

Under the full costing method, supported by Dr. Shakow, these already incurred or sunk costs would be ignored and the unit would be judged on the basis of its total cost i.e. as if we were starting from the beginning. This, he argues, more accurately reflects the position of ratepayers who are not supporting the Limerick investment at this time. This assumes that the company will recover its sunk investment in the Limerick unit if it is cancelled (Tr. 2943). Although supporting the full cost methodology, Dr. Shakow has made no study of the potential for selling the Limerick units or for the possibility of a tax write-off (Tr. 2943; 2945-47). Dr. Shakow did state that if the Commission should allow the company to recover its existing investment, there would be justification for using incremental costing instead of full costing (Tr. 2945-46).

## OPTIMAL 1992 BASELOAD PLANT CONFIGURATION UNDER ALTERNATIVE ASSUMPTIONS

Case #	Load Growth	Plant Cost	Capital Cost	Optimal New Capacity	Optimal Reserve Margin (Approximate Range)
1	PECO	PECO	Full	2400 Mw, Coal*	14 - 22%
2+	PECO	PECO	Incremental	Limerick #1 Limerick #2 600 Mw, Coal	30%
3	PECO	ESRG-HIGH	Full	1500 Mw, Coal	14 - 22%
4	ESRG	ESRG-LOW	Full	600 Mw, Coal	14 - 22%
5	PECO	ESRG-LOW	Full	1500 Mw, Coal	14 - 22%
6	PECO	ESRG-LOW	Incremental	1500 Mw, Coal	14 - 22%
7++	ESRG	ESRG-LOW	Incremental	600 Mw, Coal	14 - 22%
8	ESRG	PECO	Incremental	Limerick #1 Limerick #2	30%

Source: ESRG Model

\* All coal units listed in this column are 300 Mw units.

+ PECO Planning Case.

++ Base Case.

With respect to the cost estimate of the plant, PECO claims that the completed Limerick station will cost \$3.1 billion on a 1985/1987 schedule. OCA's estimates appear to be in the range of \$4.2 billion to \$4.9 billion (Tr. 2959). <sup>32/</sup> On surrebuttal, Dr. Shakow gave a new cost estimate for Limerick of \$7 billion. The company notes that this figure lacks credibility since the Limerick plant is already 50% complete at approximately 17% of Dr. Shakow's estimated cost (PECO Brief, p.52).

One last element must be considered and that is the effect on PECO if the Commission adopted the recommendation that construction at Limerick be halted. PECO witness Paquette testified that if the plant were terminated and PECO's investment could not be recovered by its sale, an assumption which seems reasonable on this record, <sup>33/</sup> PECO's capital loss after taxes would amount to \$700 million. <sup>34/</sup> At the present time PECO has a net work or book equity investment of about \$1.6 billion; a \$700 million write-off would reduce the value of the company's shares by 44%. This would, in effect, preclude PECO from access to the capital markets (Tr. 3814-15).

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<sup>32/</sup> PECO also notes that this includes a \$1 billion overstatement due to AFUDC calculation errors (OCA Statement 4, Exhibit DS-E, Sheet 5, PECO Statement 15, pp. 20-22).

<sup>33/</sup> Tr. 2943; 3784-85.

<sup>34/</sup> This assumes that PECO could get a tax write-off. At the present time PECO has no taxable income to offset such a loss (Tr. 3815).

After weighing all the evidence, I recommend that the Commission reject the claims of certain parties that construction at Limerick be terminated, even assuming that such authority resided in the Commission.

I find Dr. Shakow's presentation interesting and worthy of future study by the Commission in any subsequent proceeding on Limerick. His conclusion that construction at Limerick should cease is based, however, on assumptions which are not supported on this record. He assumes a reserve capacity of 14-22 percent which has not been demonstrated here. He assumes that PECO can recover most of its investment, an assumption that cannot be supported here. His original cost estimate contains a substantial miscalculation as PECO points out. His subsequent cost estimate is so much greater that it must be treated with considerable caution (Tr. 2959-71). The company's arguments cast sufficient doubt on the validity of the assumptions made by Dr. Shakow in his study to warrant rejection of his recommendations in this proceeding, especially in light of the grave consequences which would result from its adoption.

Having reached the conclusion that work on Limerick should not be halted by Commission fiat, the next issue is whether the construction schedule should be accelerated.

PECO Witness Paquette testified that the recent developments in the world oil markets now make it in the public interest to complete Limerick on an optimum schedule to reduce the plant's cost and to achieve,

at the earliest possible date, the reductions in fuel costs and oil consumption which PECO anticipates will result when the unit goes into service (PECO Statement 1A, p.7). It is anticipated that acceleration of Limerick to a 1983/1985 completion date would reduce total plant cost from \$3.1 billion to \$2.6 billion (PECO Brief, p.22).

PECO states, however, that it will take approximately \$200 million of additional construction expenditures in the period 1980 to 1983 to accelerate that schedule (PECO Statement 1-A, p.7). The company also notes that when Limerick goes into commercial operation, it will necessitate a base rate increase of approximately \$300 million per unit. The company notes that customers will receive fuel savings of approximately the same amount so that the net effect on the ratepayers' total bill will be minimal. The company expresses fears, however, that the Commission will not move promptly to grant the base rate increase required to support the carrying charges on the plant when AFUDC is terminated. In addition, it fears that advancement of Limerick will lead to accusations of "excess capacity" during this 1983-85 period in future rate cases (PECO Statement 1-A, pp. 8-9).

The company seeks to begin discussions with the Commission and its staff "to work together to agree on the best plan for completion of the Limerick plant." (PECO Statement 1-A, p.10).

Trial Staff takes a rather ambivalent position. Its witness Birx testified that the plant should be completed as soon as possible (Tr. 3388) but Trial Staff recommends a level of rate relief so low as to preclude this acceleration. The OCA requests an in-depth investigation into the company's generation planning and the necessity of Limerick.

It is hornbook law that this Commission is not a super-board of directors managing the affairs of a utility. This Commission was not established for the purpose of telling a utility when to place a generating plant on line, nor is it proper for a quasi-judicial body to work out the ratemaking, treating of a plant, such as Limerick, outside the context of a rate proceeding. It could well appear to the public that the company now is somehow seeking the Commission's imprimatur on its past, present and future construction plans. The company has for the last ten years made decisions concerning Limerick, it should continue to do so and let the Commission pass on the propriety of those decisions.

For the foregoing reasons I recommend that the Commission make no decision now on Trial Staff's prospective rate base adjustments for Limerick; that the Commission not direct PECO to halt construction on the project; that the Commission not order a special investigation into the need for Limerick, the time has long passed for such a proceeding to result in any useful purpose; <sup>35/</sup> and that the Commission not interfere

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<sup>35/</sup> The OCA might direct its attention to seeking legislative approval of a siting bill giving this Commission such jurisdiction.

in the management of the company by expressing approval or disapproval of acceleration of this project. The company should be directed to notify the Commission approximately six months prior to Limerick's commercial operation and at that time, the Commission should institute an investigation as to the construction practices of the company and as to whether Trial Staff's recommendations are warranted. Since the company will of necessity be seeking rate relief to cover the costs of the plant at approximately the same time, these two investigations should be coordinated.

#### VIII. EXCESS CAPACITY

A central, if not the central issue, in this proceeding has been the claims of many parties that PECO has such excessive generating capacity that an adjustment to base is necessary. By way of explanation, I will refer throughout this discussion to "excess capacity." This is simply a phrase of convenience which I will use to refer to PECO's reserve capacity over and above the level need to comply with its contractual agreements with the PJM Interconnection and MAAC Agreements. It should not be taken in a pejorative sense. In addition the Commission in its August 9th Order sought exploration of the question of whether the utility uses an optimum mix of existing capacity. As detailed below I do not find on this record that PECO's reserve capacity is so excessive as to warrant an adjustment to its revenue requirement. I also find on this record that the company's mix of generating plant is reasonable.

PECO's Capacity

PECO witness Boyer presented the company's position on the problem of excess capacity. This position, basically the same as presented in R.I.D. 438, is that the nature and amount of generating capacity which must be added is based on the annual peak load review. Annual sales and peak demands are estimated for a minimum of 15 years into the future. Generation reserves necessary to supply these forecasted annual peak demand plus reserve is compared to the installed generation minus scheduled retirements plus committed new generating capacity. When the total forecasted generation exceeds the forecasted supply, additional generating capacity is planned (PECO Exhibit VSB-2, p. 1).

In addition to generation sufficient to meet forecasted annual peak demands, some additional generating capacity is necessary to insure that there is a margin to allow for day-to-day variations in the operating condition of installed generation and for deviations of the annual peak demand from its estimate.

The amount of generation reserves required depends on the amount of reliability desired. The reliability criterion used by the PJM Interconnection is that customers will not experience a curtailment in electric service more than one day every ten years because of an inadequate supply of generation (PECO Exhibit VSB-2, p.4). Approximately 20 percent of the estimated annual peak demand has been the reserve generating capacity required to meet that reliability criterion.

The following table shows the historical annual peak loads and installed generating capacity.

Historical Annual Peak Loads and Installed Generating Capacity

Actual Annual Peak MW	Change (2) in Peak MW	Installed Generating Capacity MW	Change (2) in Gen. Capacity MW	Percent Generation Reserve Capacity	Weather Corrected (1)	
					Peak MW	Percent Reserve Capacity
1966		3,572		(2.7)	3,680	(2.9)
1967	54	4,111	539	10.3	3,970	3.6
1968	648	4,800	689	9.7	4,460	7.6
1969	217	5,066	266	10.3	4,820	5.1
1970	120	5,357	291	13.7	4,910	9.1
1971	210	5,928	571	20.4	5,040	17.6
1972	391	6,136	208	15.5	5,340	14.9
1973	447	6,377	241	10.7	5,630	13.3
1974	(329) (3)	6,968	591	28.3	5,620	24.0
1975	99	7,214	246	30.5	5,530	30.5
1976	(184) (3)	7,167	(47) (3)	34.1	5,650	29.6
1977	542	8,202	1035	39.3	5,580	47.0
1978	(221) (3)	7,727	(475) (3)	36.4	5,630	37.2

Notes: (1) Corrected to the most severe temperature conditions which have a 50% probability of occurrence.

(2) Change from previous year.

(3) Decrease

PECO's estimates for the next ten years show that the reserve levels will decline until 1985 when Limerick Unit No. 1 is scheduled to come on line (See Appendix H).

These unusually high levels of reserve capacity have been the source of concern to the Commission in PECO's last two rate cases (R.I.D. 295 and R.I.D. 438).

PECO states that the reasons for this excess capacity are many including the fact that the recent nuclear generating unit additions were planned many years ago to supply estimated annual peak loads which were higher than those recently experienced. Also additional short lead time units had to be installed because of delays in construction of the large nuclear generating units. <sup>36/</sup> The reduction in annual peak loads has been the result of the conservation of electrical energy usage caused by a public appeal to reduce energy usage; the curtailment of electric energy usage caused by the higher oil prices and the resulting higher prices for electricity; the 1973-1975 business recession; and the emigration of people from the Philadelphia region. None of these circumstances, it is claimed, were or could have been foreseen by PE peak load forecasters.

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<sup>36/</sup> It should be remembered that the Peach Bottom, Salem and Limerick units were planned in the late 1960's (PECO Exhibit VSB-2, p.9). During this same period and up through the early 1970's, the Commission was encouraging the utility to plan for greater growth than even it had forecasted and was directing the utilities to construct combustion turbine capacity until these base load plants came on line (PECO Exhibit VSB-2, App. C and D).

In summary, the present operating reserves of PECO are in excess of the requirements of the PJM Interconnection and the Middle Atlantic Area Council (MAAC). These reserves represent plant which PECO has constructed and for which its ratepayers pay a return. Trial Staff, OCA, CEPA and Philadelphia all propose that an adjustment be made to PECO's rate base or revenues so that the ratepayers are not called upon to support this plant. Three specific adjustments were proposed and will be discussed individually.

#### Birx Adjustment

An adjustment for "excess capacity" was proposed by Trial Staff Witness Dr. Donald Birx (Trial Staff Statement No. DLB-1, pp. 13-20). Dr. Birx recognized that reserve capacity is necessary to provide for reliability of service when units are down for either scheduled or forced outage. He stated that the primary factors influencing the loss of load probability are the size of the installed units, the forced outage experience, and the peak load probabilities. Dr. Birx felt that these factors could be controlled through a variety of load management techniques, better maintenance procedures and through installing smaller plants. Dr. Birx stated that the present reserves for PECO amount to 36%. The difference between this and the PJM requirement of 22% amount to 773 megawatts which, he states represents excess capacity. Dr. Birx, referring to PECO Exhibit No. VSB-2, Table 1, p.8, noted that the company

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has a number of retirements and deratings amounting to 185 MW planned for the near future; this brings the excess down to 588 MW. Rounding this off, he suggested removal of 500 MW of plant in service. Dr. Birx derived a value for rate base in \$/MW for PECO's peaking capacity since in his view it is peaking capacity that is excess on PECO's system. Using the Eddystone 3 and 4, Muddy Run and Croydon plants as typical of PECO's peaking capacity, he determined the net original cost amount in rate base for these plants to be \$344,497,000 which amounts to \$169,487 per megawatt of installed capacity. He, therefore, recommended removal of 500 MW of excess at this dollar value of \$85,000,000.

Dr. Birx testified that his adjustment would not have a serious effect on the projected future reserve capacity of PECO. It would be the company's decision as to whether or not to retire plants because of excess capacity, his suggestion would simply remove the excess from rate base until such time as it could be justified as being used and useful. Depreciation expense would continue and a return sufficient to cover the fixed capital obligations of the company would be allowed. If the physical retirement of 500 MW actually occurred, under PECO's forecast, the reserves would be 9 percent in 1984. Dr. Birx suggests two alternatives for achieving an adequate reserve load in 1984. The first is to shave 9 percent of the projected peak load for 1984. The second is to bring Limerick on line in the 1984-1985 period rather than in 1985-1987. This would raise the 1984 reserve to 25 percent.

Boonin-Barrett Alternative

An alternative adjustment for the company excess capacity was proposed by Trial Staff Witnesses David M. Boonin and Eileen Barrett of the Commission's Bureau of Conservation, Economics and Energy Planning (Trial Staff Statement No. DMB/EMB-1). These witnesses determined that PECO had excess capacity by examining the company's projections of installed generating capacity and estimated peak load contained in PECO Exhibit VSB-2, p.8. For the three-year period 1979-1981 they calculated the average installed generating capacity at 7701 MW and the average peak load at 5850 MW. They then reduced the average peak load for the period by 2.4% to reflect the benefit from the diversity of PMJ peak loads that PECO will receive in the planning period 1981-82 <sup>37/</sup> by virtue of its membership in the PJM pool. The adjusted number, 5709 MW, is the diversified planning peak. The difference between the average total installed capacity and the average diversified peak is 1992 MW, or a reserve margin of 35%. The witnesses determined that a reserve margin of 20% above peak is adequate for the company's system; therefore, only 6851 MW are needed to serve its customers. The so-called excess generating capacity was calculated therefore at 850 MW (Trial Staff Exhibit DMB/EMB-1-A, Schedule 3).

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<sup>37/</sup> This is the most recent estimate of future peak load (Trial Staff Statement DMB/EMB-1, p.4).

The witnesses selected 20% as an adequate reserve margin. In reaching this conclusion, they point to a 1966 joint meeting of regulatory commissions representing the PJM area, where a decision was reached to inform the member companies of the PJM that immediate preparations should be made to increase installed generating capacity under a reserve margin of 20% above forecasted loads was reached. The selection of this margin, they state, was related not to a loss of load probability of one day in ten years but to the spatial distribution of the 1966 PJM generating system, since 20% of the generating capacity of the PJM system was installed or under construction in western Pennsylvania and tied to the eastern portion of the PJM territory by a single transmission line (Ibid., p.7). <sup>38/</sup> In 1975 the New York Public Service Commission concluded that for the New York Power Pool, a 20% reserve margin was equal to a loss of load probability of one day in ten years. They point out that PECO now states that a reserve margin of 25%-29% is necessary for reliability of service, while 22% is required by PJM.

The witnesses cite in addition two recent studies by the staffs of the North Carolina Utilities Commission and the Library of Congress which conclude that a standard percent reserve margin of 15%-20% would be adequate; the discrepancy between these two claims is

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<sup>38/</sup> This statement, however, is solely the witness's opinion and not the result of any analysis of any Commission document or minute of the meeting (Tr. 3174).

explained in part by the definition of the one day in ten years reliability criterion and the way in which reserve margins are calculated. They point out that Loss of Load Probability is defined as the probability of any occurrence of any duration which results from the failure of the operating generating capacity to deliver power. This may result in voltage reductions, brownouts, load shedding as well as a complete blackout. The failure to recognize that not all losses of load have the same impact on consumers leads to the erroneous conclusion, that any outage must be more expensive than the cost of an additional generating station. Another drawback of the loss of load criterion, according to the witness, is that it calculates reliability exclusively for the generating system while ignoring the quality of the transmission and distribution systems.

The loss of load probability criterion of one day in ten years is used to generate a system-wide reserve margin for the PJM system for planning and contractual purposes. Once the contractual reserve margin is established, the forecast obligation for each member company is determined (PECO Exhibit VSB-2, App. E). This obligation is affected by the forced outage rate of each company and PECO's forced outage rate has been consistently above the PJM average, according to these witnesses (Trial Staff Statement No. DMB/EMB-1, p.11). This is caused by equipment problems and a tendency not to repair generating units as fast as possible

since an adequate reserve margin exists to permit generating stations to be repaired during normal working hours (Ibid. p.12). In conclusion, the witnesses reject the claim that an adequate reserve margin must exceed the 20 percent level.

The witnesses determined a value (\$25.55 per KW) to be assigned to the excess capacity from the PJM Agreement (Trial Staff Exhibit DMB/EMB-1-A, Schedule 4). This represents the net annual cost of the least expensive type of generating capacity in the PJM System and is, in their opinion, the lowest reasonable cost per KW of excess capacity.

The witnesses recommend an upward adjustment to the total revenues of the company to recognize that if there is a value to the alleged excess capacity, it is to other utilities. They further state that while generating capacity is constructed in discrete units of multiple megawatts, rather than by individual megawatts, any unnecessary capacity can be leased or sold. In their opinion, 850 MW of PECO's installed capacity is not necessary for PECO's ratepayers. They have assigned a revenue level to this capacity, creating in their opinion an inducement for PECO to remove this capacity. In conclusion, the witnesses recommend an upward adjustment to total revenues of \$21,717,500 (850 MWX \$25.55 per KW).

Weiss Adjustment

A third adjustment for excess capacity was proposed by Consumer Advocate Witness Thomas H. Weiss (Consumer Advocate Statement No. 5, pp. 6-19). Mr. Weiss noted that in 1978 the company had an installed reserve capacity of 49% of system peak demand <sup>39/</sup> and a net reserve generation capability of 35.7%. He testified that maintaining such a large reserve generating capacity can be detrimental to the company. Mr. Weiss stated that there is no generally accepted industry-wide standard for reserve margins although most utilities generally plan for an installed reserve margin of between 15%-25% of peak demand. Mr. Weiss noted that reserve margins are the function of a number of items including system economic dispatch criteria, the type and availability of the fuel used by the system, the degree of separation between the two major peaks which a system will experience during the measured period and the adequacy of the transmission and switching system to which the generation units are attached. The different factors and the weight assigned to these factors will cause reserve margin estimates to vary. For example, PECO has determined that a reserve margin of 25% would be required for the test period ending March 31, 1980. The Mid-Atlantic Area Council (MAAC) estimates that a 22% margin is sufficient while the Energy Systems Research Group, the Consumer Advocates load forecasting experts, believe that PECO needs a margin in the range of 14 to 22 percent.

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<sup>39/</sup> PECO claims that this calculation is incorrect and should be 36 percent (PECO Statement 15-A, p.11).

Mr. Weiss stated that the company's current excess capacity stems from decision made in the mid-sixties when it was planning the Eddystone 3 and 4 units. During this time oil-fired generation appeared to be a reasonable long-term base load generation alternative. By the late 1960's PECO was planning to build nuclear plants at Peach Bottom and Salem. By the mid-1970's when these plants were still under construction, PECO should have seen, the witness stated that the costs required to effect completion of nuclear plants were being inflated due to safety requirements and that fuel oil was becoming so expensive as to nearly preclude electric utilities from any further consideration of constructing oil-fired capacity. At the same time there was a decline in previously predicted growth rates. In spite of this, Mr. Weiss stated, PECO continued with its construction plans and even planned construction at Limerick. Only now, he stated, is the company making an effort to adjust its excess capacity by retiring the previously moth-balled units at Richmond 12 and Barbadoes 3 and 4.

Mr. Weiss stated that there were several ways to adjust rate base to recognize the existence of excess capacity. One way is to exclude the investment in designated units based on an analysis of the current use of production plant, the efficiencies of the various plants and the company's own retirement plans. Another method would be to reduce the investment in all production plant by a factor representing

the unneeded capacity as a percentage of total capacity. This method, he stated, fails to assess adequately the operating efficiencies of individual units. A third method is to designate older facilities as those which are representative of the unneeded capacity and remove the investment from the determination of the company's revenue requirement. This, however, does not guarantee that the most inefficient units would be removed. A final method would remove from rate base investment representing the excess capacity and would capitalize a modified allowance for funds used during construction (AFUDC) on the removed plant until such time as the plant is needed. The AFUDC rate would include an equity return at a zero cost level, thereby representing only the embedded cost of debt and annual depreciation expense would cease. This method, however, would in the witness' opinion shift the costs of the excess capacity onto future ratepayers. Mr. Weiss stated his preference for the first-mentioned methodology. He determined the level of PECO's alleged excess capacity to be 775 megawatts during the 1981 summer peak, on the basis of the 7,689 megawatt installed generating capacity shown by PECO for the summer of 1981. From this installed capacity, he subtracted 6,914 megawatts which represents the capacity necessary to service the 1981 peak demand with an installed generating reserve margin set at the midpoint of the 14%-22% range used by Dr. Shakow of the Energy Systems Research Group based on the ESGEM model.

In order to decide which units should be eliminated for rate-making purposes to reflect the removal of excess capacity from rate base, he reviewed statistics describing the utilization of the company's generating units in 1978 as obtained from its filings with the Federal Energy Regulatory Commission (Forms 1 and 12) and the company's retirement plans. On the basis of his review, he excluded the costs associated with the following units:

Chester 5 and 6	124 megawatts
Richmond No. 9	166 megawatts
Barbadoes Nos. 6 and 7	38 megawatts
Southwark Units 1-6	<u>420</u> megawatts
Total	<u>748</u> megawatts

He determined the depreciated original cost of these units to be \$25,043,000 and recommended that this amount be eliminated from rate base.

#### PECO's Position

PECO maintains that no excess capacity adjustment is warranted. As noted earlier PECO witness Boyer stated that the decisions regarding generating capacity, made many years before due to the long lead time required to install major generating stations, were reasonable based on the facts which existed at the time. Indeed, if the 1973 oil embargo and resulting recession had not occurred, the company maintains that the

generating reserves available now and for the next few years would have been barely adequate (PECO Exhibit VSB-2, Table I). He explained that the current reserve capacity requirement for planning purposes is a reliability criterion of loss of load probability of one in ten years. The current reserve capacity requirement, being used to determine PECO's capacity obligation to the PJM Interconnection, is 22 percent. The PJM Management Committee agreed to use 22 percent as a basis for calculating member companies' capacity obligation for 1981. Mr. Boyer noted that while reserve requirements beyond 1981 have not been estimated, it is expected that they will approach 25 percent.

Mr. Boyer further noted that the reliability standard of loss of load no more than one day in ten years has been followed by much of the electric industry and has been employed by PJM for over fifteen years. Under the PJM Agreement, PECO must employ this reliability criterion in its generating plant planning program (PECO Statement 9-A, p.1). While it is not the only the standard which could be employed in generating plant planning, he stated, it is the most appropriate one for use at this time and is the standard that has been employed, with the Commission's knowledge, in planning its present generating plant facilities. He also noted that in future years, generating plant reserve margins in the area of 25 percent to 29 percent will be required to meet this standard (PECO Exhibit VSB-2, App A.).

The company also presented Mr. Emil Kasum, Chief System Planning Engineer. First, he addressed Consumer Advocate Witness Shakow's calculation of system reliability levels (PECO Statement No. 15, p. 6-13). Mr. Kasum criticized Dr. Shakow's ESGEM model for using a simplistic method to evaluate system reliability. He described it as a Monte Carol simulation technique in which the accuracy of its results depends on the number of random samples taken. He described the Loss of Load Probability method used by PECO as an exact analytical technique which has no inherent sampling error. <sup>40/</sup> He states that the ESGEM Model's reliability evaluation is also based on the erroneous assumption that PECO's reliability can be evaluated through a single area analysis, without detailed modeling of the PJM system. Mr. Kasum also testified that the ESGEM model incorrectly assumes that PECO's benefits from interconnections should remain constant at an average available capacity of 1072 megawatts regardless of PECO's level of installed reserves. It is incorrect, he stated, to presume that as PECO drops its installed reserve to a 14% level, that the remaining interconnection members would provide the same support as they do at the existing 35% interconnection reserve margin.

He also testified that Dr. Shakow's calculated reliability indices are not equivalent to the industrial standard. Dr. Shakow calculates the hours that load curtailment occur and translates them

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<sup>40/</sup> An example of this potential for error was cited by Mr. Kasum. He points to Sheets 16 and 18 of Consumer Advocate Exhibit DS-C which show that (given the ESRG construction program, ESRG demand forecast and ESRG low cost and full plant estimates) when the 1987 reserve margin is increased from 22% to 30% the incidence of voltage reductions increases from 0.2 to 2.3 hours per year. This tenfold change is, he states, obviously in the wrong direction (system reliability should not decrease as reserves increase) and, he states, can only be due to an inadequate number of samples.

into a loss-of-load probability (LOLP) index by assuming that 24 hours of curtailment equate to one day of curtailment. The definition of LOLP refers to days per year in which curtailment has occurred without regard to the length of time within those days that the curtailment occurred. The model also assumes that when a capacity deficiency occurs, load will be only curtailed to reduce the load to exactly equal the currently available capacity. This, he argued, leaves no spinning reserve and would make the system vulnerable, in the event of the sudden outage of a major generating unit or transmission facility, to cascading system-wide interruptions.

Mr. Kassum also notes that the major focus in the ESGEM model is on economics rather than technical reliability and that PECO is at present bound by the PJM contract to have reserves to meet a reserve requirement based on the one day in ten year LOLP or pay substantial penalties; it cannot unilaterally plan its capacity on an alternative basis.

Mr. Kassum further stated that when demand growth rates moderated beginning in the early 1970's, PECO moved to reflect this change in its capacity planning. No additional generating plant was planned for construction after the Croyden units in 1972. Planning for the proposed Fulton nuclear facility was abandoned and, in recent years,

PECO has retired older generating units where economic to do so. <sup>41/</sup> The company has also sold the generation of Salem No. 2 to Jersey Central. Mr. Kassum also explained that certain economic penalties can result for the retirement of generating plant, even though such plant may not be needed for capacity reasons. Even though the generating unit may not actually be producing, it may be reducing energy costs through the PJM contractual split saving pricing mechanism to price purchased energy. With the unit retired, a more expensive unit must be employed in this pricing analysis, resulting in greater costs to be borne by ratepayers. Mr. Kassum also noted that additional transmission facilities to a local area are sometimes required upon the retirement of generating plant in a given location in order to avoid possible interruptions of service due to transmission limitations and/or outages. Mr. Kassum illustrated this point by reference to the Richmond 9 and Southward Units 1 and 2 which Mr. Weiss recommended be eliminated from rate base. The retirement of these units would require, according to the company, additional transmission reinforcements to assure local area reliability in an amount greater than \$16 million. Southward Units 1 and 2 generated 394,325 MWH in 1978 and 344,068 in the first ten months of 1979. Mr. Kassum stated that

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<sup>41/</sup> These have included Barbadoes 3 and 4, Richmond 12 and Chester 5 and 6 (PECO Statement No. 15-A, p.2).

this energy would need to be generated from higher cost sources should the units be retired; costs which would be passed on to ratepayers through PECO's energy clause. Furthermore in the first ten months of 1979, Southward 1 and 2 generation costs were used in computing split savings energy purchases for a total of 608,595 MWH. If these units had not been available, combustion turbines would have probably been used to compute PECO's avoided costs; this would have increased the cost of purchased energy by some \$6.7 million for that period (PECO Statement No. 15-A, p.4).

Mr. Kassum noted that, under the PJM Agreement, PECO's generating capacity obligation is determined three years into the future based upon the company's forecast peak load, historic forced outage rates and other data. PECO's capacity obligation for the next two planning periods is shown below (Ibid., p.6):

<u>Planning Year</u>	<u>Installed Capacity</u> (MW)	<u>Capacity Obligation</u>	<u>Capacity In Excess of Obligation</u>
1980-81	7689	7483	206
1981-82	7689	7476	213

Mr. Kassum states that if PECO were to reduce its installed generating capacity by more than 206 MW in 1980-81 or 213 MW in 1981-82, then PECO would have to buy additional generating capacity from the PJM companies at the contract rate of \$25.55 per KW. Furthermore, if PECO

were to retire any units, it would be combustion turbines with poor operating records and which are not needed for local reliability, such as Barbadoes 6 and 7. If these units were retired, annual capital costs would be reduced by about \$5.00 per KW (Ibid., p.6).

Mr. Kassum also testified that contrary to Trial Staff's contention, PECO's claimed future reserve margins are not inflated by high forced outage rates. He pointed out that the outage rates employed by PJM to calculate the required reserve margin have been adjusted to eliminate the effects of maintenance periods which have been extended for economic reasons (Ibid., p.8). A 20 percent across the board reduction in the forced outage rates of marginal and peaking units was used in the reliability calculations resulting in an additional 1 percent reduction in reserve requirement.

The Commission in R.I.D. 438 considered virtually the same arguments and concluded that no adjustment should be made (nimeo, pp. 10-15). Since that time the Commission has had an opportunity to review the issue of excess capacity in West Penn Power Company (R.I.D. 183, Order entered June 29, 1979). There the Commission affirmed an earlier order which reversed a still earlier order making an adjustment for alleged excess capacity. The Commission specifically referred to the standard necessary to warrant an adjustment for excess capacity, stating:

Having recognized the need for some reserve capacity, we must consider whether the reserve capacity here is so excessive as to demonstrate serious miscalculations of the system's requirements resulting from management imprudence. As noted above we interpret the Court's remand here as an admonition to us to review thoroughly the record here to determine whether our original position that there was imprudence can be clearly and convincingly demonstrated. After such a review we find that while there is evidence for our original position, it does not meet the high standards of proof necessary to support such a finding of imprudence. Under these circumstances we are compelled to conclude that our original finding must be modified. (mimeo, p. 5)

Applying this standard to the record here, I cannot find that the reserve capacity here during the time these rates are in effective will be so excessive as to demonstrate serious miscalculations of the system's requirements resulting from management imprudence.

Before discussing the reasons for this conclusion, two other areas should be considered load forecasting and reliability standards.

Load Forecasting

Two load forecasting studies were presented - one by PECO (PECO Exhibit WCH-1), the other by the OCA witness Stutz (OCA Exhibit JS-5). Although much has been stated concerning these forecasts, several things should be borne in mind. First, forecasts are just that - estimates of future conditions made without knowledge of future events. Their use for ratemaking purposes is therefore limited. Second, these two studies have limited bearing on this proceeding. For example, according to OCA witness Shakow it is not at all significant whether one chooses PECO's load forecast or Dr. Stutz' load forecast for deciding what to do with Limerick (Tr. 2909-10). During the period these rates will be in effect, the difference between the two forecasts is relatively small and do not materially affect the different peak loads used for any "excess" capacity adjustment. For example, the company forecasts a period of load of 6000 MW in 1981, (PECO Exhibit VSB-2, p.8) while Dr. Stutz forecasts a peak of 5860 MW (OCA Exhibit JS-4, p.5), or a difference of 2.4 percent. For 1982 the difference between the two estimates is slightly over 3 percent. It might be interesting to examine in excruciating detail the difference between these two estimates - but for purposes of determining PECO's revenue requirements over the next few years the game is not worth the candle. I can imagine fewer areas of investigation with a lower payback ratio than a thorough investigation of the various forecasts governing

the saturation growth in home freezers in 1987. <sup>42/</sup> If history is any guide the only sure conclusion is that every estimate of load for 1987 will be wrong. This is not to say that load forecasting should not be done and thoroughly explored by the Commission. I simply point out its limits in the context of a rate case. Finally, I note that the OCA's base forecast growth rate approximates that projected for the PECO low range forecast (PECO Statement 10-A; OCA Statement No. 3-A, p.6).

#### Reliability Standards

As noted elsewhere, PECO plans its generating plant capacity to meet a reliability standard of loss of load no more than one day in ten years. Under the PJM Agreement, this is the criterion to be used as the design objective (PECO Exhibit VSB-2, App.A; PECO Statement 9-A, p.1).

The three adjustments proposed by the witnesses here to treat excess capacity each use a different reliability standard. Dr. Birx uses a 22 percent reserve margin which is the present contractual reserve requirement for PJM. But this is not the same as an individual company's planning requirement which may vary depending on load shape, seasonality of peak, generating unit size and generating unit outages (PECO Exhibit VSB, App.A).

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<sup>42/</sup> If we were considering whether or not PECO should start construction of additional plant, this, of course, would be of primary importance. But we are not and PECO is not.

Witnesses Boonin/Barrett proposes a 20 percent fixed reserve capacity criteria and criticizes use of the one-day in ten-year reliability criterion.

Mr. Weiss uses a 14-22 percent reserve capacity range based on the computer model (ESGEM Model) designed by OCA witness Shakow. This uses a different reliability standard than the one-day in ten years loss of load now used by PECO, the PJM Interconnection and MAAC.

After reviewing the record here, certain conclusions seem evidence. First, for all its claimed faults, the one day in ten years planning criterion has been used by the company, by the PJM Interconnection, by MAAC and by this Commission over the last decade. It should be used in this proceeding to determine PECO's reserve capacity levels. It is a reasonable standard, one in general use by the industry and the one upon which PECO has based its capacity planning.

But one cannot help but question in light of the testimony here whether this is the best standard. Certainly the issues brought forth by Ms. Barrett and by the Shakow study deserve serious consideration. These questions transcend any rate case and would impact all jurisdictional utilities. At the same time they raise serious issues of public policy - would the citizens of the Commonwealth be willing to trade off the reliability assurances that this standard provides for the greater possibility of brownouts, blackouts and voltage reductions and

their attendant social costs, if it would result in lower electric rates in the future. These are just some of the questions which must be explored before any decision can be made. It is my recommendation that the Commission institute an investigation on its own motion of the proper reliability standard for the next decade. At the same time the Commission could consider the load growth forecasts and long-range planning of the utilities of this Commonwealth.

#### Conclusion

As stated earlier, I do not find that the record shows such management imprudence as to warrant an adjustment. Furthermore, the adjustments proposed are severely flawed.

Dr. Birx proposed an adjustment eliminating 500 MW of capacity from PECO's system based on a 22 percent reserve capacity level. He prices out this adjustment using PECO's most recent non-based load generating plant facilities. These units, as the company points out, are highly valuable to PECO's customers which would not be retired by the company. Dr. Birx used these plants because he felt that it would be unfair to the company to take the entire plant of PECO and use the average cost per kilowatt. He rejected use of the most fully depreciated plant because he felt it would be unfair to the customer "because if you take Eddystone-3 and 4, for instance, at the time of the Arab oil embargo

Philadelphia Electric had about \$40 million invested in that, the signal flags were all flying and yet they went ahead and completed the plant at a cost of \$50 million or somewhere around there." (Tr. 2768). The record indicates however, that at December 31, 1973 expenditures plus commitments at the Eddystone 3 and 4 facilities totalled \$166 million out of a total plant cost at completion of \$252 million, <sup>43/</sup> (PECO Statement 15 App. 12).

The Boonin/Barrett adjustment relies on a 20 percent reserve criterion. In addition, it imputs a revenue of \$25.55 per kilowatt to the 850 MW of capacity which it claims is excess on the basis that PECO could sell this capacity to some other utility. Nothing in the record indicates that there is the slightest possibility of such a sale. In fact, the record clearly shows that utilities in the Eastern United States and Canada are in a position similar to that of PECO since they too were subject to the same economic factors in the last 5 years as PECO (PECO Statement 15-A, pp. 4-5). Where such adjustments have been made in the past there has always been some historical basis or record evidence to support the basic premise that some sales would be made; the issues was the level of such sales. E.g. Orange and Rockland Utilities, Inc., 14 N.Y.P.S.C. 777 (1974). Without such a basis, such an imputation of revenue would be arbitrary and capricious.

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<sup>43/</sup> Installation of oil burning facilities such as Eddystone in the early 1970's was necessitated for environmental reasons.

OCA witness Weiss' adjustment proposes the elimination of the Richmond 9 and Southwark Units 1 and 2. PECO witness Kasum points out (PECO Statement 15A, pp.3-4) that retirement of these units would require additional transmission reinforcements to assure local area reliability in an amount greater than \$16,000,000. Southwark Units 1 & 2 oil-fired steam units generated 394,325 mwh in 1978 and 344,068 mwh in the first ten months of 1979. This energy would need to be generated from higher cost sources should the units be retired. These additional costs would be passed on to ratepayers through PECO's energy clause. Assuming the cost increment would be as little as \$5/mwh, this additional energy cost for 1979 (10 months) would equal approximately \$1.7 million. In addition, during the first ten months of 1979, Southwark 1 & 2 generation costs were used in computing split savings energy purchases for a total of 608,595 mwh. If Southwark has not been available, combustion turbines would have probably been used to compute PECO's avoided cost. Southwark's generation cost is about \$50/mwh compared to about \$72/mwh. Therefore, the cost of purchased energy could increase \$11/mwh if the Southwark units were not available. PECO's cost of purchased energy would have increased by \$6.7 million in the first ten months of 1979. This increase would have been passed on to ratepayers through PECO's Energy Clause. These costs exceed the cost savings which could be obtained as a result of the units' retirement.

If the Commission finds that an excess capacity is warranted, I recommend that the Commission an adjustment that is reflective of the real world.

Under the PJM Agreement, PECO's generating capacity obligation is determined three years into the future based upon the company's forecast peak load, historic forced outage rates and other data. As a consequence, PECO's capacity obligation has been determined for the next two planning periods and is shown in the following table:

<u>Planning Year</u>	<u>Installed Capacity</u> (MW)	<u>Capacity Obligation</u> (MW)	<u>Capacity In Excess Of Obligation</u> (MW)
1980-81	7689	7483	206
1981-82	7689	7476	213

If the company were to reduce its installed generating capacity by more than 206 mw in 1980-81 or 213 mw in 1981-82, then PECO would have to buy additional generating capacity from the PJM companies at the contract rate of \$25.55 per kw to meet its forecast obligation (PECO Statement 15-A, pp. 56).

If the Commission finds that PECO's management was imprudent in its planning and construction, the amount of excess capacity is in the area of 200 MW.

If the Commission in effect tells PECO that there is too much plant in its rate base, the resultant rate base adjustment should be calculated using the generating units which would be retired - the oldest combustion turbines (PECO Statement 15-A, p.6).

The record does not, however, support such a finding. <sup>44/</sup>

Finally, with respect to PECO's generating mix, OCA witness Shakow testified that PECO's construction program was based on methodologies which are biased toward nuclear baseload plants (OCA Statement 4, p. 3). It is interesting to note that Trial Staff's witness Dr. Birx believes that PECO has an excess of peaking capacity, not base load plant (Trial Staff Statement DLB-1, p. 18) and that Dr. Shakow recommends the addition of 1500 MW of coal plants by 1992 (OCA Statement 4, p. 4) in place of Limerick. Nothing in the record indicates that PECO's present mix of generating units is inappropriate. While the combustion turbines installed in the early 1970's are highly expensive, they were needed at the time and installed at the direction of the Commission. PECO is now locked into leases for this equipment (Trial Staff Statement DLB-1, p. 19). The Shakow testimony dealing with potential bias toward nuclear base load plant lacks specific factual support for its conclusions. Finally, it should be noted that the question of PECO's generating mix would have more relevance if, we were not now at the end of PECO's construction cycle.

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<sup>44/</sup> In order to avoid extending this already lengthy discussion, I attach as an appendix (Appendix I) the separate statement of former Chairman Louis J. Carter on the subject of PECO's excess capacity issued in connection with the demand of certain petitions for reconsideration in R.I.D. 438.

PENNSYLVANIA PUBLIC UTILITY COMMISSION

ORDER ADOPTED MAY 9, 1980  
at  
DOCKET NO. R-79060865

RE: Filing of Supplement No. 6 to Electric Tariff No. 25  
of Philadelphia Electric Company - Electric Rate Increase

The Full Text of the Commission's May 9, 1980 Order and Relevant Portions of the Commission's Opinion Accompanying the May 9, 1980 Order are attached to Petitioner's Brief at Appendix A.

PHILADELPHIA ELECTRIC COMPANY  
ELECTRIC OPERATIONS

DIRECT TESTIMONY  
OF  
JOHN J. CARROLL

July 1979

- Q. Would you explain the basis for this adjustment?
- A. For each month that Salem No. 2 Unit was expected to be in commercial operation, an analysis was made to determine if a major outage for either Salem Unit was included in the preparation. Since, for budgeting purposes, No. 1 Unit was expected to return in May 1979 and not to have its next outage until April 1980, and since No. 2 Unit was not scheduled to begin service until October of 1979, the period from October 1979 through March 1980 represents the period of common operation for which an adjustment needed to be made. The monthly values for each account were reviewed and 50% allocated to No. 1 Unit and 50% to No. 2 Unit. This percentage was selected as the work force is either identical for both units or common to both units, any startup maintenance problems on No. 2 Unit would in all probability be covered by warranty and are not reflected in the budget values and previous analysis of PE owned and operated units has shown this to be a fair and equitable allocation of costs between units at a single station. Therefore, the adjustment represents 50% of the Salem Station expenses, excluding fuel, for the period October 1, 1979 through March 31, 1980.
- Q. Are you familiar with the capacity factors shown in PECO EX. 1, vol. I, Sched. 1-B-2 for the year 4-1-78 through 3-31-79?
- A. Yes, these were prepared under my direction.

Q. Do the capacity factors shown represent a complete indication of the economic and operating value of these units?

A. For the base load units, namely Peach Bottom Nos. 1 and 2, Salem No. 1, Cromby No. 1, Eddystone Nos. 1 and 2, and the units at Keystone and Conemaugh, capacity factors are a true indication of the operating and economic value of these units during the periods indicated. However, since, by their nature, intermediate and peaking units are not intended for continuous operation but rather are often employed in establishing the price for more economical energy purchases from the Interconnection, the capacity factor alone does not give a true indication of the economic and operating value of these units.

Q. Doesn't the capacity factor measure the utilization of these units for generation purposes over the period under study?

A. Yes, the capacity factor does measure utilization for direct generation purposes. What it fails to recognize, however, is the equally important function of these units as replacement units for purposes of pricing the purchase of Interchange energy in accordance with applicable Interconnection Accounting principles.

Q. Would you please explain how using a unit as a replacement for purposes of Interconnection Accounting is a benefit to PECO's customers?

A. If Philadelphia Electric were an isolated Company, then its generating units would be required to supply its entire customer requirements. However, since PECO is a member of the PJM

Interconnection, and since all units on the PJM Interconnection are operated under the principles of economic dispatch, there are many hours during the year when power is available on the Interconnection at a lower cost than PECO's production cost at that time. During these hours, PECO purchases such energy from the Interconnection with resultant savings to its customers. Under the Interconnection Agreement, the price paid by PECO for this power is half-way between PECO's cost to produce this energy from its then least expensive generating unit not in operation and the production cost of the company selling this power. This pricing mechanism is generally referred to as the "split-savings" price. To the extent that PECO has low cost oil-fired steam power to act as a "replacement" in such transactions, rather than much higher cost combustion turbine power, it experiences a substantial additional lowering of energy costs which are passed on to customers.

- Q. How can the value of these units as "replacements" be reflected in traditional capacity factor measurements?
- A. We have developed what we call a Utilization Factor for this purpose. This factor includes not only the generated megawatt-hours produced during the measurement period (as measured by traditional capacity factors), but also the Interconnection accounting megawatt-hours in the same period (a unit's value as a replacement). This factor more accurately measures a generating unit's operating and economic value in reducing PECO fuel costs to the benefit of customers.

- 11 -

- Q. Have you prepared a Table which shows a comparison between capacity factors and utilization factors for various units?
- A. Yes, Table II attached to my testimony shows various generating units, their actual MWH generated, capacity factor, accounting MWH, total MWH and utilization factor. It is necessary to present these units in these groupings due to space limitations in the Interconnection Accounting Program which is employed in determining the utilization factor. You will note that the reheat oil units, including Eddystone Nos. 3 and 4, are above 40% utilization factor and the remaining oil-fired steam units are above 30% utilization factor. Croydon approaches 20% and the other peaking units are less than 5%. These figures demonstrate the substantial economic and operating value of these units which is not measured by simple capacity factors.

TABLE II

<u>STATION/GROUP</u>	<u>ACTUAL MWH</u>	<u>CAPACITY FACTOR %</u>	<u>NET ACCOUNTING MWH</u>	<u>TOTAL UTILIZED MWH</u>	<u>UTILIZATION FACTOR</u>
Cromby 2	1,062,663	60.4%	6,669	1,069,332	60.7%
Eddystone 3 & 4	1,276,025	19.2%	1,444,586	2,720,611	40.9%
Schuylkill 1 ) Delaware 7 & 8 )	1,916,905	52.6%	458,208	2,375,113	65.2%
Richmond 9	236,832	16.3%	325,265	562,097	38.7%
Chester 5/6	169,282	15.6%	255,624	424,906	39.1%
Southwark 1 & 2	401,662	12.9%	662,080	1,063,742	34.1%
Croydon CT's	314,598	9.2%	362,797	677,395	19.7%
Other CT's & Jets	207,849	2.4%	206,867	414,716	4.9%

JJC:tmg

7/17/79

PHILADELPHIA ELECTRIC COMPANY  
ELECTRIC OPERATIONS

DIRECT TESTIMONY OF  
MORTON W. RIMMERMAN

July, 1979

TESTIMONY OF  
MORTON W. RIMERMAN

Q. Please state your name and business address for the record.

A. Morton W. Rimerman, 2301 Market Street, Philadelphia, Pennsylvania.

Q. By whom are you employed and in what capacity?

A. I am Treasurer of the Philadelphia Electric Company.

Q. What is your educational background?

A. I attended LaSalle College and received a Bachelor's Degree in Business Administration with majors in Accounting and Finance in 1958. In 1962, I received a Master's Degree in Business Administration from Drexel University. In 1973, I attended the Executive Development Program given at the Graduate School of Business and Public Administration at Cornell University which program covered a broad curriculum including managerial finance, executive decision making and other topics.

Q. Please describe your work experience with Philadelphia Electric Company.

A. I was first employed by Philadelphia Electric Company as a clerk in the Accounts Payable Section in 1948. I gradually advanced through various positions with the Company in its Accounts Payable, Financial, Computer and Systems divisions until 1970 when I was elected an Assistant Treasurer. In 1973, I was elected to my current position as Treasurer of the Philadelphia Electric Company.

Q. Please describe your responsibilities as Treasurer.

A. As Treasurer, I am the Chief Operating Financial Officer of the Company. I am responsible for the Company's daily financial operations and for the execution of its short and long-term financial policies. The Company's Financial Division, Accounts Payable Division, Treasury Division

(including the banking and stock transfer sections) and Payroll Division operate under my direction. Included in my responsibilities is the maintenance of daily relations between the Company and the banking community.

Q. Mr. Rimerman, have you testified on behalf of the Company in previous rate cases before the Commission?

A. Yes, I appeared as a witness in R.I.D. 438 testifying before the Commission regarding the Company's claim for bank balances. I am also appearing as a witness in the Company's present gas rate case pending before the Commission.

Q. Mr. Rimerman, what is the purpose of your testimony?

A. The purpose of my testimony is to provide information and explanation with respect to the Company's rate base claim for cash working capital, which appears on Page C-25 of Exhibit DPS-1 & DPS-2. I will also explain the reasons why the Company maintains bank balances, the nature of the Company's relationships with its depository banks as respects these balances and the nature and extent of use of the banking services obtained.

Q. Mr. Rimerman, what elements make up the Company's computation of cash working capital for the test period March 31, 1979?

A. The Company's computation of cash working capital consists of the following elements: Operating and maintenance expense, which is the cash required in advance of the receipt of revenue to defray the cost of operating and maintenance expenses determined from a revenue expense lag study detailed on Page C-25a of DPS-1. The average lag in receipt of revenues is based upon actual measured test year lag data, equalling 57 days offset by an average lag in the payment of cash expense items of 23 days. The resulting net lag in receipt of revenues of 34 days is multiplied by the daily adjusted proforma test year operating and maintenance expenditure to derive the cash

investment required of investors. Proforma expenses have been adjusted to reflect the cost of fuel in excess of base fuel cost, since these are costs which the Company actually incurs and for which working capital is required. The employment of adjusted proforma expense levels conforms to the Commission's order in R.I.D. 438. For the test year ended March 31, 1979, this cash requirement totalled \$70.9 million. This cash requirement is offset by the \$28.4 million net balance of accrued taxes and prepaid items as shown on Page C-25 of DPS-1.

Bank balances serve to support the Company's lines of credit, bank borrowings, and to compensate banks for the cost of numerous services provided the Company and to meet normal operating cash needs. The claim for average bank balances is based upon a thirteen month average of monthly bank balances for the period ended March 31, 1979 of \$12.3 million, of which \$10.5 has been allocated to electric operations, as shown on Page C-25 of DPS-1.

- Q. Please explain the development of the Company's claim for cash working capital for the future test year ended March 31, 1980.
- A. The Company's claim for cash working capital for March 31, 1980 of \$52,276,000 is detailed on Page C-25 of DPS-2. This claim consists of \$71,876,000, which represents the daily adjusted proforma future year operating and maintenance expense of \$2,114,000 multiplied by the net lag of 34 days developed for the historical test year data and shown on Page C-25a of DPS-1. This cash requirement is offset by \$30,100,000 net balance of accrued taxes and prepaid items, which represents a 6% increase over the accrued taxes and prepaid items developed for the historical test year of \$28.4 million and shown on Page C-25 of DPS-1. The Company does not expect required bank balances in the future test year ended March 1980 to differ significantly from the claimed bank balances for the historical test period ended March 31, 1979. Therefore, all bank balance data will relate to the March 1979 period.

The claim for average bank balances of \$12.3 million of which \$10.5 million has been allocated to electric operation for the future test year is identical to the bank balances claimed in the test year and is shown on Page C-25 of DPS-1.

No deduction to claimed working capital has been made on account of accrued debt interest or preferred stock dividends. In the Company's view, such monies are part of the Company's permitted return and therefore belong to investors from the moment of their receipt. Moreover, when viewed correctly, preferred stock dividends and bond interest create a necessity for and not an offset to working capital.

Q. Mr. Rimerman, please explain why the Company maintains bank balances?

A. Bank balances are maintained to support the Company's lines of credit, bank borrowings, and to compensate banks for the cost of numerous services provided the Company and to meet normal operating cash needs. Bank credit is the most convenient and flexible source of short-term funds available to the Company and the furnishing of such credit is the most valuable service performed by the Company's depository banks. Such convenience and flexibility is important to the Company in the management of cash flows in an uncertain business environment. Providing corporations with access to such credit means that banks must assume much of this uncertainty. Such credit is immediately available on demand, and funds can be taken down and repaid at the discretion of the Company. Providing such a continuous service has its costs, and banks have traditionally required customers to have enough funds on deposit to compensate them for these costs. At March 31, 1979, the Company had \$209.1 million of bank credit lines of which \$159.1 million was supported by compensating bank balances.

In addition to supporting the cost to the bank of continuously making this credit available, the Company's bank balances also permits the Company to

borrow at a lower interest rate than it otherwise could. This last point is evidenced by the fact that where the Company has obtained bank credit under a fee arrangement, the interest rate paid on borrowings exceeds the bank's prime rate whereas the banks where compensating balances are maintained only the prime rate is charged.

A third reason for maintaining bank balances is to compensate banks for the cost of numerous services provided the Company for which no specific fee is paid. These services include traditional third-party payment services (i.e. checking accounts and utility payments), money mobilization services (i.e. wire transfers and courier services, special check sorting and listing services as well as a reconciliation process, etc.) and money market services including advice and information on money market investments or services as agents in the sale of commercial paper.

Bank balances are also kept to meet normal operating needs for cash.

Payroll requirements, tax payments, interest and dividend payments, fuel payments and other peak demands for disbursements necessitate the maintenance of minimum cash reserves since such disbursements do not always parallel revenue collections from customers. Finally, small depository accounts are maintained with many of the banks in our service territory as a convenience for our customers. These banks and their branches are available to our customers for bill payments. The availability of this service is a major convenience to our customers. Its cost is partially offset by the minimum cash balances kept in these small accounts.

- Q. Have you any documentary support for the "understanding" that such balances will be maintained?

- A. Yes, I do. Letters from our major depository banks stating their "understanding" that such balances will be maintained are set forth in PECO Exhibit I Volume II Schedule 2-A-16.
- The terms of this "understanding" as reflected in these letters is that balances will be maintained to compensate the bank for the major services described above - i.e. the availability of credit, borrowings under such credit and normal bank services.
- Copies of letters evidencing the Company's fee line credit arrangements with two New York banks are also included in Section 2-A-16.
- Q. Have you a schedule which identifies the various banks at which these balances are maintained, states the balances required, the average daily balances maintained and provides other information?
- A. Yes, I do. This information is contained in PECO Exhibit I, Volume II Schedule 2-A-16. The data shown on this schedule is for the twelve month period ended March 31, 1979. As shown in the column headed "C & D - Type of Account", claimed bank balances for the test year of \$11.9 million reflects the balances maintained by the Company in checking accounts at its depository banks. The total average daily compensating balance maintained by the Company as shown in column f equals \$15.1 million. This total includes approximately \$3.2 million contained in various special purpose accounts which, though employed to satisfy the Company's balance requirements, is not included in the Company's rate base claim because of the special nature of these accounts. Column e calculates the total balances required under the Company's relationships with its depository banks which totals approximately \$21.7 million.
- Q. Mr. Rimerman, I notice that the total of the average daily balances maintained by the Company is less than the total balances required under the Company's arrangements with its depository banks. Please explain why this occurs.

- A. There are several reasons why it appears that the total of the average daily balances actually maintained by the Company is less than the total balances required under the Company's arrangements with its depository banks. The major difference between these two figures is made up by disbursement "float." Varying proportions of our daily disbursements take from one to five days to pass through the check clearing system. On our records, we deduct these disbursements at the time a check is issued. However, the bank's records do not reflect this charge until some later time when the check is presented for payment. Accordingly, although the Company's records show daily balances maintained which appear to be less than required, as viewed by the bank on the basis of its records that is generally not the case.

A second reason is the Company's sophisticated cash management program which insures that our bank balances are maintained at the lowest possible level.

- Q. Mr. Rimerman, for what purpose does the Company employ the credit lines which are supported by the bank balances which you have described?

- A. The Company employs these credit lines for many purposes including interim financing of its continuing construction program, prepayment of various state taxes including Gross Receipts, Capital Stock and Corporate Net Income Taxes, to provide flexibility in its financing program and as a back-up to the issuance of commercial paper.

The flexibility in the Company's financing program provided by the availability of these credit lines is of extreme importance, both to the Company and our customers. Should temporary, unfavorable market conditions or some unforeseen incident prevent a planned sale of securities the availability of the Company's credit lines permits continued financing of operations and/or capital construction

without costly disruptions. The possible use of these lines as a reserve source of interim or emergency financing has grown in importance in recent years. The experience of the "credit crunch" in 1974-75, and difficulties of certain corporations in raising interim funds dramatically demonstrates both the value of having access to bank credit and the penalties of not having it.

Q. Do you have a schedule which illustrates the extent to which these credit lines were employed during the test year?

A. Yes, I do. A schedule containing information with respect to the Company's use of these credit lines is detailed in PECO Exhibit I, Volume II, Schedule 2-A-17a and is for the twelve month period ended March 31, 1979.

For the March 31, 1979 test year, dealer commercial paper averaged \$3.0 million and bank master notes averaged \$12.6 million. The maximum short-term debt supported by the Company's lines of credit outstanding during this period equaled \$37.4 million on February 22, and consisted of \$25 million of commercial paper and \$12.4 million of bank master notes. It should be noted that these usage levels are not typical. Borrowings during the test period were held at an extremely low level due to problems in the monetary markets and regulatory lag as evidenced in R.I.D. 438, which was filed in August 1977 with a final Order not being issued until March 1979. These problems forced the Company to change its normal use of short term debt as an interim source of capital and to seek out alternate financing vehicles. Usage levels are expected to increase to historical levels in future years.

Under normal conditions, outstanding short-term debt would be expected to range from a high of \$150 million to a low of \$25 million during the annual period, with an average of about \$50-60 million.

Q. Please describe the efforts which the Company makes to insure that its bank balance requirements are held to the lowest possible level?

A. A very important part of our cash management program is control of our bank balances. Balances are reviewed on a daily basis to insure that minimum balances are met to properly compensate banks for the services which they provide, and also to insure that over-compensation does not occur. The quantity and costs of services provided by our depository banks are constantly reviewed and unit prices are compared for reasonableness. Receipt float is reviewed to determine the proper float factors (the number of days or fraction thereof required for a bank to collect a deposit item). These factors are negotiated with the banks to insure proper credit toward balances. If an error is discovered in the cost or quantity of claimed services as measured against internal controls, a correction is immediately obtained.

Our cash management program takes advantage of technological innovations such as bank direct send techniques, direct deposit of receipt items, sophisticated customer receipt processing equipment, and high speed check in-housing encoding facilities. Employment of these facilities reduces the costs and the accounting period before cash receipts become available to the Company. Our thorough review assures that bank balances are neither over nor under, but rather hit minimum targets.

Q. Have you made a study of the comparative costs to the Company and its ratepayers of obtaining the bank services supported by the claimed bank balances through fee arrangements?

A. Yes, we have studied the comparative costs of obtaining these services through fee arrangements. Present economic analysis, as shown on Appendix A attached,

indicates that there is an advantage to the customer in compensating banks by balances rather than fees. As shown, the total revenue requirement of a fee arrangement for those of the Company's lines of credit which are presently supported by bank balances (i.e. \$159.1 million at March 31, 1979) and associated average borrowings and bank services is \$2.39 million per year as compared to an actual revenue requirement of \$2.02 million for the maintenance of the claimed minimum book balances. In addition to the economic advantage, balance arrangements are preferable to fee lines because it would provide better credit availability in the long run. A fee would compensate the bank for their services and credit commitments, however, the funds available for investment by the bank would be sharply reduced. It would follow then, and this has been confirmed in personal discussions, that a bank who was forced to choose between a borrower who maintains compensating balances and one who is on fee basis, would choose the former. Thus, our bank borrowing capability could be adversely affected if we were on a fee basis.

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## PHILADELPHIA ELECTRIC COMPANY (Total)

Comparison of Annual Revenue Requirements For  
Compensating Balances vs. Fee Arrangement  
(Millions)

<u>Compensating Balance Method</u>	<u>Annual Rev. Requirement</u>
Return on Average Book Balances	
\$12.3 Million X 10.42% Rate of Return	\$1.28 Million/Yr.
Plus Income Taxes <span style="font-size: 2em; vertical-align: middle;">[</span> (10.42% - (52.1% X 8.31%)) X $\frac{.49768}{.50232}$ ] X 12.3 Million	<u>.74</u>
Total Revenue Requirement - Compensating Balances	<u>\$2.02</u> Million/Yr.
<u>Fee Basis</u>	
Stand-By Cost	
Total Lines	X Prime Rate (1)
\$159.1 Million	X 10%
	X Cost (2)
	X .075
	\$1.19 Million/Yr.
Increase in Usage Cost	
Average Borrowings (3)	X Prime Rate (1)
\$ 50.0 Million	X 10%
	X Cost (2)
	X .04
	.20
Cost of Bank Service/per year (4)	.46
Minimum Balance Requirements (5)	<u>.54</u>
Total Fee	<u>\$2.39</u> Million/Yr.

## NOTES:

- (1) For purposes of this comparison 10% is considered a typical Prime Rate.
- (2) Based on actual experience for the two fee lines currently in place.
- (3) Average daily borrowings for the years 1975, 1976, 1977 and 1978 were \$50 Million.
- (4) Calculation of Bank Service  
Charges on a Fee Basis

	<u>Compensation Balance Per Day for Activity</u>	X	<u>Earnings Rate</u>	<u>Fees for Activity (Per Year)</u>
Amount Submitted in PECO Exhibit I, Volume II, Schedule 2-A-16				
Bank Account Activity	\$6,661,000	X	6.9%	.46

(5) With a pure fee line it would be impossible to reduce bank balances to zero due to the unavailability of funds as a result of receipt float. On an average daily deposit of \$5.8 million, 70% or about 4.1 million is not available to the Company on the day of deposit. A minimum bank balance of \$4.1 million converted to a fee basis would cost the Company \$ .54 million per year computed as follows:

\$4.1 x 16% revenue requirements	\$0.66
Less earnings credit for available funds of \$1.7 million @ 6.9%	<u>0.12</u>
Net Cost	\$ .54 Million/Yr.

REBUTTAL TESTIMONY OF

M. W. RIMERMAN

Q. Are you the same Morton W. Rimerman as previously testified in these proceedings?

A. Yes, I am.

Q. In Trial Staff Statement GFM-1, Mr. Markovci has adjusted cash working capital downward by \$27,071,000 to take into account interest payments for the year ended March 31, 1980 (Exhibit GFM-1A). Do you have any comments on this adjustment?

A. Yes. I believe it is totally improper to do this on two accounts.

1. On the following table it will be noted that the embedded cost for both debt and preferred capital has increased in each filing since 1971. This table illustrates that in the period between rate cases embedded costs of preferred and debt has risen significantly. During these intervening periods between rate cases the Company has not been recovering the actual higher costs of debt. Therefore, the Company has continually been experiencing a lag in collection of the higher embedded costs associated with supplying customers.

energy needs. As I have stated in cross-examination, if rates could be adjusted as each higher cost issue is made then there might be some justification for such an adjustment.

<u>Test Year</u>	<u>Embedded Cost</u>	
	<u>Preferred</u>	<u>Debt</u>
<u>Ending</u>		
12/31/70	6.75%	6.00%
8/31/72	7.10%	6.20%
6/30/74	7.50%	7.67%
8/31/75	7.75%	7.84%
12/31/77	7.80%	8.00%
3/31/80	7.80%	8.31%

The effect of this lag can also be seen on page B-19 and B-20 of Exhibit DPS-1 and 2, which sets forth the Company's several debt and preferred issues during this period. In each case these issues exceeded the cost of the Company's Commission approved embedded capital costs. A comparison of date of issue of these securities to the effective date of rates approved in the next following Commission Order indicates the approximate effect of this lag.

In addition, if it is determined that expenses such as debt interest payments and preferred dividends should be included as a credit in the development of the average days lag and expense, there should also be a corresponding negative adjustment to account for the lag in collection of the depreciation expense. Depreciation is accrued on a monthly basis, with the receipt of revenue collection. Such an

adjustment should be made since this depreciation expense is used to supply our monthly internal financing need.

Q. Is there any other error in the theory which Mr. Marcovci uses in adjusting cash working capital for long term interest payments and preferred dividend payments.

A. Yes. If Mr. Marcovci wishes to make such an adjustment he should also take into account the revenue lag associated with interest or dividend collection. Using Mr. Marcovci's own figures he assumes a 90-day lag in the expense payment for long-term interest and a 45-day lag in the payment of preferred dividends. Using his 45-day revenue lag would completely eliminate the preferred adjustment and would eliminate one-half of the long-term interest payment adjustment that was made. However, I do not agree with Mr. Marcovci's development of the 45-day lag.

On Exhibit GFM-1C, Mr. Marcovci has developed a 45-day lag of revenue. This compares to the Company's 57 days which included a 38-day time period for average time a bill is outstanding. Mr. Marcovci, in his analysis, has attempted to break that 38-day period into two segments. The first encompasses the time between bill preparation and the time the bill is remitted without penalty charges and the second is the average period of time that bills are delinquent. In computing the segment associated with delinquency time

span, Mr. Marcovci has failed to consider two important elements. The first being the revenue outstanding on which no late payment penalties are received. In the test period this amounts to in excess of \$10 million in charge offs. In addition, he has not considered those late penalties forgiven during the year.

1 BY MR. SAYRE:

2 Q Now, let's say that the company uses some of  
3 these banks, as I am sure it does, to deposit the amounts  
4 that it receives from its customers and then uses those  
5 accounts to pay its expenses, its payroll and other expenses.

6 I presume that the banks with the high activity  
7 balance shown would be that kind of bank; is that right?

8 A Yes.

9 Q Now, that money, the average daily balance, let's  
10 say, that the company has in the bank, that it uses for  
11 financing its expenses, do those average daily balances count  
12 toward the five to ten per cent of line requirement or toward  
the activity balance requirement that the bank requires?

13 A It accounts toward both.

14 Q That is, the company is not required to maintain  
15 these amounts that you have shown in column E separately  
16 apart from the company's normal accounts and business that is  
transacted at the bank?

17 A Do I gather you are asking whether we segregate  
18 funds to satisfy activity requirements and segregate funds  
19 to satisfy line requirements?

20 Q I gather the answer is no?

21 A Is that what you are asking?

22 Q Yes.

23 A The answer is no.

24 Q And the bank doesn't obviously then require you  
to do so; right?

25 A That is right.

1  
2 balances quite frequently and adequacy or inadequacy of  
3 the balances.

4 Q And have you been getting a lot of such calls  
5 recently?

6 A I have to know what your definition of a lot is.  
7 I have received calls, yes.

8 Q How many of the banks have complained about the  
9 level of your balances, say, in the last - -

10 A Oh, at one time or another I would say just  
11 about all of them.

12 Q In the last few months.

13 A Four, five.

14 Q The figure of 15,098,000, your actual compensating  
15 bank balance, how much of that amount is in addition to the  
16 normal balances that you keep in the accounts for operations?

17 A As shown in this Exhibit, I would say that our  
18 normal balances for operations are about 12 million dollars,  
19 and that would be the 11.9 million that you see in the first  
20 column.

21 The 3.3 million 161 thousand that you see in the  
22 second column, which are escrow or other service accounts,  
23 are the ones that you might say are over and above what we  
24 need for daily operation. These are amounts that are for some  
25 reason escrowed, such as the 1,163,000 common stock dividends,  
million dollars in the payroll account. It is not our money.

1

2

It belongs to the employees. Dividend reinvestment, 369,000 dollars average at Girard Bank, that money belongs to someone else. It is not Philadelphia Electric's. It belongs to shareholders.

3

4

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Q Could you go into more detail about that 1,163,000 figure and the common stock dividend account at the First Pennsylvania Bank?

9

10

11

A Yes. This was the average that was out -- or, on deposit at First Pennsylvania for common stock dividends which had not been presented for payment by the shareholders.

12

13

14

Q So, at any time the shareholders could have drawn that money down if they had all come to claim their dividends as soon as they were allowed to?

15

16

17

18

A Yes.

19

20

21

Q And is that 1,163,000 included in the company's cash working capital claim, or, rather, compensating bank balance claim? I mean to use that term as a generic.

22

23

24

25

A Would you repeat that?

Q Is the company making a claim in rate base for that \$1,163,000?

A No, it is not.

Q Is that \$1,163,000 figured into the, I believe, thirteen monthly balances by which you determined the compensating balance requirement?

A No, it is not.

1                   But I would like to point out that the company  
2 is taking credit for the benefit of the customer by including  
3 this as balances available for the bank to use in calculation  
4 of an earnings credit so that Philadelphia Electric and  
5 ultimately the customers are getting credit for these funds  
6 being on deposit at those banks.

7                   So, no, it is not included as a cash working  
8 capital requirement or allowance; yes, it is being used for  
9 the benefit of the consumer.

10  
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13 (Transcript continues on next page)  
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1 Q Were any of the lines of credit for which  
2 compensating bank balances are claimed in this case, were any  
3 of those lines used during the historic test year?

4 A Yes.

5 Q I presume that's included in your testimony or  
6 in an exhibit somewhere? Could you refer me to that, please.

7 A That's what I'm looking for right now.

8 Q Page 8, perhaps?

9 A It is included -- there is testimony on page  
10 8 of my Statement Number 7.

11 Q I'm looking right now at Exhibit 1, II-A, 17A.

12 A Yes.

13 Q I see a lot of zeroes there.

14 A That's right.

15 Q Is that schedule correct? That none of those  
16 particular lines of credit were used during the test year?

17 A That's right.

18 Q Which ones were used, then?

19 A In your question, I interpreted your question  
20 to be short-term debt outstanding during the test period.  
21 Maybe you had better read it back.

22 Q Let me restate it for you. My question.

23 A Okay.

24 Q My question is of the lines of credit for which  
25 the company is claiming a need for compensating bank balances

1 in this case, how many of these lines of credit were used  
2 during now, the historic test year?

3 A I will answer that this way. These specific --  
4 of these specific lines, there were no borrowings whatsoever  
5 during the test period. However, there were borrowings  
6 during the test period by use of commercial paper, and in  
7 order to sell commercial paper, you must have bank lines  
8 of credit to back up the paper or if you don't, your dealer  
9 will not be able to sell your paper.

10 Some higher credits -- in fact, as Philadelphia  
11 Electric was some years ago when we were a higher credit, we  
12 were able to sell commercial paper without bank loans to back  
13 it up. As the credit fell from Aaa to A and now on the verge  
14 of becoming Bbb, dealers will ~~not~~ sell it because buyers will  
15 not buy commercial paper without bank credit lines to back/<sup>it</sup>up.

16 During that period, the maximum short-term debt  
17 supported by the company's lines of credit outstanding during  
18 this period equalled 37.4 million dollars. That is rather  
19 low, or somewhat low, lower than normal and I would point  
20 out that as of now, there's about \$120 million of short-term  
21 debt outstanding.

22 Q Supported by these lines of credit or in  
23 total short-term debt?

24 A It is short-term debt and it is a combination  
25 of bank loans and commercial paper. But remember, commercial

1 paper must be backed up by bank lines of credit.

2 Q Do the letters that are submitted in Exhibit 1,  
3 attachment 2A-16 contain references to bank balances required  
4 for purchase by the banks of commercial paper?

5 A I'm sorry. Would you repeat that? The letters  
6 in 2A-16 what?

7 Q Do they refer to the bank's requirements that  
8 you testified to for commercial -- pardon me, of your maintain-  
9 ing bank balances in order for them to purchase your commercial  
10 paper?

11 A The banks don't purchase our commercial  
12 paper.

13 Q Who purchases your commercial paper?

14 A They're generally institutional investors  
15 with short-term excess funds that they have available for  
16 the investors. We sell our paper through a commercial paper  
17 dealer, so we do not deal with the purchasers directly.

18 Q So all that you have referred to with respect  
19 to commercial paper doesn't have anything to do with these  
20 bank lines of credit, then?

21 A I stated that in order to sell commercial paper,  
22 the dealer and the ultimate purchasers of that paper want  
23 assurances that they are going to be repaid. And what  
24 assurances do they have? They have our promise to pay, but  
25 with the credit of single A, single A minus teetering on the

1 brink of becoming Bbb, our good promise isn't enough for  
2 them. They want to be sure that there is credit behind  
3 this commercial paper, that if we can't come up with the cash  
4 from our operations, we can borrow it somewhere to repay the  
5 commercial paper purchaser upon maturity.

6 The dealer requires that we maintain bank lines  
7 of credit at least equal to the amount of commercial paper that  
8 we are authorized to sell.

9 Q And what's that amount?

10 A The board of directors has authorized Philadelphia  
11 Electric to issue and have outstanding at any one time commer-  
12 cial paper not in excess of \$75 million.

13 Q You are saying that that dealer -- who is the  
14 dealer?

15 A A. G. Becker, B-e-c-k-e-r.

16 Q Is that an institution or an individual?

17 A It is a firm.

18 Q And does that firm, then, you are saying requires  
19 that you maintain compensating bank balances with banks, at  
20 least in the principal amount of the paper outstanding? Is  
21 that what you are explaining?

22 A No. He doesn't specify how you get these lines  
23 of credit. He merely has stated that in order to sell our  
24 paper, we must have bank lines of credit available to back up  
25 this paper. Now, you could do it with these. You can do it

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1 with balances. He just requires that it be there.

2 Q And that's \$75 million at the present?

3 A That's what we are authorized, yes.

4 Q Your bank lines of credit, am I correct, under  
5 Attachment 2A-17A are \$209,100,000.00?

6 A That's right.

7 Q Have you submitted any letters similar to the  
8 letters for the bank for any contracts in this case that  
9 put in written form your dealer's requirement with respect  
10 to lines of credit?

11 A No. We haven't. And as I recall, it is not  
12 in written form. It is strictly verbal. However, we do report  
13 to the dealer periodically on lines of credit availability.

14 Q What use of these bank lines of credit, commer-  
15 cial paper aside, is forecast during the balance of the future  
16 test year?

17 A Well, I can tell you that we are at \$120 million  
18 as of the close of business on Friday, short-term debt. I have  
19 seen some numbers that indicate prior to the settlement on the  
20 bond offering bids are scheduled to be open tomorrow at noon.  
21 We would expect total short-term debt outstanding to be possibly  
22 around somewhere between \$115 million to \$125 million.

23 Looking forward through the end of this year,  
24 I can see short-term debt at somewhat in excess of \$100  
25 million.

1 Q You expect it to decline a little bit,  
2 then?

3 A Well, we are going to sell bonds tomorrow. We  
4 are going to have a settlement for \$100 million. What we would  
5 do would be to pay short-term debt down and then it would start  
6 increasing. Now, that assumes, of course, that there is a bond  
7 sale tomorrow. With what's happening in financial markets,  
8 well, it just seems -- it really points up, I think, the  
9 need for adequate bank lines so that if some unforeseen  
10 circumstance such as unfavorable credit markets, actions by  
11 some governmental unit, creates an adverse investment climate,  
12 that you do have adequate borrowing facilities to see you  
13 through a trying period.

14 Q But you have received some bids from under-  
15 writers?

16 A No. The bids are -- no. The bidding is tomorrow  
17 at noon at 2301 Market Street on the 25th Floor.

18 Q Oral rather than written?

19 A Written. Sealed bids.

20 Q Have many sealed bids been submitted?

21 A No. In the bidding, they wouldn't go and submit  
22 a bid today on merchandise that they are going to buy  
23 tomorrow. In fact, they won't price their bid until probably  
24 one minute of twelve and they will come running in the room  
25 sealing the bid as they hand it over. This is generally the

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1 way it is done. Now, that doesn't say that the company has  
2 to accept bids. I mean if somebody were to come in and put  
3 a rate of 20 percent on a bond, I think that management  
4 would have second thoughts. But it is this type of uncertainty  
5 that creates the need, in addition to meeting adequate working  
6 capital, short-term borrowing availability. These unforeseen  
7 circumstances can really create a need for borrowing capacity.

8 Q Now, we have been talking about short term debt  
9 in the neighborhood of \$100 million to \$125 million. Of that  
10 figure, how much of it is or do you expect to be actual  
11 borrowings on these lines of credit that we have been referring  
12 to? For which the banks require compensating balances?

13 A Well, if you have \$120 million or \$150 million  
14 worth of short term debt outstanding, then you must have that  
15 \$120 million, \$150 million, whatever it happens to be in bank  
16 lines available. It doesn't matter whether it is in borrowings  
17 from the bank or commercial paper outstanding. You must have  
18 that credit availability.

19 Q Mr. Rimerman, I don't think you have answered my  
20 question yet. I am asking you specifically of this \$100  
21 million to \$125 million, how much either is now or will be  
22 during the future test year, borrowed from these banks under  
23 these lines of credit?

24 A The \$120 million at present?

25 Q We'll start there.

1  
2 A At the present time, \$51 million is in bank  
3 loans. \$8 million are in trust department variable demand  
4 notes which is the same as commercial paper, and \$61 million  
5 in commercial paper, dealer paper.

6 Q So you've got about \$69 million in commercial  
7 paper?

8 A That's right.

9 Q And \$50 million in bank loans?

10 A 51.

11 Q \$51 million in bank loans. Now, out of that  
12 \$51 million in bank loans, is all of that \$51 million borrowings  
13 on this \$209,100,000 total lines of credit that you detail  
14 in II-A-17-A of Exhibit 1?

15 MR. HALL: Do you mean do we have any other  
16 bank loans that we haven't told you about?

17 MR. SAYRE: No. I'm just asking is that  
18 \$51 million that you have currently outstanding in bank loans,  
19 is that included in the \$209,100,000 available line of credit  
20 figure?

21 THE WITNESS: Yes. If I understand your question  
22 correctly. What I'm saying is yes, the \$51 million in  
23 borrowings have been made from this list of banks where we  
24 maintain or have borrowing ability. We certainly haven't gone  
25 someplace else. I mean we have paid for it here and this is  
what we are using.

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BY MR. SAYRE:

Q You're borrowing at prime?

A When we have to.

Q You are borrowing at better than prime for the \$51 million?

A Part of it.

Q Any of it worse than prime?

A Oh, no. Oh, no. Of course, as credit deteriorates, that can happen.

Q Can you say on average, how much better than prime?

A The rates vary from the \$51 million.

Q Well, prime varies, too.

A And the rates varied between about 12.11 percent and 13 and a half.

Q Do you have any estimations that you care to make today about what the yield is going to be on your bond offering to the company?

MR. BURGRAFF: Could I have the question?

THE WITNESS: High.

MR. BURGRAFF: And the answer.

(The question and answer were read by the reporter)

MR. BURGRAFF: Thank you.

THE WITNESS: I know that when we filed our

1 securities certificate with the PUC we used, as I recall,  
2 it was originally like ten and an eighth and then I think it  
3 was updated to like ten and a half percent in the prospectus  
4 and I was in New York last Thursday at an information meeting  
5 and took somewhat of a razzing about assuming a ten and a half  
6 percent rate.  
7

8 BY MR. SAYRE:

9 Q That's the coupon rate?

10 A Yes. It is a nominal coupon rate.

11 Q And how about your par with the company after  
12 its costs?

13 A Assuming that they are sold at par.

14 Q So going back to II-A-17-A, when you have those  
15 two columns of zeros under the description amount outstanding  
16 on any one day during the test year, you mean only the  
17 historic test year?

18 A Yes.

19 Q Could you explain how your company's sophisticated  
20 cash management program adds to the difference between the  
21 company's books for bank balances and the bank's books beyond  
22 what disbursement float already has?

23 A We have cut receipt float dramatically.

24 MR. HERSHEY: Could I have the question and  
25 answer, please?

(The question and answer were read by the reporter)

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STATEMENT NO. 9

PHILADELPHIA ELECTRIC COMPANY

ELECTRIC OPERATIONS

DIRECT TESTIMONY OF

VINCENT S. BOYER

July 1979

TESTIMONY OF VINCENT S. BOYER

Q. Mr. Boyer, would you please state your name and address for the record.

A. Vincent S. Boyer, 2301 Market Street, Philadelphia, Pennsylvania.

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

A. I am Vice-President, Engineering and Research Department for the Philadelphia Electric Company.

Q. What is your educational background?

A. I received my Bachelor of Science Degree in Mechanical Engineering from Swarthmore College in 1939. I received my Master of Science Degree in Mechanical Engineering in 1944 from the University of Pennsylvania. I have also taken graduate courses in nuclear reactor engineering and nuclear instrumentation at the University of Pennsylvania and Drexel University.

Q. Can you tell us something about your experience prior to your present position?

A. In 1939, I joined Philadelphia Electric Company as an Engineer of Plant Tests in the Electric Operations Department. Following service in the United States Navy from 1944 to 1946, I returned to Philadelphia Electric Company and served in various supervisory positions in power stations where I had responsibility for the maintenance and operation of boiler plant equipment. In 1951, I was transferred to the Mechanical Engineering Division where I was engaged in power station design. I was appointed Assistant Superintendent of the Company's Cromby Station in 1952 and I assisted in directing the operator's training program and in placing the two units of the Cromby Station in service. In 1956, I was appointed Superintendent of the Cromby Station. In 1960, I was designated Superintendent of the Company's Peach Bottom Atomic Power Station and in 1963 I was appointed Manager of Nuclear Power in the Electric Operations Department. In January 1965 I was designated Manager of the Electric Operations Department. In October, 1968, I was appointed to my present position of Vice-President, Engineering & Research.

- Q. Have you been active in any professional organizations?
- A. I am a Fellow of the American Society of Mechanical Engineers and past Chairman of its Philadelphia Section. I am a fellow of the American Nuclear Society, a Director and Past President of the Society and have served as Chairman of its Reactor Operations Division.
- Q. What have been your responsibilities as Vice-President of the Engineering and Research Department?
- A. I am responsible for the system planning, engineering design, and construction of Company facilities, including power generation and transmission facilities. In addition, I am responsible for the Company's research activities.
- Q. Have you prepared some exhibit material which further describes the Company's electric system?
- A. We have an exhibit prepared under my direction. This shows salient features of the electric system of the Company and subsidiaries which operate as a single, integrated system.

Counsel:

I ask that a pamphlet entitled "Philadelphia Electric Company - Salient Features of the Company's Electric System" be marked for identification as Exhibit VSB-1.

- Q. Will you please highlight the most significant points of the present electric system as set forth in Exhibit VSB-1
- A. The Exhibit, VSB-1 contains several maps and a table as follows:
- Page 1 - is a colored map of the electric service territory of Philadelphia Electric Company (and its Maryland electric distribution subsidiary). Each numbered area is an operating division. The electric service area of the Company itself, all in Pennsylvania, is 2257 square miles, contains a population of about 5,900,000 and includes 209 cities, townships, and boroughs.

Page 2 - is a map of the electric transmission system of Philadelphia Electric Company and subsidiaries. It shows, in schematic diagram form, all of the Company's generating stations, transmission substations and transmission lines. It also shows overhead circuit mileage from 13 kv to 500 kv and underground circuit mileage from 13 kv to 220 kv. Electrically, the system consists of 11 generating stations plus several combustion turbine locations, about 1100 miles of transmission lines at 69,000 volts or higher, and about 23,000 miles of distribution lines of 33,000 volts or lower. It also includes many substations and general facilities necessary for the supply of its electric service.

Page 3 - is the table showing the PE System's generating capacity which was in service by the summer of 1978 with a summer rating of 7,726,600 kw shown in the last column. The mothballed units (Barbadoes No. 3 and No. 4 and Richmond No. 12) are not included in the tabulation. Philadelphia Electric Company, in addition to operating its own large system, participates in larger power pools as a member of the Pennsylvania-New Jersey-Maryland Interconnection, called "PJM."

Q. Please describe this Interconnection.

A. The PJM Interconnection consists of eleven operating companies in Pennsylvania, New Jersey, Maryland, Delaware and the District of Columbia combined into six member systems as follows:

Public Service Electric & Gas Company

Philadelphia Electric Company Group

Philadelphia Electric Company

Atlantic Electric Company

Delmarva Power & Light Company

Pennsylvania Power & Light Company Group

Pennsylvania Power & Light Company

Luzerne Electric Division

United Gas Improvement Company

Baltimore Gas and Electric Company

General Public Utilities System  
Jersey Central Power and Light Company  
Metropolitan Edison Company  
Pennsylvania Electric Company

Potomac Electric Power Company

Page 4 - is a map of the main power systems in the PJM Interconnection and the interconnections with neighboring systems. The dark red lines show the principal 500 kv interconnections within Pennsylvania which is the backbone of the system. The major mine-mouth generating stations, Conemaugh, Keystone, and Homer City, are located at the western end of the 500 kv system. PE has an ownership share in the Conemaugh and Keystone stations. Philadelphia Electric Company's Peach Bottom and Muddy Run plants, which can be seen at the Maryland border, also are tied into the 500 kv system by one line coming from Conastone Substation in the west, one going east to Keeney Substation in Delaware, another going northwest to Three Mile Island (TMI) Substation, and a fourth 500 kv line running northeast to PE's Whitpain Substation. The Salem plant in which PE has an ownership share, is located on the Delaware River about where it empties into Delaware Bay. This plant is connected to the system by two 500 kv lines going northeast to New Freedom Substation and a 500 kv line going west to Keeney Substation. The Company's Limerick Nuclear Power Station will be located on the 500 kv line near the point marked Cromby. The major interconnections with out-of-state systems also are shown on this map. For example, it can be seen that there are connections at the northwest corner of the state with Niagara Mohawk Power Corporation and with Cleveland Electric Illuminating Company and in the south, with Potomac Edison Company and Virginia Electric and Power Company.

Q. I show you an exhibit which has been marked for identification as VSB-2 and ask you if that was prepared under your direction and supervision?

A. Yes.

Q. Please briefly explain the nature of Exhibit VSB-2.

A. This document was prepared in order to provide a thorough explanation of the method used by the Company to determine the need for increased generating capacity and to explain the higher than normal reserve capacity of the last few years.

The nature and amount of generating capacity which must be added in order to properly serve the public is based on the annual peak load review. We believe that the decisions, necessarily made many years ago because of the long lead time required to install major generating stations, were reasonable ones based upon the facts which then existed and upon thoroughly prepared estimates of future growth. If the unexpected Arab oil embargo of late 1973 and the resulting recession had not occurred, the generating reserves available now and for the next few years would have been barely adequate. The current load and capacity forecast is shown on Table I. The annual peak load is expected to grow between 1978 and 1988 at a 2.5 % compound rate.

Since the equivalent of the energy from Salem No. 2 has been sold to General Public Utilities for the time period of the commercial operation date through 1984, the Salem No. 2 capacity has been removed from the installed capacity for those years. As a consequence, generating reserve capacity and the system reliability have been reduced.

- Q. What is your current reserve capacity requirement for planning purposes?
- A. Currently, the criterion used to determine the required reserve generating capacity is a reliability criterion of loss of load probability of one in ten years. To meet this criterion will require a reserve generating capacity of at least 25% of the annual peak demand. This percent reserve capacity is expected to increase gradually over the next ten years. (See Appendix A, Exhibit VSB-2).
- Q. What is the current reserve capacity requirement being used to determine Philadelphia Electric Company capacity obligation to the PJM Interconnection.
- A. The PJM Management Committee agreed this year to use 22 % reserve capacity as a basis for calculating member companies' capacity obligation for 1981. The 1979 reserve capacity obligation is 20 % of the annual peak load estimated in 1977. The 1980 reserve capacity obligation is 22 % of the annual peak load estimated in 1978. Reserve requirements beyond 1981 have not been estimated, but are expected to approach 25 %. The procedure used to calculate each PJM member's capacity obligation is explained in Appendix E of VSB-2.
- Q. Salem No. 1 was the last generating unit to be installed on the Philadelphia Electric Company System. Was the Salem No. 1 service date deliberately delayed?
- A. No! The service date of Salem No. 1 was not deliberately delayed. The major reasons for the delays that occurred are the labor problems leading to reduced productivity and significant increases in regulatory requirements by the Nuclear Regulatory Commission.

The fifty-two work stoppages during the construction period, including five major construction strikes were the source of the labor problems. In addition, early in the job 900,000 manhours of production were lost because of inclement weather.

Among the increases in regulatory requirements the quality assurance program had a considerable effect on the duration and extension of the construction of the plant. Certain materials had to be qualified in accordance with quality assurance regulations and then vendors obtained who could meet these requirements. This was a time-consuming process. As early as March 1970 Management recognized that the 1972 service date could not be attained.

Q. What was the cost per kilowatt of the construction of Salem No. 1 and one-half of the common plant?

A. We have calculated the cost to be \$670 per kilowatt.

Q. Have you compared that unit cost with the unit costs of other pressurized water reactor units that were completed at or about the same time as Salem No. 1?

A. Yes. For purposes of comparison we selected large generating units which were first units of a multiple unit plant and went in service about the same time as Salem. The costs are for the first unit and one-half of common plant.

The 906 MW Davis-Bessie Unit No. 1 went into commercial operation November 17, 1977 with a cost of \$772 per kilowatt.

The 861 MW Farly Unit No. 1 went into commercial operation August 9, 1977 with a cost of \$880 per kilowatt.

The 852 MW Beaver Valley Unit #1 went into commercial operation on November 1, 1976 with a cost of \$686 per kilowatt.

The 777 MW St. Lucie Unit No. 1 went into commercial operation on December 21, 1976 with a cost of \$630 per kilowatt.

In comparison with these four plants Salem No. 1 cost is reasonable for construction of a large PWR which went into service about the same time as the other four plants. Only one unit had a lower cost per kilowatt.

Q. Did Philadelphia Electric establish an on-site presence to monitor construction of the Salem No. 1 Unit? If not, why not?

A. No. Such a presence would have served no purpose and would have yielded no information not otherwise being obtained from our monitoring the progress and cost of Salem's construction. Since only one organization can be in charge, such a presence would have had a disruptive effect on the Public Service Electric and Gas Company construction organization. In addition, a number of highly trained personnel would have been required. Our skilled personnel were engaged in the construction and management of Peach Bottom for which we are responsible.

Q. In the spring of 1978 Theodore Barry & Associates, Inc. (TB&A) reviewed and evaluated the construction of Salem No. 1 from a management point of view. Are you familiar with the report of TB&A?

A. Yes. The report asserted that had the "preferred management practices" identified by that consultant been employed in Salem's construction, savings in a range of between \$22 million and \$70 million out of a total Salem station cost of \$1.21 billion could have been realized (i.e. between approximately 1.8% and 5.8% of the total cost). PE's share of these savings according to TB&A range from \$5.9 million to \$19.25 million.

Q. Do you agree with these conclusions?

A. No. TB&A's findings are not significant. I would be surprised if a consultant who spent as much as 150 man days reviewing the construction of a billion dollar plant over an extended period of time had failed to find methods for saving at least a few percent of the projects' costs. Hindsight is always better than

foresight. At the time the plant was under construction, Management extended every effort to minimize the cost. To expect perfect management of a construction project of this size is unreasonable. The Public Utility Commission of New Jersey agrees with me and has summarily rejected the report.

- Q. Could you elaborate on the various capacity factors of your generators.
- A. In order to satisfy the varying load requirements of an electric power system in the most economic manner, it is necessary that the available generation have different load carrying functions. The optimum mix of generation must include base load, intermediate and peaking units, so as to minimize the revenue requirements associated with capital and production costs. The higher capital costs of base load units is justified by their low production costs, and as a result these units will operate at a high capacity factor (50-85%). The intermediate type units have lower capital, but higher production costs, that make these units the most economic for cycling duty and have capacity factors in the 20-50% range. Units designated for peaking operation are characterized by minimum capital costs and high production costs. Since they are called on to operate for short periods of time and to provide required reserves, their capacity factors are low (0-20%).

A unit's capacity factor indicates the equivalent hours each year that the unit would have operated had it operated only at rated load. However, units do not always run at full rated output, but will run at values below rated output because of system economic dispatch constraints, or due to partial equipment outages. Thus actual unit running hours may significantly exceed the apparent running hours as indicated by its capacity factor. Accordingly, capacity factors do not in my opinion fully measure the economic and operating value of our generating units.

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- Q. Barbadoes 3&4 and Richmond 12 generators were placed on cold standby status in late 1977 and early 1978. What is their current status.
- A. These units were removed from service when studies demonstrated savings accruing to cold standby status. They were placed on cold standby since the peak load forecast at that time indicated that these units would be required to be returned to service in 1982 to alleviate capacity shortages that would have otherwise occurred. However, the most recent load forecast indicates no further need for these units for capacity reasons, and that retirement is in order. Therefore, a petition to the Public Utility Commission to discontinue standby status and to retire these units is under preparation.

EXHIBIT VSB-2

PHILADELPHIA ELECTRIC COMPANY

ELECTRIC OPERATIONS

EXPLANATION OF LOAD  
FORECASTING AND OF  
PRESENT AND FUTURE  
GENERATING RESERVE  
CAPACITY

July 1979

### The Planning Process

The object of the Philadelphia Electric Company planning process is to plan an electric system that will reliably supply our customers at a minimum cost to our customers.

Generation planning begins with the forecast of future annual sales and peak demands. At least once a year the annual sales and peak demands are estimated for a minimum of 15 years into the future. In addition the generation reserves necessary to reliably supply these forecasted annual peak demands are calculated. The total generation required, peak demand plus reserve, is compared to the installed generation minus scheduled retirements plus committed new generating capacity. When this total forecasted generation requirement exceeds the forecasted supply, additional generating capacity is planned.

The program of generation expansion is reviewed annually and is modified on a timely basis as changes in peak demand forecasts and slippages in the service dates of committed generating units warrant. The type of generating unit and its required service date govern the point in time when the commitment is made to build a particular generating unit. For example, a nuclear unit requires about 12 years from the time of the decision to build to the time of commercial operation (lead time) compared to a combustion turbine which requires two to three years. Lengthening the lead times for new generation requires earlier planning and earlier commitments to build generating stations. Plans may be altered to conform with changes in the financial, regulatory and/or legal environment that the utility experiences

up until the time when the financial penalty, resulting from the additional delay or cancellation, becomes too great.

As mentioned above sufficient generation must be installed to reliably supply the forecasted annual peak demands. Some additional generating capacity above the amount needed to just supply the anticipated annual peak demands is needed to provide a margin of reserve to insure that the probability of the demand exceeding available generating capacity is at an acceptable level. This safety margin is necessary to allow for the day-to-day variations in the operating condition of the installed generation and for the deviations of the annual peak demand from its estimate.

Generation may become unavailable due to either being forced out, or scheduled out for preventive maintenance. Unit failure, or forced outage, is usually the dominant factor in establishing the desired reserve margin. Generating units may be forced out of service five or more weeks each year, although not usually consecutive weeks. If the generating unit is the first of a particular size or type to be built and there are "start-up" problems or if the failure of the generating unit involves damage or destruction of major items of equipment, then the generating unit may be forced out for many months at a time. Preventive maintenance, usually three to five weeks for most units, will ordinarily be performed in the seasons of the year when there is low daily peak demand. However, forced outages are just as likely to occur on the day of the annual peak demand as on any other day. Thus, if large seasonal variations exist in the daily peak demand, the effect of scheduled

preventive maintenance on the required reserve will be small. The converse would be true for a system with relatively small seasonal variations in daily peak demand.

Electric utilities are mandated to provide reliable service. If inadequate generating capacity is installed because the annual peak demand is higher than estimated, there is nothing to be done but reduce or eliminate service to selected customers in order to reduce the demand. Conversely, if the annual peak demand is much lower than estimated because of unforeseen circumstances, generating reserves are higher than necessary at that time. The long lead times required to construct large generating units impose a severe restriction to the flexible planning needed to supply sudden, drastic changes in customers demands.

Because generating units come in discrete sizes, rarely will the installed and planned generation exactly match the required generation. However, the generation requirement is matched as close as can be justified economically. For instance, two small peaking units would not be installed in a year prior to the installation of a large base unit just to have sufficient reserves during that year.

The sharing of excess reserves is an example of one major advantage of power pools. If in a given year one company has a generating capacity deficit, another company who has an excess of generating capacity can be the source of generating

capacity for the deficit company. Of course, the transmission must be adequate to permit transfer of this capacity from one company to another. Philadelphia Electric Company is a member of the Pennsylvania-New Jersey-Maryland (PJM) Interconnection.

#### Generation Reserve Goal

The amount of generation reserves required depends on the desired reliability of the system. The public has grown to expect and depend on highly reliable electric service. However, electric utilities can only supply service as reliable as can be justified economically. As a result of considerable study a criterion has been established which appears to satisfy the customers' needs for reliable service without imposing excessive costs on the electric utility. This criterion is a goal which utilities try to achieve during periods of growth in annual peak demand.

The PJM Interconnection reliability criterion, which in recent years has become widely used by many other companies, is that customers will not experience a curtailment in electric service more than one day every ten years because of an inadequate supply of generation. For Philadelphia Electric Company and other members of the PJM Interconnection, approximately 20% of the estimated annual peak demand has been the reserve generating capacity required to meet that reliability criterion. An explanation of the method used to obtain a more accurate estimate of the required reserve percentage is found in Appendix A.

Generation reserves which are higher than those needed to meet the reliability criterion may be economically justified. When the annual fuel plus operating savings of a new generating unit is greater than the fixed annual costs of the new unit (capital carrying charges plus fixed operating and maintenance costs), then the new unit should be installed regardless of the installed reserve capacity. An example of such units are Peach Bottom Nos. 2 and 3, where low cost nuclear fuel is replacing high cost fossil fuels.

PEACH BOTTOM ESTIMATED ANNUAL SAVINGS (PER SHARE)

	<u>(Millions of Dollars)</u>				
	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Carrying Charges	16.3	66.0	63.7	63.6	61.4
Fuel Cost	4.5	12.5	14.0	12.3	19.7
O&M Cost	<u>0.7</u>	<u>4.7</u>	<u>11.9</u>	<u>18.5</u>	<u>16.7</u>
Total Revenue Requirement	21.5	83.2	89.6	94.4	97.8
Minimum Cost of Replacement Energy	<u>34.7</u>	<u>96.6</u>	<u>108.6</u>	<u>97.0</u>	<u>157.9</u>
Minimum Net Savings	13.2	13.4	19.0	2.0	60.1

History of Annual Peak Demands and Generation Reserves

Annual peak demands (usually referred to as annual peak loads) have not grown since 1973 because of the 1973 Arab oil embargo and the ensuing business recession, energy conservation and curtailments of usage. The following table shows the annual peak loads, the installed generating capacity at the time of the peak load and the percent reserve capacity at the time of the peak load.

Historical Annual Peak Loads and Installed Generating Capacity

Year	Actual Annual Peak MW	Change (2) in Peak MW	Installed Generating Capacity MW	Change (2) in Gen. Capacity MW	Percent Generation Reserve Capacity	Weather Corrected (1)	
						Peak MW	Percent Reserve Capacity
1966	3,673		3,572		(2.7)	3,680	(2.9)
1967	3,727	54	4,111	539	10.3	3,970	3.6
1968	4,375	648	4,800	689	9.7	4,460	7.6
1969	4,592	217	5,066	266	10.3	4,820	5.1
1970	4,712	120	5,357	291	13.7	4,910	9.1
1971	4,922	210	5,928	571	20.4	5,040	17.6
1972	5,313	391	6,136	208	15.5	5,340	14.9
1973	5,760	447	6,377	241	10.7	5,630	13.3
1974	5,431	(329)(3)	6,968	591	28.3	5,620	24.0
1975	5,530	99	7,214	246	30.5	5,530	30.5
1976	5,346	(184)(3)	7,167	(47)(3)	34.1	5,650	29.6
1977	5,888	542	8,202	1035	39.3	5,580	47.0
1978	5,667	(221)(3)	7,727	(475)(3)	36.4	5,630	37.2

- Notes: (1) Corrected to the most severe temperature conditions which have a 50 % probability of occurrence.  
 (2) Change from previous year.  
 (3) Decrease

The generation reserve capacity column indicates that generation reserves were not above the reliability goal until 1974, never exceeding 20.4 %. In some years, particularly the late 1960's, they were deficient.

The column of the change in the annual peak loads shows that the annual peak loads regularly grew until 1974. Since then, the actual annual peak load has been oscillating between the 1976 low of 5346 MW and the 1977 high of 5888 MW. Only the 1977 peak load exceeded the 1973 peak load of 5760 MW.

The size of the annual peak load depends to some extent on the weather conditions at the time the annual peak load occurs. The Philadelphia Electric Company annual peak load occurs on a hot, humid day in the summer when our customers have a maximum need for air conditioned comfort. A better indication of the annual peak load growth can be observed by correcting the actual peak loads to what they would have been under standard weather con-

of occurrence). On a weather corrected basis, the annual peak load in 1978 is equal to 1973, showing no growth in annual peak load for the last five years. Weather corrected annual peaks and percent reserve capacity based on those peaks are shown on the last two columns of the Table. Clearly the major reason for the high generation reserve capacity of recent years was that the annual peak load, at least temporarily, stopped growing. The situation which has occurred as compared to our expectation is graphically portrayed on Figure 1.

#### Forecast of Annual Peak Demands and Generation Reserves

The current estimates of the 1979-1988 annual peak loads, installed generating capacity, and percent generation reserves are listed in Table I, on the following page. Based on current projected peak loads, Table I exhibits a higher than normal reserve generating capacity in 1979 steadily decreasing to reach a normal reserve capacity by 1982.

In an effort to reduce the current higher than normal reserve generating capacity, Philadelphia Electric Company has agreed to sell to General Public Utilities Company the energy from Salem No. 2 generating unit for five years. As a consequence, the Salem No. 2 generating capacity has been removed from the installed generating capacity figures of Table I for the years 1980 through 1984. In addition, negotiations are in progress with Atlantic Electric Company (AE) to sell to AE a portion of the Limerick generating units.

The other companies of the PJM Interconnection are also experiencing the same phenomena of higher than normal reserves as indicated in Table I.

The reasons for the current higher than normal reserves can best be explained by looking at the reasons for the high generation reserve capacity experienced over the last five years (1974, through 1978).

TABLE I

## ANNUAL PEAK LOAD AND INSTALLED GENERATING CAPACITY FORECAST

Year	Philadelphia Electric Company			PJM Interconnection			
	Generation Changes	Installed Generating Capacity-Mw	Estimated Peak Load Mw	Reserves %	Installed Generating Capacity-Mw	Estimated Peak Load Mw	Reserves %
1979		7727	5700	36	44888	33160	35
1980	+ 474 Mw; Salem 2 - 23 Mw; Retire Schuylkill 9 - 15 Mw; Derate Schuylkill 3	7689(1)	5850	31	45591	34140	34
1981		<u>7689(1)</u>	6000	28	46991	35350	33
1982	- 124 Mw; Retire Chester 5&6 - 6 Mw; Deration (2)	7559(1)	6150	23	49316	36720	34
1983	- 17 Mw; Deration (3)	7542(1)	6300	20	49408	37870	30
1984		7542(1)	6450	17	51069	38970	31
1985	+1055 Mw; Limerick 1 - 38 Mw; Retire Barbadoes 6&7 - 166 Mw; Retire Richmond 9	8867	6600	34	53097	40110	32
1986		8867	6800	30	54310	41270	32
1987	+1055 Mw; Limerick 2	9922	7000	42	56110	42400	32
1988		9922	7200	38	56735	43580	30

(1) Energy from Salem 2 contracted to GPU through 1984; capacity is not included in PECO installed total until 1985.

(2) The result of the addition of cooling towers at Cromby.

(3) The results of the addition of sulfur dioxide removal equipment at Eddystone and Cromby.

Reasons for the High Generation Reserve Capacity

The reasons for the high generation reserves over the last five years are that the recent nuclear generating unit additions were planned many years ago to supply estimated annual peak loads which were higher than those recently experienced. Also additional short lead time units had to be installed because of delays in construction of the large nuclear generating units. The reduction in annual peak loads has been the result of the conservation of electrical energy usage caused by a public appeal to reduce energy usage; the curtailment of electric energy usage caused by the higher oil prices and the resulting higher prices for electricity; the 1973-1975 business recession; and the emigration of people from the Philadelphia region. None of these circumstances were or could have been foreseen by PE peak load forecasters.

The timetable for the nuclear units as originally planned versus the actual service dates and current projections is shown in the following table.

Nuclear Units

<u>Year Planned*</u>	<u>Nuclear Unit</u>	<u>Planned Capacity (Mw)</u>	<u>Original Planned Service Date</u>	<u>Actual or Current Service Date</u>
1965	Peach Bottom #2	450	1971	1974
1965	Salem #1	450	1972	1977
1965	Peach Bottom #3	450	1973	Late 1974
1965	Salem #2	450	1974	Late 1979
1968	Limerick #1	1055	1975	1985
1968	Limerick #2	1055	1977	1987

\* Year initial decision was made to install units.

Because of construction delays in building the Peach

Bottom and Salem nuclear units and regulatory delays in the construction of the Linerick nuclear units, additional generating units, which could be built in a short time period, had to be installed to meet the supply deficiency that would have otherwise occurred.

Supplementary Units

<u>Year Planned*</u>	<u>Unit</u>	<u>Type</u>	<u>Planned Capac. (Mw)</u>	<u>Initial Service Date</u>	<u>Actual Service Date</u>
1968	Combustion Turbines (CTs)	Oil Fired	600	1971	1971
1970	Eddystone #3	Oil Fired	400	1974	1974
1970	Eddystone #4	Oil Fired	400	1975	1976
1972	Croydon CT's	Oil Fired	400	1974	1974

\* Year initial decision was made to install units

When the nuclear and the replacement generating units were planned, the annual peak load forecasts were much higher than were subsequently experienced. During the late 1960's the rapid growth in the use of air conditioning caused PE's actual summer peak loads to grow rapidly. Annual peak load forecasts were continuously being revised upward (See Figure 2). As a result the nuclear generating units were planned. But when delays in the construction of these units became apparent, additional generating units with short lead times (e.g. Eddystone #3 and #4 had to be installed to replace the delayed generating capacity.

Then in 1974 the Arab nations quadrupled the price of oil which precipitated higher electric prices and a prolonged business recession. The Philadelphia area was hit especially hard by the downturn in business activity. As a result PE's annual peak loads in 1974, 1975, 1976 and 1978 were all less than the 1973 annual peak load. Since the annual peak loads were considerably reduced from those previously forecast and the generating units had been installed to supply the higher annual peak loads, PE had higher than normal generation reserves.

Annual peak load forecasts are the basis upon which decisions are made to install additional generating units. The current method used to forecast annual peak loads is described in Appendix B. Annual peak load forecasts are under constant review and are updated periodically as conditions warrant. The annual peak loads are a function of the annual energy sales. Thus the reasons for the five year period of no growth in annual peak loads and the resulting increased generation reserves can be explained by examining the causes for the reduced energy sales.

#### Energy Sales Reduction Caused By Conservation

The estimates of conservation for residential customers were obtained by comparing billing data prior to and after the Arab oil embargo of 1973 and from customer surveys made in 1978 and 1979. Conservation estimates for small commercial and industrial customers were determined by comparing the billing data of existing customers with prior years' data. Our larger customers were interviewed at random and their bills compared to determine the extent of their conservation.

Energy conservation has been an important cause of the slower growth of electric sales since 1973. On the basis of our experience from 1973 through 1978, Philadelphia Electric Company estimates that the reduction in sales by reason of conservation has averaged about 2.0% annually or approximately 500 million kilowatt hours per year.

Energy Sales Reduction Caused by the Recession of 1973-1975

Another important reason for the decrease in energy sales is the recession of 1973-75 and its lingering after effects. According to the National Bureau of Economic Research, the recession lasted for 16 months, from November 1973 to March 1975. This duration makes it the longest recession since the Great Depression. The average peacetime recession since 1945 has lasted 10 months. The Arab oil embargo was a major reason for the long duration of the recession. It forced a decline in economic activity. This, in turn, cut consumer incomes and employment, and generated a spiral of rising unemployment and prices and declining output. Partly because of its long duration, the recession was also the deepest of the entire postwar period. This is documented by almost any measure including the largest drop in the average work week, stock prices, building permits, Gross National Product or Gross Regional Product in constant dollars, and corporate profits after taxes. At the same time, interest rates, prices, and the unemployment rate rose higher than in any peacetime recession. From the Philadelphia Electric Company point of view, perhaps the most discouraging statistic came from the Federal Reserve Board documenting the fall in industrial capacity utilization from a level of 88% in mid-1973 to a level of 71% by early 1975. The major economic effect of such a fall in the industrial capacity utilization rate is that capacity expansion is postponed. This postponement causes a reduction in economic activity that will never be made up. In other words, the amount of energy-using plant, equipment and appliances is lower in any given year because of the

loss induced by this decline in utilization of industrial capacity. The loss of manufacturing energy sales since 1973 to Philadelphia Electric Company is shown in the following table:

Actual Energy Sales to Manufacturing Businesses

<u>Year</u>	<u>Millions of Kwh</u>
1971	7,587
1972	7,910
1973	8,302
1974	8,127
1975	7,321
1976	7,654
1977	7,803
1978	8,044

From 1973 to 1975, manufacturing energy sales fell by 981 million kilowatt-hours, or 11.8%. The economy made some recovery since 1975, but the level of activity in 1978 was still 258 million kWh below its previous peak of 8,302 million in 1973. The national industrial capacity utilization rate improved since 1975 and by 1978 it has reached the full utilization level of 92%. Energy sales to Philadelphia Electric manufacturing customers made a partial recovery by 1978 increasing 723 million kilowatt-hours, or 9.9% above 1975, but still 3.1% below the 1973 level. Energy sales to manufacturers will have to increase by an additional 258 million kilowatt-hours, or 3.2% more than in 1978 just to regain the pre-recession peak of 1973. Of the 648 million kilowatt-hour reduction in sales between 1973 and 1976, about 410 million kilowatt-hours is attributed to the severe business recession and, as previously discussed, will not be regained.

In relative terms, the recession affected Philadelphia more severely than the United States as a whole. This is evident from the unemployment rate in Philadelphia Standard Metropolitan Statistical Area (SMSA) which has been greater than the National rate since 1973.

<u>Unemployment Rate</u>		
<u>Year</u>	<u>U.S.</u>	<u>Phila. SMSA</u>
1973	4.9	5.6
1974	5.6	5.9
1975	8.5	8.7
1976	7.7	8.5
1977	7.0	8.6
1978	6.0	7.3

The Philadelphia Labor Market Area is currently considered a Labor Surplus Area. As a result, other areas of the country are relatively more attractive for people looking for work. This, in part, helps to explain the third cause for the reduced energy sales.

#### Energy Sales Reduction Caused by Emigration from Philadelphia Region

The third important cause of the reduced energy sales and reduced annual peak loads is the serious loss of population the Philadelphia region has experienced since 1970. According to U. S. Bureau of the Census figures released in 1978, 207,900 people emigrated from the Philadelphia five-county area from 1970 to 1977. Extrapolating at the same annual rate to 1978, the number would increase to 237,600 or 6.1% of the 1970 population of 3,872,000. This loss of population is being duplicated in most of the large metropolitan areas in the country including Boston, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, Milwaukee, New York and Seattle. In Pennsylvania, Pittsburgh

experienced an emigration of 134,600 from 1970 to 1977. Previous to 1970, the Philadelphia area experienced a net immigration of people. Electric use per capita in the five-county Philadelphia area in 1978 was:

$$\frac{27.394 \text{ Million KWh} = 7,310 \text{ kWh/capita}}{3,747,500 \text{ Population}}$$

Thus the loss of 237,600 people since 1970 could have reasonably caused a reduction of 1,737 million kilowatthours in energy sales in this time interval.

#### Total Energy Sales Reduction

In summary, there has been a total reduction in Philadelphia Electric Company's annual energy sales of about 4.7 billion kilowatthours because of conservation, the long business recession, and the emigration of people from the Philadelphia area.

#### Reduction in 1978 Annual Energy Sales

	<u>Billions kWh</u>
Conservation and Curtailment from 1974 through 1978	2.6
Long Recession from 1973 to 1975	.4
Population Loss 1970 to 1978 (Incl. Plant Closings since 1974 = .5)	<u>1.7</u>
TOTAL	4.7

Energy sales in 1978 would have been 4.7 billion kWhrs (or 17%) higher than the energy sales actually experienced. As a rule of thumb, a 17% increase in energy sales is the equivalent of an approximately 15% increase in the annual peak load. If the 1978 peak load had been approximately 15% greater than the actual peak load of 5,667 mw, the installed generation reserve would have been only 18.6% instead of the 36.4% that was actually experienced.

Clearly, over the last five years there have been significant disruptions to what had previously been a steady pattern of economic and energy growth in the Philadelphia region. The installed generating capacity that existed in 1978 was the result of decisions that were made in 1965, 1968, 1970 and 1972 when no one could have reasonably anticipated the three major interruptions in past trends which have been previously identified. As late as September 13, 1973 in its 24th Annual Electrical Industry Forecast, Electrical World said:

"The electric utility industry thus faces a sharply increasing demand for its services - a demand that can be met only be a record-shattering drive to build new facilities."

The important lesson to be learned from the past ten years is that factors such as wars, rapid changes in conservation and curtailment of usage, population migration, and recessions are very powerful forces which are without control and impossible to forecast accurately. The best that a utility can do is adjust to them as rapidly as possible when they have been identified as having a significant influence on the future of the Company.

#### Revisions to Annual Peak Load Forecasts

Philadelphia Electric Company has always considered the ever changing conditions of the Philadelphia region when making annual peak load forecasts. Because of the changing economic and demographic climate of the region, the annual peak load estimates for the early 1970's did not materialize.

According to Mr. George I. Bloom, Chairman of the Public Utility Commission, Philadelphia Electric Company's forecasts made during the late 60's and 70's were too low. In a letter to R. F. Gilkeson on April 21, 1970 Mr. Bloom stated, ". . . if the RJM member companies continue to follow a forecasting procedure based on an annual load growth of less than 10%, they will be unable to meet the projected electric demands that we predict will

occur in the next ten years." (See Appendix C). In 1970 PE forecast an annual peak load growth of about 7.5%, considerably less than the 10% suggested by Mr. Bloom.

As each subsequent summer's peak load was less than predicted, the forecasts were reduced as shown in Figure 3. As the annual peak load forecasts have changed, there have been changes in planned capacity additions. Even with the reduced peak load forecasts there was concern that the generation reserves would be inadequate during the mid-1970's. Philadelphia Electric Company was not unique in forecasting higher annual peak loads than actually occurred. Electrical World in their annual forecasts also revised its forecasts of the total U.S. annual peak demands upward until 1974 as shown in Figure 4.

#### History of Generation Reserve Goals

Reserve generation capacity is needed to provide assurance that when the annual peak load is demanded by our customers there will be enough generation available to supply that demand. Generation may be unavailable for a variety of reasons; the most common reason is that some portion of the complex generating unit is broken or not functioning properly. (For a detailed explanation of the method used to determine the desired generation reserve see Appendix A.)

Philadelphia Electric Company has not historically had more than enough generation reserve. Every year since 1968 until 1974 at the time of the annual peak load there was not enough generation capacity available to supply the load except for 1969 when there was just enough. This is shown in the following table.

Installed Generating Capacity vs. Available  
Generating Capacity at Time of Annual Peak

<u>Year</u>	<u>Actual Summer Peak MW</u>	<u>Installed Generating Capacity MW</u>	<u>Available Gen. Cap. at time of Peak - MW</u>	<u>Available Percent Reserve</u>
1968	4375	4800	4164	-4.8
1969	4592	5066	4594	0.0
1970	4712	5357	4475	-5.0
1971	4922	5928	4780	-2.9
1972	5313	6136	4851	-8.7
1973	5760	6377	5660	-1.7
1974	5431	6968	6110	12.5
1975	5530	7214	5826	5.4
1976	5346	7167	6711	25.5
1977	5888	8202	6121	4.0
1978	5667	7727	6643	17.2

During the last ten to twelve years the amount of installed generation considered adequate to supply a given estimated annual peak load has increased substantially. In the early and mid 1960's 12 to 15 percent of the estimated annual peak was considered an adequate generation reserve. As a result of the northeast blackout on November 9, 1965, the Pennsylvania Public Utility Commission stimulated the electric utilities to increase their generating capacity. Efforts by Philadelphia Electric Company and other Pennsylvania electric utilities to reassure Commission representatives that adequate capacity was available to meet forecast peak loads and still maintain adequate reserves were not accepted with confidence. On March 31, 1966, the utilities were told that immediate preparations should be made to increase installed capacity until a reserve of 20% above forecasted annual peak loads was reached (see Appendix D). The utilities agreed to accept the Commission's proposals and institute construction programs that would meet the stated goal. Again on June 19, 1967, after the June 5, 1967 blackout, the PUC was concerned that there was "insufficient reliable capacity and transmission lines to meet customers demands." On September 16, 1969, Commonwealth Associates presented to the Commission and the PJM member

companies, an analysis of the interconnection system with recommendations to avert the expected capacity deficiency. As a result, the companies were told that the Commission wanted 2,000 megawatts of combustion turbine capacity installed immediately. After deliberation, the companies responded that 1,200 megawatts was more reasonable because the cost would exceed \$100 million for this amount of generation. Philadelphia Electric Company's share of this 1200 mw of combustion turbines was 600 mw.

Coincidentally, at about this same time, the physical characteristics of the PJM Interconnection were such that 20% reserve was calculated to be about the right reserve capacity needed to meet the reliability criterion.

#### Delays in Construction of Nuclear Power Plants

In addition to having to meet higher generation reserve requirements, the delays in the construction of the planned nuclear units compounded the problem of installing enough generation to have the desired generation reserves. Over the past 12 years, Philadelphia Electric Company has been forced to adjust to delays in the construction of nuclear plants caused by a lengthening of the nuclear licensing process, a need to constantly retrofit safety systems and an inability to hold construction schedules.

In 1965, Philadelphia Electric Company first announced its plans for the Peach Bottom and Salem nuclear units. The schedule was as follows:

<u>Year</u>	<u>Unit Additions</u>
1971	Peach Bottom #2 450 Mw
1972	Salem #1: 450 Mw
1973	Peach Bottom #3: 450 Mw
1974	Salem #2: 450 Mw

Counting the preliminary planning and engineering time, this schedule was based on the time required to install nuclear units as it was estimated in 1965.

Successive peak load forecasts made in 1968, 1969 and 1970 were each higher than the previous one. Therefore, on the basis of the load forecast made in 1968, PE then decided to build two more nuclear units at Limerick for service in 1975 and 1977. The May 1968 forecast estimates were as follows:

May 1968 Load, Capacity and Reserve Forecast

<u>Year</u>	<u>Forecasted Peak Load Mw</u>	<u>Estimated Installed Capacity-Mw</u>	<u>Estimated Reserves (%)</u>	
			<u>With Limerick</u>	<u>Without Limerick</u>
1970	4720	5245	11.1	11.1
1971	5040	5730	13.7	13.7
1972	5360	6146	14.7	14.7
1973	5680	6599	16.2	16.2
1974	6010	7073	17.7	17.7
1975	6340	7968	25.7	11.5
1976	6670	7968	19.5	6.0
1977	7010	8863	26.4	0.9

Also in 1968, Pennsylvania utilities were urged to set a generation reserve goal of 20% of the estimated annual peak load. Because of the time required to construct base generating units it was impossible by the early 1970's to reach that reserve capacity by building additional base generating units; therefore, Philadelphia Electric Company turned to internal combustion generation which could be installed more rapidly. The installation of combustion turbines was planned in 1970, 1971, and 1972.

Then in 1970 it was recognized that Peach Bottom #2 and Salem #1 would be delayed one year from 1971 to 1972 and 1972 to 1973 respectively. In addition, a one year delay in Peach Bottom #3, Salem #2 and Limerick #1 and #2 was anticipated. Because of the large number of combustion turbines installed and planned for installation (about 1100 Mw) there was an excess of peaking capacity and thus a need to meet further requirements with base and intermediate capacity. Therefore Eddystone #3 and #4 (400 mw each) were planned as intermediate units for service in 1974 and 1975. At that time forecast estimates were as follows:

June 1970 Load, Capacity and Reserve Forecast

<u>Year</u>	<u>Forecasted Peak Load Mw</u>	<u>Estimated Installed Capacity-Mw</u>	<u>Estimated Reserves %</u>	
			<u>With Eddystone 3 &amp; 4</u>	<u>Without Eddystone 3 &amp; 4</u>
1971	5360	6167	15.1	15.1
1972	5880	6820	16.0	16.0
1973	6350	6898	8.6	8.6
1974	6880	7950	15.6	9.7
1975	7500	8622	15.0	4.3
1976	8040	9677	20.4	10.4
1977	8600	9677	12.5	3.2
1978	9180	10732	16.9	8.2
1979	9780	11832	21.0	12.8
1980	10400	11832	13.8	6.1

Two years later by May of 1972, the following unit delays had been experienced:

Unit Delays by May 1972

Peach Bottom #2	from 1971 to 1974 (3 years)
Salem #1	from 1972 to 1975 (3 years)
Peach Bottom #3	from 1973 to 1975 (2 years)
Salem #2	from 1974 to 1975 (1 year)
Limerick #1	from 1975 to 1977 (2 years)
Limerick #2	from 1977 to 1978 (1 year)

In spite of the reduction of the annual peak load forecast in 1972, the already experienced capacity delays meant that additional generating capacity had to be installed by 1974 if Philadelphia Electric Company was to have the desired generation reserves. Because time was short (1974 was only two years away), combustion turbines were the only viable alternative; therefore 400 mw of combustion turbines at Croydon were planned. The Croydon combustion turbines, unlike other combustion turbines previously available, have regenerative heat exchangers and can operate as intermediate generation and oil was a relatively inexpensive fuel. These units were expected to not only supply a capacity deficit in 1974 but to be much needed intermediate generation for many years thereafter.

The May 1972 forecast estimates were as follows:

May 1972 Load, Capacity and Reserve Forecast

<u>Year</u>	<u>Forecasted Peak Load Mw</u>	<u>Estimated Installed Capacity-Mw</u>	<u>Estimated Reserves %</u>	
			<u>With Croydon</u>	<u>Without Croydon</u>
1972	5450	6137	12.6	12.6
1973	5950	6424	8.0	8.0
1974	6460	7374	14.1	7.9
1975	7030	8965	27.5	21.8
1976	7610	8965	17.8	12.5
1977	8090	10020	23.9	18.9
1978	8650	10915	26.2	21.6
1979	9140	10915	19.4	15.0
1980	9630	12075	25.4	21.2
1981	10120	12075	19.3	15.4

Need for Base, Intermediate and Peaking Generating Capacity

Each type of generating capacity installed during the time interval 1968 to 1976 has qualities which make it appropriate for the proper mix of generating units which comprise Philadelphia Electric Company's generation. This is evident if we examine the PE load duration curve (Figure 5). The load duration curve is a graph of the percentage of the time that the hourly load is equal to a percentage of the annual peak load. The shape of this curve together with the variation in fuel costs, form the basis for the economic selection of unit types to supply the load. In general the base generating capacity is best supplied by nuclear or coal-fired steam units which have a relatively high capital cost and low fuel cost. The intermediate generating capacity is best supplied by fossil-fired steam units which have the ability to cycle (shut down and return to service over

a short time interval, e.g. daily). These units have relatively moderate capital costs and are often the older generating units which were previously base generating capacity. The peaking generating capacity is economically supplied by either generating units which have a low capital cost and high operating costs or which have limited energy generating capability since they can be operated very few hours during the course of a year. On the Philadelphia Electric Company system, combustion turbines, hydroelectric generation and pumped hydro-electric generation are considered peaking generating capacity.

The combustion turbines installed in the early 1970's filled the need for generating capacity which could be installed in a short time and also provide peaking generating capacity for the Philadelphia Electric Company system. The Croydon combustion turbines are more efficient than the simple heat cycle turbines and can be used as intermediate generating capacity. They have a heat rate of approximately 10,000 btu/kwh (34% efficiency) as compared to 14,000 btu/kwh (24% efficiency) for simple heat cycle units. The regenerative heat cycle type of unit was not available from manufacturers until 1972. Eddystone #3 and #4 units also provide the intermediate cycling generating capacity needed to supply the Philadelphia Electric Company energy requirements.

#### Current Generating Capacity Additions

Currently, the only Philadelphia Electric Company generating units under construction are Salem No. 2 (a jointly-owned unit) and Limerick No. 1 and No. 2. These three units are nuclear units which have long lead times. All three have been delayed from their original

service dates. Further delay in the installation of these units would be uneconomical. Even if the annual peak load remained constant over the next eight to ten years, the savings in fuel costs by operating these units will more than offset the costs incurred by completing their construction.

FIGURE 1

159a

PHILADELPHIA ELECTRIC COMPANY SYSTEM  
ELECTRIC PEAK LOADS-CAPACITY

MILLION  
KW

MILLION  
KW

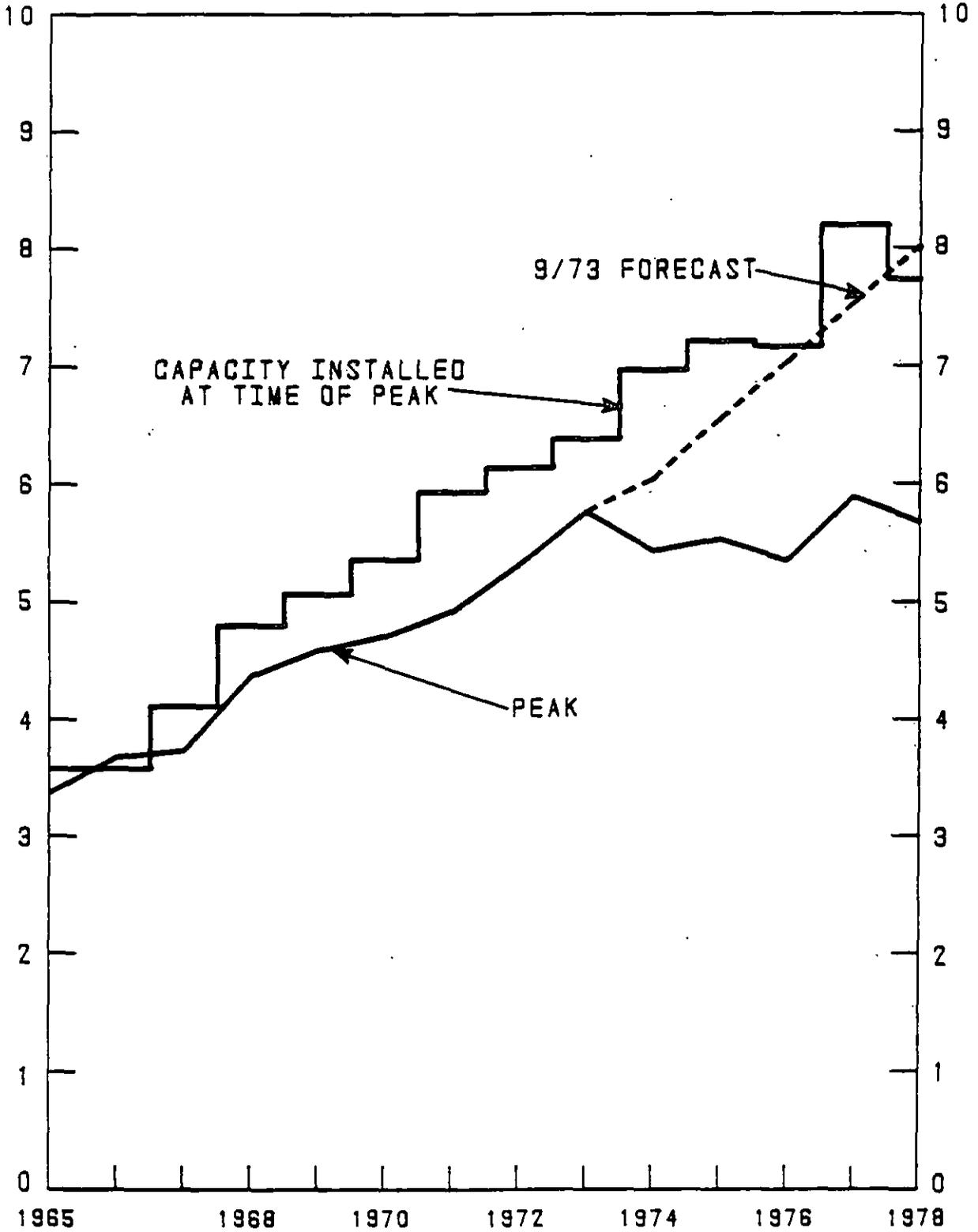


FIGURE 1

FIGURE 2  
 PHILADELPHIA ELECTRIC COMPANY SYSTEM  
 PEAK LOAD FORECASTS - 1965, 1968, 1970

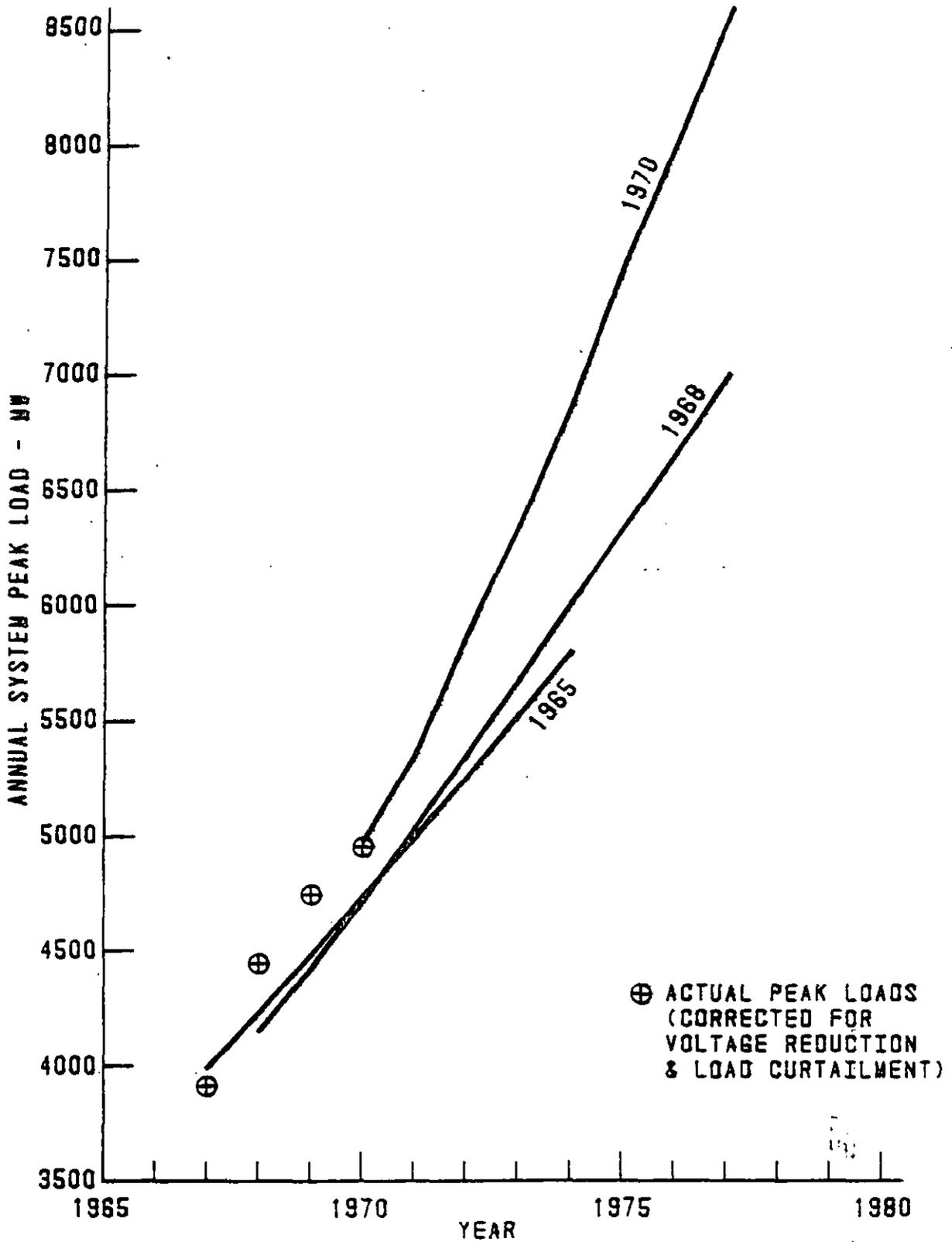


FIGURE 2

FIGURE 3  
 PHILADELPHIA ELECTRIC COMPANY SYSTEM  
 PEAK LOAD FORECASTS - 1970 TO 1979

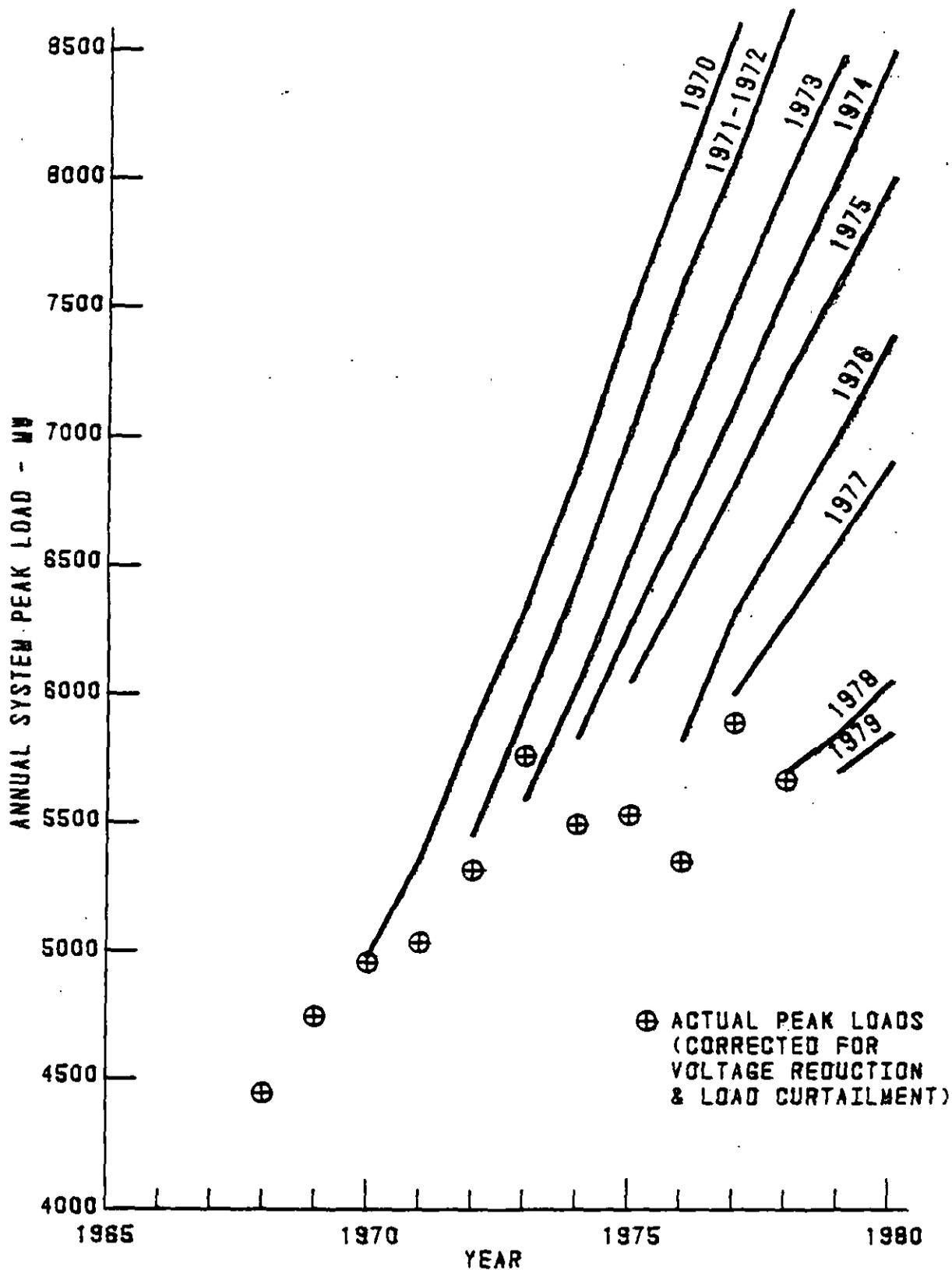


FIGURE 3

FIGURE 4  
ELECTRICAL WORLD NATIONAL FORECASTS

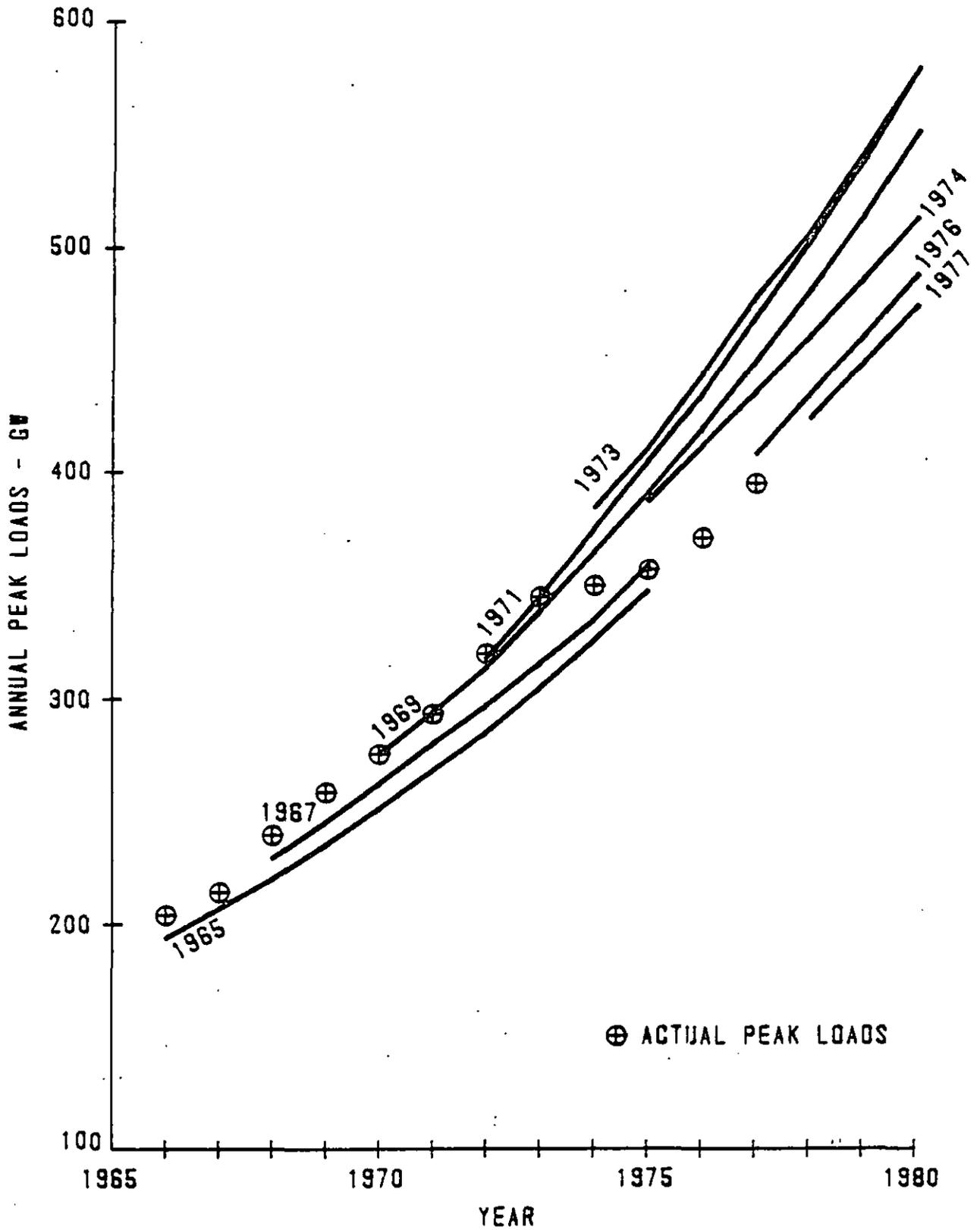
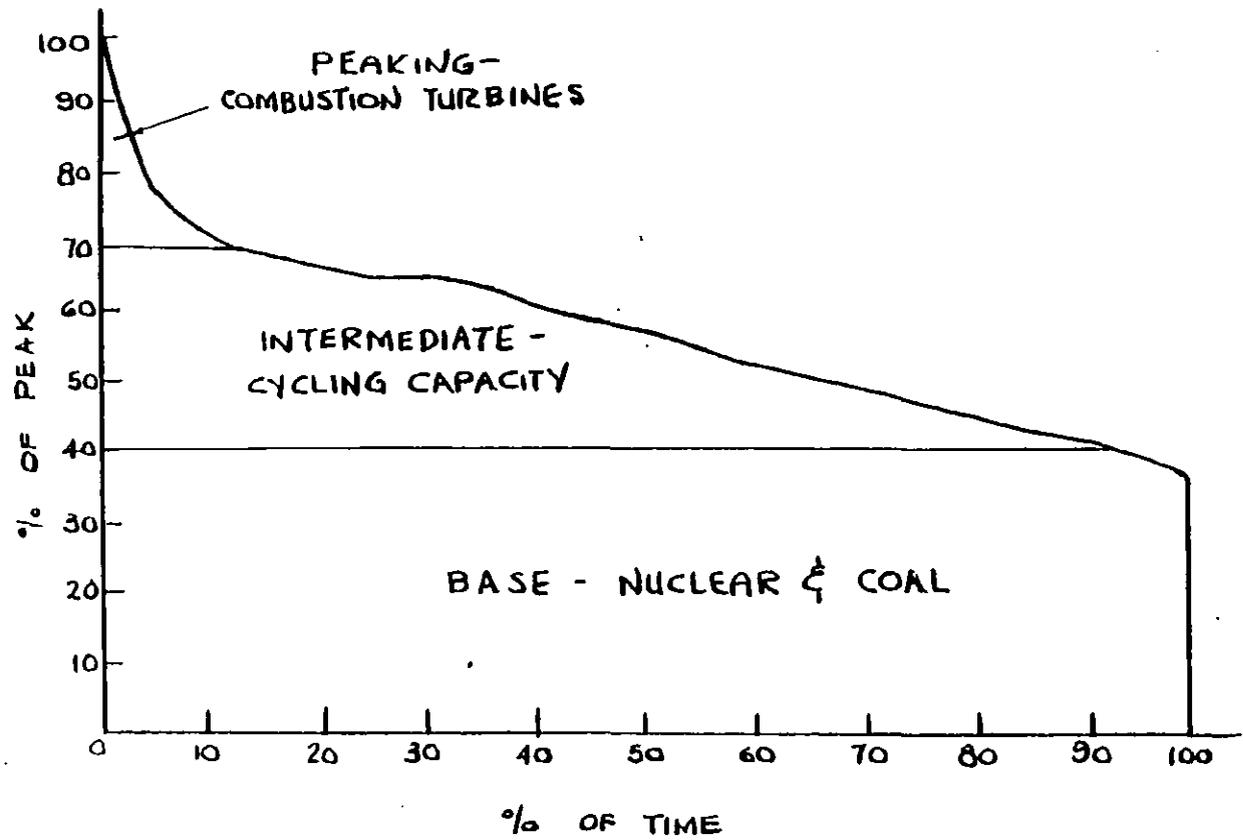


FIGURE 4

FIGURE 5.  
PHILADELPHIA ELECTRIC COMPANY  
LOAD DURATION CURVE



- 30 -

FIGURE 5.

## APPENDIX A

RELIABILITY AND RESERVES

Prior to the early 1960's, the PJM Companies, including Philadelphia Electric, used a constant percentage reserve margin as the basis for installing generating capacity, where past experience was used to determine the required reserve margin. During this era when generating unit sizes were relatively small, construction lead times were short, and interconnections were not as extensive as they now are, this approach was adequate for most utilities. However, with the advent of very large units, with their inherent economies of scale, longer construction lead time, and higher forced outage rates, past experience could no longer be relied upon to determine an adequate reserve margin. Also, in the late 1950's the annual peak demand began to occur in the summer instead of the winter. The actual summer annual peak demand is more sensitive to weather conditions, therefore, the possible deviations from the forecasted annual peak demand are greater. The PJM Companies recognized that another approach was necessary. Since from the utility customers' viewpoint the manifestation of reserve margin is the reliability of his electric service, a constant reliability objective was chosen to be the standard. The reserve margin necessary to meet this reliability level was then calculated based on statistical probabilities. Using this calculated reserve margin, utilities were now able to use a sophisticated systematic approach to generation planning which could provide consistent adequate reliability at minimum cost.

Several possible reliability indicators could have been used. The reliability indicator chosen by PJM companies was that of loss-of-load probability (LOLP). Simply put, a method based on this indicator determines the probability of having the load exceed the available generation at any time. In this way the frequency of load curtailment can be determined. The resulting

loss-of-load probability is expressed in years-per-day of occurrences. The procedure is to match a capacity model, which simulates each generator's operation including its forced and scheduled outages, and a load model which represents the variation and probability of occurrence of the 260 weekday peak demands. By matching the probable available generation to the probable daily peak load the frequency of load exceeding available generation can be calculated. The method is comprehensive since a variety of data including load shape, generating unit availability, and the effects of transmission ties to other power pools are included in the analysis. The vehicle for this calculation is a digital computer program which incorporates the mathematical technique and the system-to-be-modeled data. The point to be emphasized is that for a constant system reliability, the reserve margin is a calculated by-product which will reflect changes in any of the significant parameters.

In the early 1960's, the PJM companies agreed to install a required reserve margin which considered a loss-of-load probability of one-day-in-ten-years as the design objective. This reliability objective appeared to produce reasonable results when compared to historical system performance. The MAAC Reliability Council, whose signatories include all PJM companies, also adopted the one-day-in-ten year standard as a basic reliability criterion. Other power companies and reliability councils reached the same conclusion and also adopted similar reliability objectives. The one-day-in-ten years LOLP became an unofficial standard of the electric utility industry.

Once a constant reliability objective was chosen as the design criterion for the required reserve margin, the PJM companies were able to pioneer in an additional area. The member companies agreed to allocate the total PJM reserve requirement to the individual companies in a manner proportional to each individual company's contribution to the total PJM reserve requirement.

The method was adopted in June 1974 and provides for the recognition of individual company differences. These differences occur principally in the following four categories:

1. Load Shape — flat load shape vs. sharp peak loads
2. Generating Unit Size - large units vs. small units
3. Generating Unit Outages - good generator availability vs. poor generator availability
4. Season of Annual Peak - summer peak vs. winter peaks

## APPENDIX A

PJM has periodically reviewed their calculations to determine reserve levels. Required reserve levels as calculated to meet the reliability criterion, are tabulated here:

(1)

% Reserve Requirement to the Reliability Criterion for Forecasts made in -

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1971</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
1967	11.0										
1968	15.0	11.5									
1969	15.0	13.5	18.0								
1970	16.0	15.0	19.0								
1971	18.5	17.0	19.5	20.0							
1972	18.0	15.5	19.5	19.4							
1973	18.5	17.0	19.5	23.7	18.7						
1974	18.0	16.5	19.0	23.1	20.7	19.3					
1975	16.5	16.5	19.5	21.1	22.2	20.0	23.8				
1976	16.0	16.5	19.5	21.9	21.6	20.2	21.0	26.9			
1977		16.5	19.0	21.4	21.0	20.6	22.1	24.5	28.0		
1978			19.0	22.7	20.6	19.9	21.1	23.4	27.9	28.3	
1979				20.5	21.8	21.7	21.4	23.5	27.8	28.2	25.5
1980				21.6	22.4	22.1	21.2	23.0	28.9	28.2	24.6
1981					23.1	22.4	22.1	24.1	29.0	29.1	25.0
1982					20.8	21.5	24.2	25.6	29.4	28.8	25.4
1983						20.4	21.9	23.5	29.2	28.8	26.5
1984							21.9	22.8	29.3	33.2	29.1
1985								24.5	30.0	31.1	27.1
1986									29.9	31.5	27.1
1987										31.4	27.2
1988											28.2

(1) The loss of load probability criterion is one day in ten years.

The PJM planning reserve requirement, as indicated by the latest calculation in the table on Page APP-A4, varies between 25 % and 29% of the annual peak demand. An individual company's requirements will vary about these values when its reserve percentage is based on its own annual peak load. These reserve requirements are planning values. PJM contractual reserve requirements which are the basis for dollar interchanges between PJM companies may be different from planning values. Currently, the contractual reserve requirement has been set at 22 % for PJM which would correspond to a 24 % to 26 % range for PECO in the 1980's. This 22 % is applied for monetary purposes to 1980 annual peak loads estimated in 1978 and to the 1981 annual peak loads estimated in 1979. The overall trend of increasing required reserve levels indicated in the table on page APP-A4 is due predominately to the system wide decrease in unit availability.

ANNUAL PEAK DEMAND FORECASTING METHODDESCRIPTION OF DAILY WEATHER FACTOR (DWF) FORMULA

Prior to estimating future peak demands, historical peak demands are adjusted to a standard weather condition. In this way actual peak demand growth rates are determined.

Analyses to date indicate that the weather variable most highly correlated with daily peak demands consists of 29 hours of weighted dry bulb temperatures and one hour of weighted wet bulb temperature. The formula for this weather variable, called the daily weather factor (DWF), is as follows:

$$DWF = \left[ \frac{1}{29} \sum_{n=1}^{29} T_{DB}^{(n)} \frac{n+27}{56} \right] + 0.5 T_{WB}^{(29)}$$

$T_{DB}^{(29)}$  = Dry Bulb Temp. @ Hour of peak weather

$T_{DB}^{(1)}$  = Dry Bulb Temp. 28 Hours prior

$T_{WB}^{(29)}$  = Wet Bulb Temp. @ Hour of Peak Weather

Generally, during hot weather, the higher the DWF, the higher will be the daily peak demand.

USE OF DAILY WEATHER FACTOR (DWF) FORMULA IN ANALYZING HISTORICAL PEAKS

Exhibit A is a computer output plot of peak demand vs. daily weather factor for all weekdays (excluding holidays) from April through October 1978. Examination of similar plots for past years indicates that there is a constant demand value for daily weather factors between 64 and 77 and a uniformly rising trend for all daily weather factors above 86. The sloping line of Exhibit A is the linear regression for all daily peak demands occurring above 86 DWF. The sloping line is, of course, a "mid-point" line with actual demands lying both above and below it. Demand-weather characteristic lines as calculated from actual data for all years 1968 through 1978 are shown in Exhibit B.

The standard DWF is defined as the historical average of the maximum DWF which occurs between 10:00 a.m. and the time of the peak demand on the day that the annual peak demand occurs. Calculation of the standard DWF is shown in Exhibit C. The regression demand is the demand located on the linear regression line (shown in Exhibit A) at the standard DWF. However, the most probable peak demand for a year occurs at a value slightly above the regression demand.

Exhibit D is a tabulation of the relationships between the regression demands and historical peak demands. The last column shows the ratio between the actual peak demand that occurred in each year and the regression demand at the standard DWF. The actual peak demand averages 3.4% higher than the regression demand. The most probable peak demand for a year is therefore determined by increasing the regression demand by 3.4% and is defined as the standard demand.

The inter-relationships of the regression demand, standard demand and standard DWF are shown in Exhibit E. The solid sloping line is the linear regression line of actual daily peak demands for 1978. Its intersection with the standard DWF line gives a regression demand of 5445 MW. The standard demand for 1978 is 3.4% above this, or 5630 MW. The actual peak demand for 1978 was 5667 MW.

# 1978 DAILY PEAK LOAD VS DAILY WEATHER FACTOR

(APRIL THRU OCTOBER)

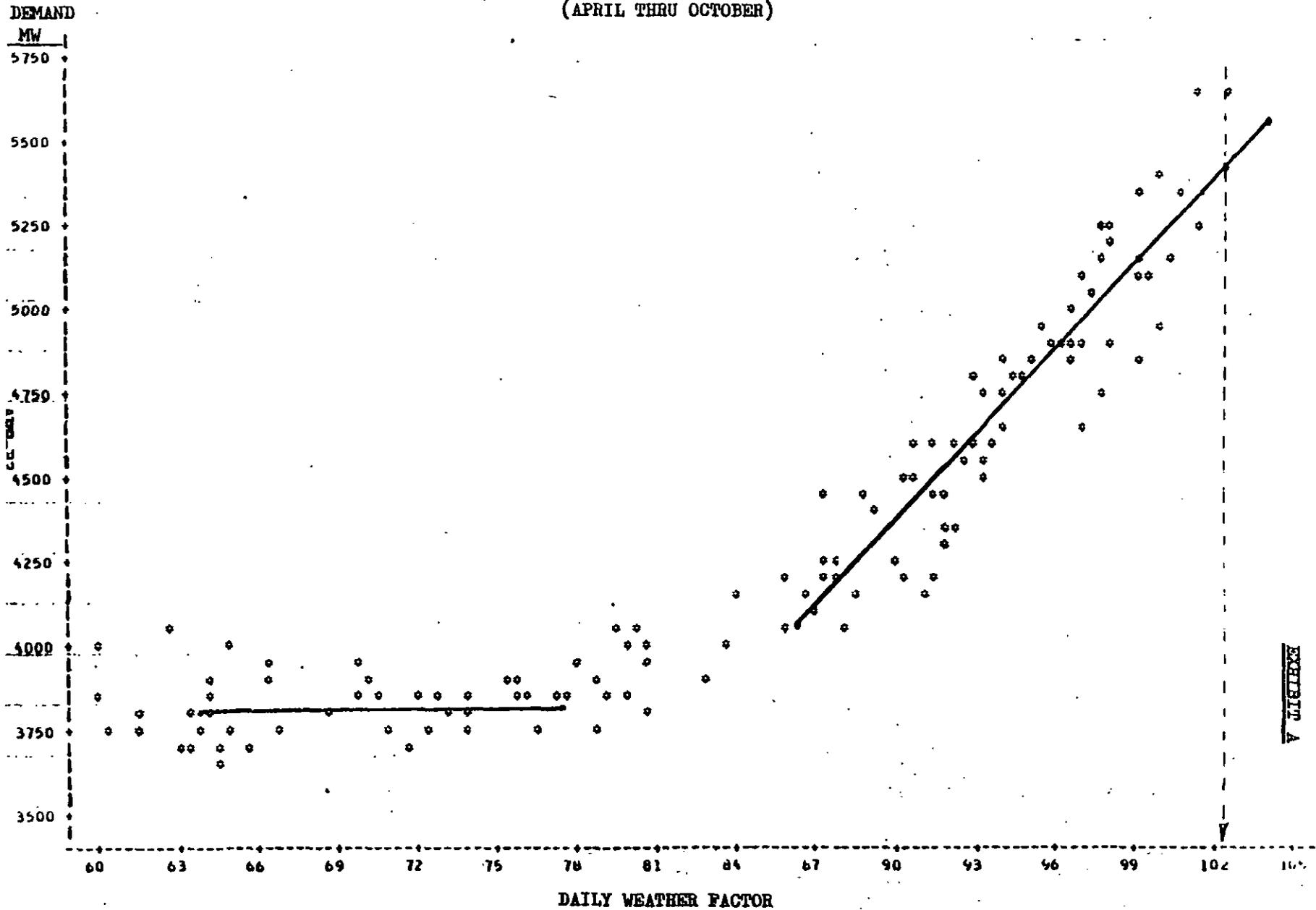
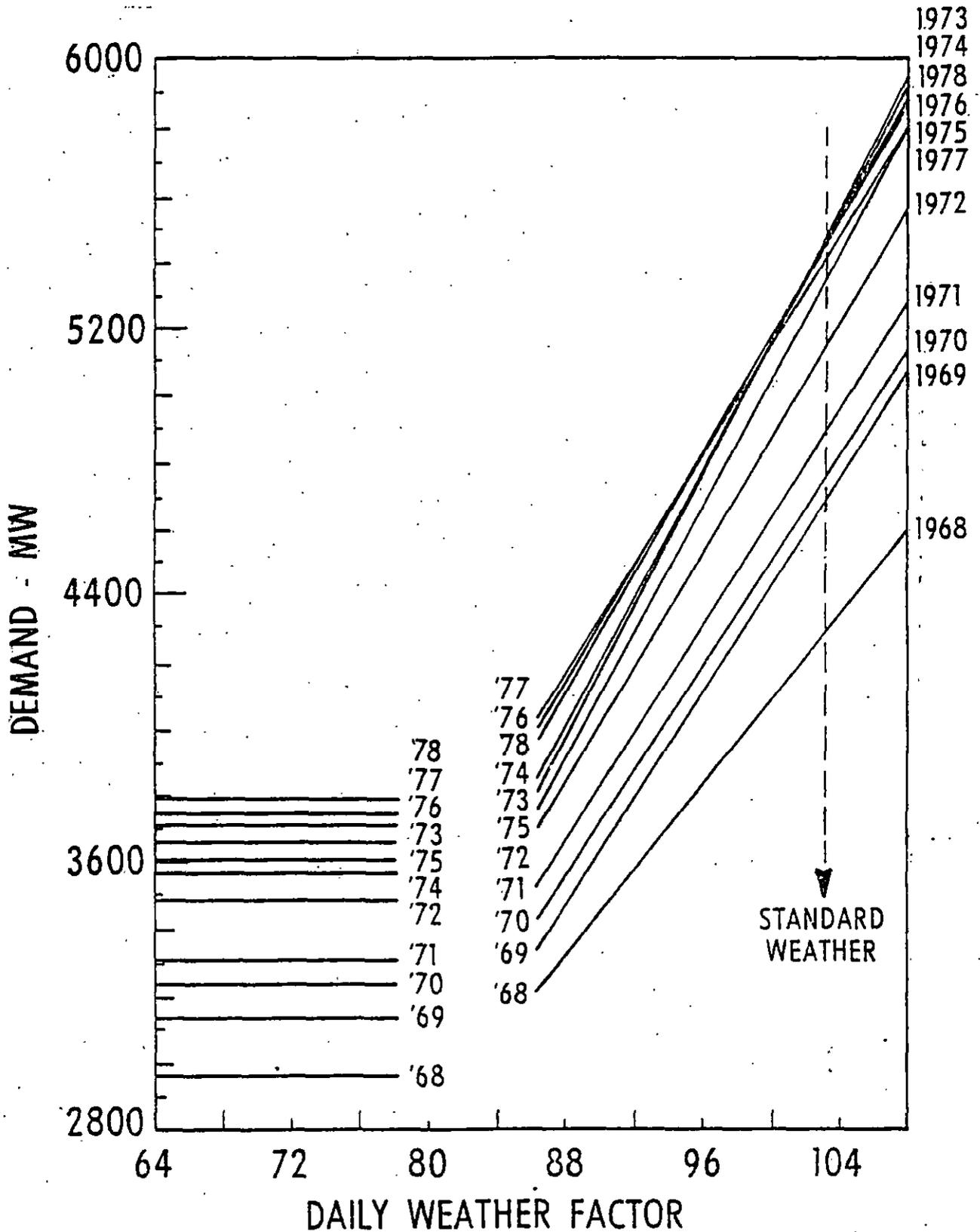


EXHIBIT A

# WEATHER FACTOR VS. HISTORICAL LOAD



## Exhibit C

MAXIMUM DWF BETWEEN 10 A.M. & TIME OF PEAK DEMAND

	<u>DWF</u>	<u>Date</u>
1968	102.7	7-18
1969	104.0	7-17
1970	102.8	9-23
1971	100.7	7-1
1972	104.3	7-20
1973	104.7	8-30
1974	101.6	7-9
1975	104.5	8-4
1976	96.9	6-28
1977	106.3	7-21
1978	101.6	8-17

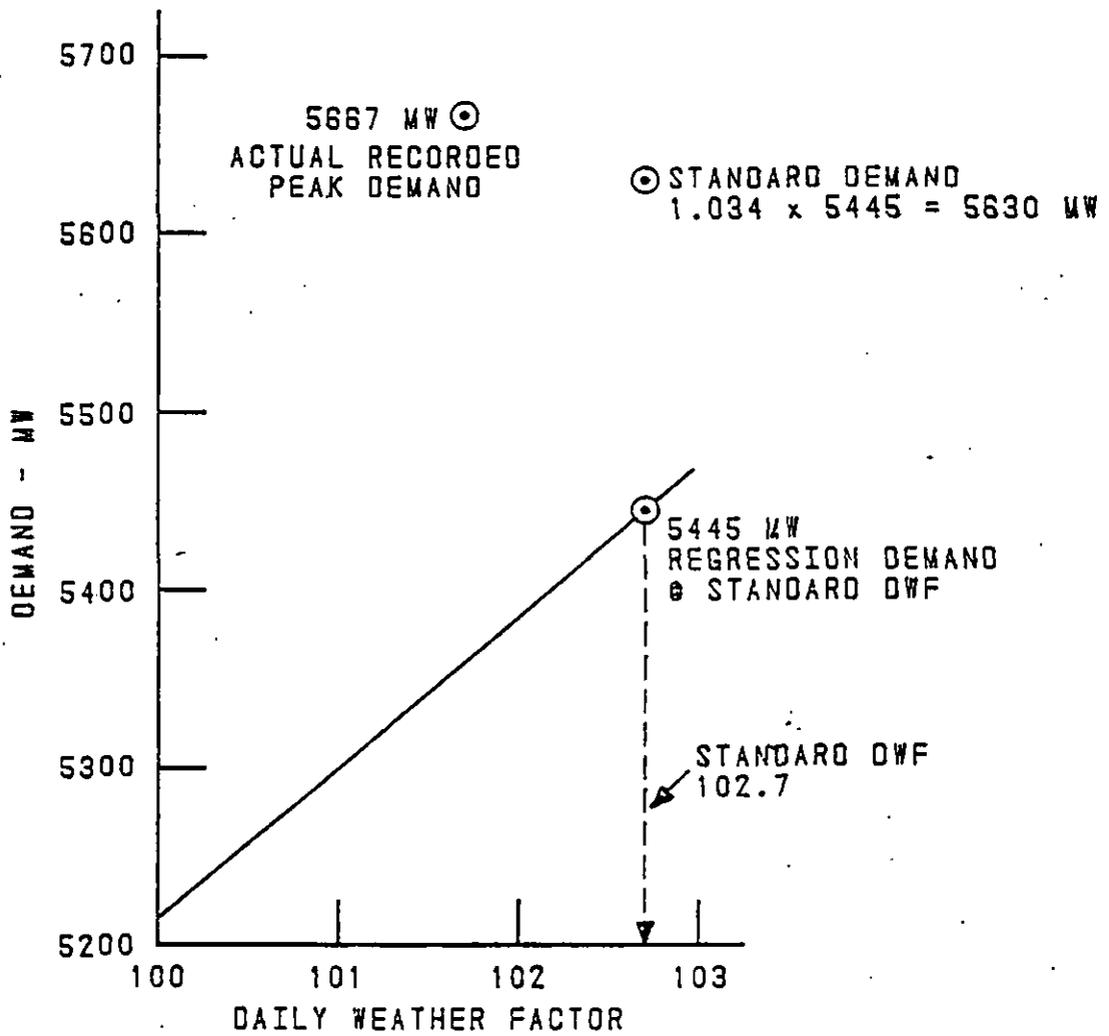
(Standard DWF) 102.7

STANDARD DEMAND FACTOR

	<u>Regression Demand @ 102.7 DWF</u>	<u>Net Actual Peak Demand</u>	<u>Corrected Peak Demand</u>	<u>Corrected Demand ÷ Demand @ 102.7 DWF</u>
1968	4316	4375	(4445)	1.030
1969	4661	4592	(4746)	1.018
1970	4750	4712	(4954)	1.043
1971	4878	4922	(5034)	1.032
1972	5162	5313	5313	1.029
1973	5448	5760	5760	1.057
1974	5434	5431	(5492)	1.011
1975	5344	5530	(5545)	1.038
1976	5462	5346	5346	.979
1977	5397	5888	5888	1.091
1978	5445	5667	5667	<u>1.041</u>
		<b>Average Standard Demand Factor</b>		<b>1.034</b>

( ) Corrected for voltage reduction and load curtailment.

Note: The recommended Standard Demand Factor of 1.034 and Standard DWF of 102.7 vary slightly from those recommended in previous reports. This is due to more data now being available plus a different method for calculating maximum DWF.



USE OF DWF APPROACH IN ESTIMATING FUTURE PEAK DEMANDS

The basis for the procedure to forecast demand is shown in Exhibit F. This graph is the demand-weather characteristic line for 1978 shown in Exhibit C. The horizontal segment is defined as the base demand. The sloping segment shows the relationship between the weather sensitive demand and the weather.

The base demand has been found to have a high correlation with the average April and October output and sales. Since monthly outputs are not subject to variation due to a change of billing cycles and/or estimated readings which affect monthly sales figures, the output values are now used instead of sales values as in previous years.

The first column of Exhibit G is a tabulation of the historical average total monthly outputs of April and October. The second column is a tabulation of the corresponding base demands. In the last column the ratio of base demand to base output has been calculated. These historical ratios and an extrapolation into the future are plotted in Exhibit H. (A horizontal segment of the plotted curve would indicate a constant base load factor). The extrapolated base demand factors are applied to the forecast of base output to compute the base demand forecast. The base output forecasts do not include any off-peak sales which result from new, non-typical loads such as off-peak electric car charging.

The coincident weather sensitive demand is derived by subtracting the base demand from the value of weather sensitive demand at the standard DWF. Historically, the coincident weather sensitive demand has been found to have a good correlation with the estimates of actual MW's of connected air conditioning.

Exhibit I shows the historical coincident weather sensitive demand and estimates of connected air conditioning for the years 1968 through 1978. The estimates of connected air conditioning are year-end values and are obtained from the Commercial Operations Department.

Exhibit J is a plot of the relationship between coincident weather sensitive demand and connected air conditioning load for the years 1968-1988. The coincident demand increased linearly with increasing connected load in the 1968-1974 period and decreased with increasing connected load in the 1975-1978 period. The 1975-1978 period decrease is the result of the impact of "conservation of energy." This impact is assumed to reach a maximum in the 1979-1980 period. The subsequent coincident weather sensitive demand versus connected air conditioning load relationship is expected to parallel the 1968-1974 period relationship.

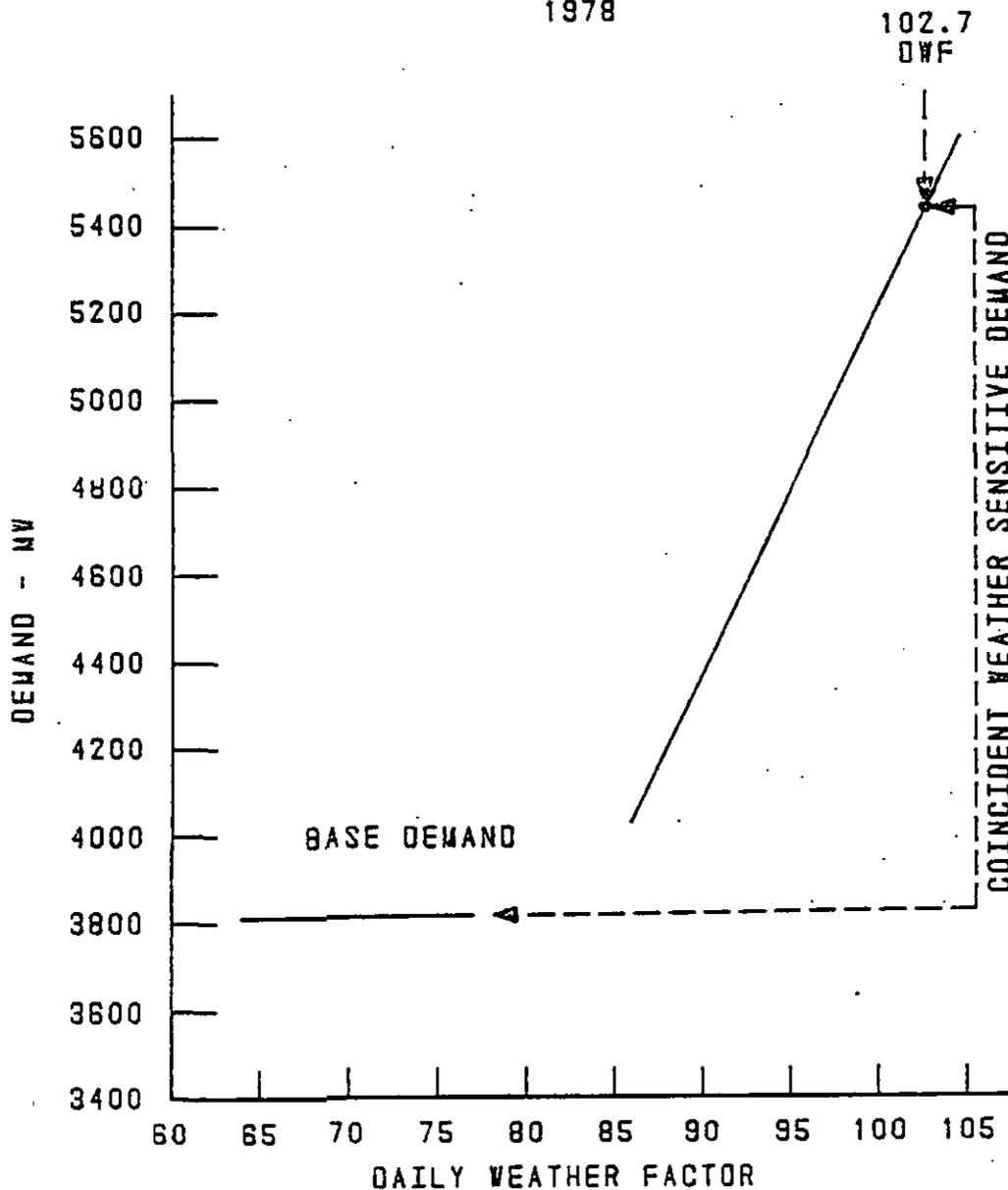
The mathematical expression for the 1980-1988 coincident weather sensitive demand versus connected air conditioning load relationship is determined by computing the linear regression of the 1968-1974 period relationship and adjusting the intercept to account for the energy conservation impact. This expression is applied to the forecast of connected air conditioning load to compute the coincident weather sensitive demand forecast.

A different method of forecasting the relationship between connected air conditioning and weather sensitive load was used for last year's forecast. In that method described in the "1977-87 Budget Forecast Annual Peak Demand" report of November 1977, relationships were more a function of the year rather than the amount of connected air conditioning.

The sum of the base and weather sensitive components of the demand forecast produces a forecast of the regression demands (value of demand on the regression line at the standard DWF). The regression demands must be increased by 3.4% (Standard Demand Factor) to obtain a forecast of the most probable peak demands (standard demands).

# DEMAND - WEATHER CHARACTERISTIC

1978



ACTUAL AVERAGE OF APRIL & OCTOBER OUTPUTSPHILADELPHIA ELECTRIC COMPANY SYSTEM

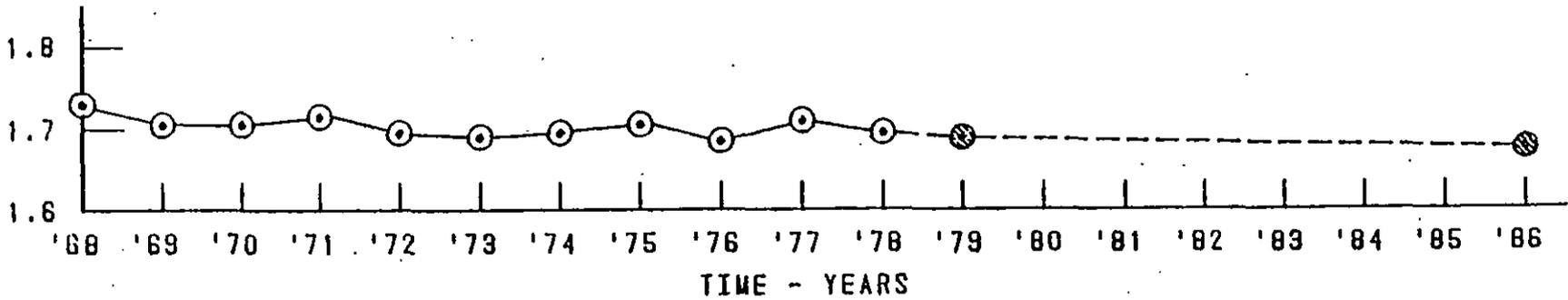
	<u>Base Output-GWers</u>	<u>Base Demand-MW</u>	<u>Demand ÷ Output</u>
1968	1734.2	2998	1.729
1969	1840.1	3142	1.708
1970	1906.3	3255	1.707
1971	1938.5	3326	1.716
1972	2059.6	3493	1.696
1973	2168.8	3668	1.691
1974	2138.4	3612	1.689
1975	2126.7	3632	1.708
1976	2209.9	3723	1.685
1977	2196.2	3763	1.713
1978	2246.2	3813	1.698

# BASE DEMAND FACTOR

$$\text{BASE DEMAND (MW)} = \text{BASE DEMAND FACTOR} \times \text{MONTHLY OUTPUT (GWHR)}$$

APP-B13

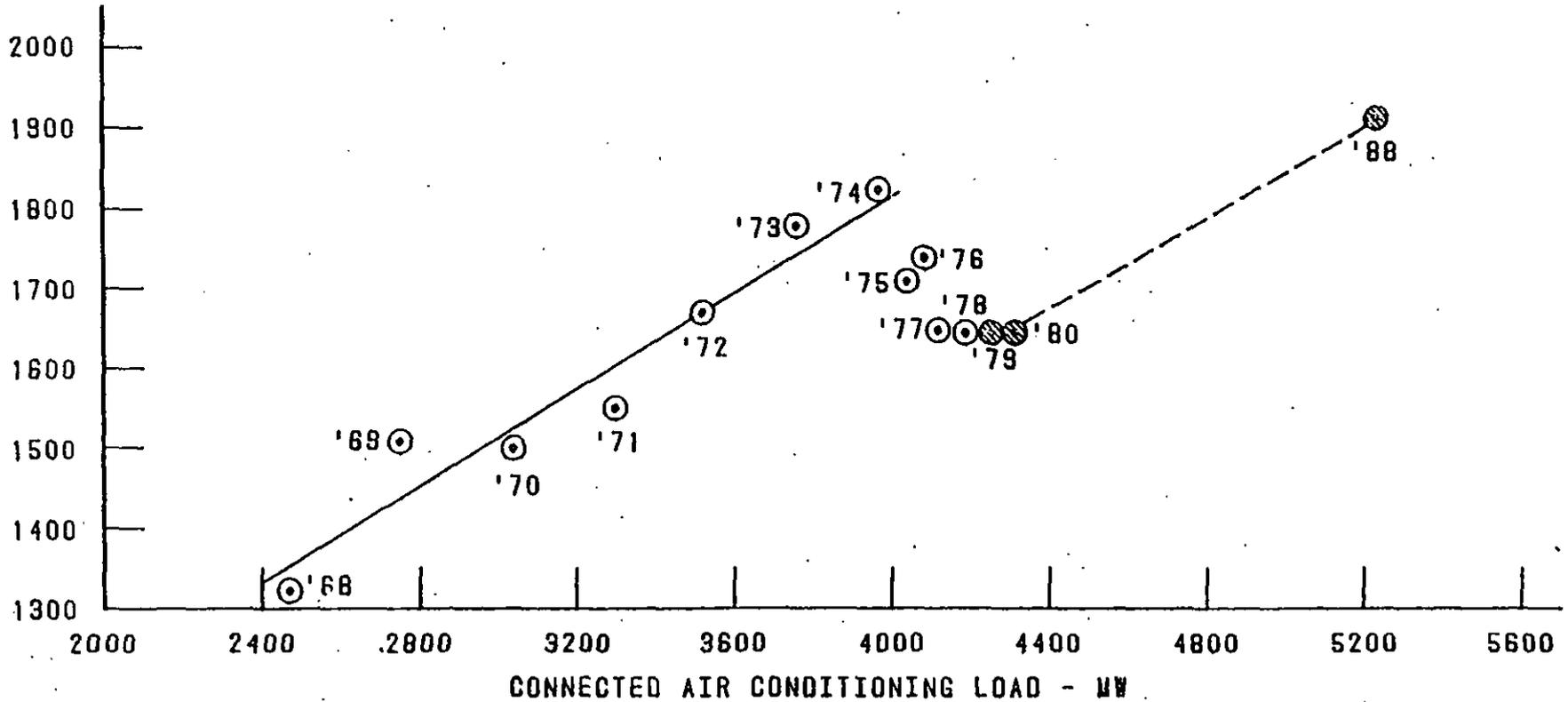
BASE DEMAND FACTOR



WEATHER SENSITIVE DEMAND - MW

	Regression Demand @ 102.7DWF -	Base Demand	=	Coincident Weather Sensitive Demand	Connected Air Cond.
1968	4316	2998		1318	2470
1969	4661	3142		1519	2755
1970	4750	3255		1495	3041
1971	4878	3326		1552	3298
1972	5162	3493		1669	3524
1973	5448	3668		1780	3758
1974	5434	3612		1822	3966
1975	5344	3632		1712	4050
1976	5462	3723		1739	4085
1977	5397	3763		1634	4124
1978	5445	3813		1632	4186

# COINCIDENT WEATHER SENSITIVE DEMAND RESPONSE



SAMPLE CALCULATION OF 1980 PEK DEMAND FORECASTBase Demand

Base Monthly Output	2395 GWERS	(Based on energy estimate of
Base Demand Factor	<u>x 1.689</u>	December 1978)
Base Demand	4045 MW	

Coincident Weather Sensitive Demand

Connected Air Conditioning Load = 4327 MW

Coincident Weather Sensitive Demand Obtained  
from Exhibit J = 1632 MW

Base Demand + Weather Sensitive Demand = Regression Demand

4045 + 1632 = 5677 MW

Regression Demand x Standard Demand Factor = Standard Demand

5677 x 1.034 = 5870 MW

5850 MW (rounded)

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

Pennsylvania, April 21, 1970

IN REPLY PLEASE  
REFER TO OUR FILE

*Dear Bob*  
Mr. Robert Gilkeson, President  
Philadelphia Electric Company  
1000 Chestnut Street  
Philadelphia, Pennsylvania 19105

R.F. GILKESON

APR 22 1970

~~Dear Mr. Gilkeson:~~

This is in reference to a report dated March 30, 1970 and submitted by the PJM Interconnection analyzing the load-capacity-reserve forecast for the summer of 1970.

I believe that, if the PJM member companies continue to follow a forecasting procedure based on an annual load growth of less than 10%, they will be unable to meet the projected electric demands that we predict will occur in the next ten years. It is my opinion that the capacity and bulk power systems additions scheduled to be completed this summer will be insufficient to meet the power demands of even a moderately hot summer.

This report indicates that a middle-of-the-road forecast procedure will continue to be followed regardless of the inaccuracies experienced during the past four years. I am convinced that a continuation of this approach to the problem will never provide an acceptable solution.

I recommend that the PJM member companies immediately review their past experiences and revise their entire approach to avoid regulatory action which otherwise will be inevitable.

Enclosed, for your information, is a copy of my letter to Wilmer Kleinbach and also a copy of a memorandum that my staff prepared.

Sincerely yours,

*George I. Bloom*

George I. Bloom  
Chairman

Enclosure

## PENNSYLVANIA PUBLIC UTILITY COMMISSION

## INVESTIGATION DOCKET NO. 138

In re: Investigation upon the Commission's own motion to determine the need for additional electric generating and transmission facilities during the next decade.

ORDER

BY THE COMMISSION, MARCH 13, 1972:

The threat of a continued shortage of electric power in Pennsylvania and nearby states is a matter of considerable concern to the Commission. As a result of the northeast blackout on November 9, 1965, this Commission has worked with commissions of other states and the Federal Power Commission to stimulate the electric power utility companies in the development of plans for increasing generating capacity to meet anticipated load growth and future demands. Such demands presumably will be further increased by the present shortage of natural gas, a matter discussed in our February 1, 1972 order at Investigation Docket No. 124, published in Pennsylvania Bulletin 256, promulgated after public notice and hearings.

On February 14, 1966 an invitation was extended to all Pennsylvania electric companies to attend a meeting in Harrisburg on March 3, 1966 to review in depth the present and future electric power supply situation within each company's operating territory and participation in power pools. This meeting revealed that load growth had exceeded the companies forecast and this conservative attitude had resulted in a serious installed capacity situation with most companies, making them extremely dependent on the resources of power pool interconnections.

In view of the influence of power pools, a joint meeting was held on March 31, 1966 in Philadelphia with the commissions of Delaware, District of Columbia, Maryland and New Jersey to analyze the purpose and operation of the PJM Interconnection. Efforts to reassure commission representatives that capacity was capable of meeting expected loads and still maintain adequate reserves was not accepted with confidence. The companies and public were warned by the Commissions that according to our predictions a desperate situation was developing that within the near future could result in possible blackouts and customer load curtailment. The companies were told that immediate preparations should be made to increase installed capacity until a reliable reserve of 20% above forecast loads was reached.

The companies reluctantly agreed to accept the commissions' proposals and institute construction programs that would hopefully reinforce existing capacity with new generation before another disastrous interruption occurred. Unfortunately the companies efforts were hopelessly late and another massive interruption occurred on June 5, 1967.

On June 19, 1967 another meeting was held in Philadelphia with member companies of the PJM Interconnection and representatives of the same commissions. The companies were told that excuses were unacceptable now that the condition we had feared was a reality and there was insufficient reliable capacity and transmission lines to meet customer demand. Emphasis was placed on the immediate need for protective devices to isolate local disturbances and prevent widespread cascading type interruptions that had been experienced twice already. The companies agreed to install automatic load shedding devices as a result of this meeting and conceded that additional capacity was needed and would be included in construction schedules under revision.

To reaffirm the commissions' suspicions, a joint meeting was held in Philadelphia on October 6, 1967 to explore the possibility of an independent engineering study of the PJM Interconnection. After considerable deliberation among the commissions a contract was signed with Commonwealth Associates, Inc., in February 1968 to begin a study and advance an opinion on the capacity-load-reserve picture for the PJM Interconnection.

On September 16, 1969 Commonwealth Associates presented to the Commissions and PJM member companies an analysis of the interconnection system with recommendations to avert the expected capacity deficiency. The picture presented was more dire than expected and the immediacy of the situation suggested that the companies must install combustion turbines to avert another interruption until the new base load capacity was installed. The companies were told that the commissions wanted 2000 megawatts of combustion turbine capacity immediately. After deliberation the companies responded that 1200 megawatts was more reasonable because the cost would exceed \$100,000,000 for this amount of generation.

The value of these conferences and recommendations has been demonstrated repeatedly because the combustion turbines have carried the electric companies through two perilous summers of capacity shortage without a major interruption and have reduced disturbances to minor voltage reductions for short periods of time. Capacity has now increased from 17,826 megawatts in 1965 with 9% reserve to 34,842 megawatts in 1972 with 21% reserve through the combined efforts of the commissions and cooperation of the electric utility companies.

The Commission is now concerned about whether current plans are satisfactory to meet projected future needs for electric power. At the same time, the Commission is aware of two possible changes in conditions

which may affect the demands for electric power during the next several decades:

1. A developing trend to conserve the use of electric service and a moratorium on the promotion of total electric residential living units.
2. Environmental regulations at both federal and state levels could limit the ability of the electric utility industry to meet forecasted demands for power.

It is incumbent upon the Commission to determine whether or not an electric energy shortage will develop and have an adverse affect upon the electric utility industry or if the industry's construction program calls for excessive capital investment at the expense of existing rate paying customers. It is hypothetical that such programs will attract prospective customers who may be denied energy from gas suppliers and further distort the demand for power.

Under the circumstances it appears that a required review by order will be more satisfactory and comprehensive than the past procedure whereby an informal review was held by the Commission and reports lacking uniformity were submitted by the participating electric companies. It is appropriate for the Commission to review the revised plans of electric utilities for plant construction because the amount of money actually being spent to meet environmental standards was unforeseen when plant additions were first projected. The Commission will consider the possible adoption of a system of regular review of plans for plant expansion by electric utility companies; THEREFORE,

IT IS ORDERED:

1. That each electric public utility subject to our jurisdiction continue to file with the Commission statements of its generating capacity and estimated customer demand requirements, as well as energy furnished during the prior calendar year. The reports are to be filed on or before

May 1, 1972 and May 1 of each succeeding year. The foregoing is to be furnished in the form to be prescribed by the Commission.

2. That each such company file with the Commission on or before May 1, 1972 and May 1 of each succeeding year a forecast of its expected annual load growth for the next ten years on an individual and not system basis in the form to be prescribed by the Commission.

3. That each such company file with the Commission on or before May 1, 1972 a schedule of generating plant and transmission line additions necessary for each such utility to meet forecasted load requirements during the said 10 year period.

4. That each such company file with the Commission on or before May 1, 1972 and May 1 of each succeeding year a summary of existing generating plants and the capital investment for pollution abatement equipment to bring each plant into compliance with federal, state and local pollution regulations. The summary shall include a statement of the estimated annual operating cost of this equipment.

5. That each such company file with the Commission on or before May 1, 1972 and May 1 of each succeeding year estimated construction costs of new and proposed generating plants and the capital investment necessary for pollution abatement equipment, including a statement of the estimated annual operating cost of this equipment.

6. That each such company file with the Commission on or before May 1, 1972 and May 1 of each succeeding year a copy of the company's report submitted to the Federal Power Commission on FPC Form 12.

7. That the Commission schedule public hearings at times and places to afford all interested persons an opportunity to present testimony on these matters. All interested persons will please notify the Commission in writing in advance.

8. That Pennsylvania Department of Environmental Resources, Pennsylvania Department of Commerce, Pennsylvania State Planning Board, Pennsylvania Office of State Planning and Development, and other state and local government officials, as well as groups and individuals concerned with the issues raised herein, be and are hereby invited to submit written statements on or before May 1, 1972 and, if they so desire, set forth requests for the opportunity to testify at the hearings to be scheduled for the purposes aforesaid.

9. That this order be published in the Pennsylvania Bulletin forthwith.

PENNSYLVANIA PUBLIC UTILITY COMMISSION

(signed) George I. Bloom

Chairman

TEST:

*Will Ketner*  
Secretary

Meeting will be held June 15 and 16.  
Pennsylvania State Office Building  
Broad and Spring Garden Streets  
Philadelphia, Pa.

Requests to testify at hearings should  
be sent to:

Mr. Will Ketner, Secretary  
Pa. Public Utility Commission  
P. O. Box 3205  
Harrisburg, Pa. 17120

ALLOCATION OF PJM CAPACITY REQUIREMENT

The PJM Agreement as supplemented April 1, 1974 fulfills the following objectives agreed to by the Chief Executive Officers of the PJM member systems during June 1970.

1. To determine the PJM capacity requirement annually for a forecast period.
2. To allocate to each member system its share of the PJM capacity requirement, which is each system's capacity obligation.
3. To develop charges for systems deficient in meeting their obligations which create an incentive to meet those obligations.

The procedures contained in the PJM Agreement are the result of separate and joint studies by committees involved in planning and contractual arrangements. As a result the following contractual equation was developed to determine a system's capacity obligation for a forecast planning Period:

$$\text{Forecast Obligation} = P \left( 1 + \frac{R + F + U + D}{100} \right)$$

P = Forecast Diversified Planning Period Peak

R = Margin of Forecast PJM Capacity Requirement over PJM  
Peak in % of PJM Peak

F = Forced Outage Rate Adjustment %

U = Large Unit Adjustment %

D = Load Drop Adjustment %

Because the PJM annual peak occurs in the summer, the forecast Planning Period is one year from June 1, to May 31 of the following year.

Forecast Diversified Planning Period Peak

Two types of diversity exist among PJM systems, one being the difference between annual summer and winter peak loads of the respective systems and the other being the difference between the sum of the system peak loads which occur during the summer season and the PJM summer peak load. Such diversity is forecast and allocated to develop for each system an annual diversified peak.

Margin of Forecast PJM Capacity Requirement Over PJM Peak

The Forecast PJM Capacity Requirement is determined 3 years in advance by the Management Committee after considering recommendations of the Planning and Engineering Committee following its annual analysis of forecast system requirements. Meeting this requirement becomes a contractual obligation of the member systems.

Forced Outage Rate Adjustment

The reliability of a generating unit in supplying load requirements can be measured by its forced outage rate which is the ratio of the number of hours each year during which it is forced out of service by equipment malfunction or failure, to the number of hours each year when the unit is needed to carry load. There are differences between each system's average forced outage rate and the PJM average forced outage rate. Systems with rates above the PJM average are allocated a proportionately larger share of the PJM capacity requirement. Conversely, those with lower than average forced outage rates are allocated proportionately less of the PJM capacity requirement. Because studies have demonstrated that the PJM capacity requirement will be changed by approximately 1.6% of peak load for each 1% change in PJM average forced outage rates, each adjustment is increased by a factor of 1.6.

Large Unit Adjustment

The installation of units larger than 1300 MW will increase the PJM capacity requirement. Consequently, if a system plans include a unit larger than 1300 MW, that system will be allocated a larger share of the PJM capacity requirement and other systems correspondingly reduced. (This adjustment is waived)

Load Drop Adjustment

Due to variations in annual load shapes of PJM systems, some have more "space" in which to accomplish the required annual maintenance of their generating units than others. Such "space" is the difference between a system's weekly available capacity and its weekly load. The difference between a system's peak load and its load in other weeks throughout a Planning Period is called "load drop". Some systems provide, through characteristics of their systems loads, the "space" for maintenance required by those systems whose annual load shapes provide insufficient "space" to maintain their generating units. The amount of such increase in capacity requirement for systems with load shapes flatter than the PJM load shape are offset in the allocation procedures by decreases for those systems having more load drop.

A system may meet its obligation in any of three ways: (a) by installing capacity on its own system, (b) by purchasing generating capacity independently of the PJM Agreement either from another PJM member or a non-member system, and (c) by purchasing additional required capacity from other member companies under the terms of the PJM Agreement. The final plans submitted by each member system to the Management Committee for meeting its obligations in a Planning Period are considered a firm commitment as of a date two years prior to the beginning of such Planning Period.

REBUTTAL TESTIMONY  
OF  
VINCENT S. BCYER

Q. Do you wish to comment on the several generating plant capacity adjustments which have been proposed by various witnesses in this proceeding?

A. Yes, I do. As is discussed in greater detail by Mr. Kasum, Philadelphia Electric Company plans its generating plant capacity to meet a reliability standard of loss of load no more than one day in ten years. This standard is followed by much of the electric industry and has been employed by PJM for over fifteen years. In fact, under the PJM Agreement, we presently must employ this reliability criterion in our generating plant planning program.

Each of the proposed adjustments to varying degrees rejects the one day in ten years reliability standard. It is true that this is not the only standard which could be employed in generating plant planning. However, it is our judgment that this standard is the most appropriate for planning purposes at this time. More importantly, this is the standard which has been employed, with the knowledge of this Commission, in planning our present generating plant facilities. As I have previously testified, to achieve this reliability criterion, generating plant reserve margins in the order of 25 to 29% are required in future years. In my opinion, this proceeding is not an appropriate forum in which to litigate the pros and cons of alternative reliability standards.

I strongly urge the Commission to reject adjustments which I can only view as penalty proposals. As is explained in greater detail by Mr. Kasum, these proposals ignore the realities of capacity planning and of current operating conditions under which this Company must operate. Moreover, to the extent these proposals rely upon a rejection of the Company's generating plant capacity planning criterion, they penalize the Company retroactively

by applying to it a standard which is different from that which has been employed in the past.

Q. Mr. Boyer, have you reviewed the direct testimony of witness Donald L. Birx in this proceeding?

A. Yes, I have.

Q. Mr. Boyer, please describe your professional experience as it relates to the life spans of Philadelphia Electric Company's fossil and nuclear generating facilities.

A. During my tenure at Philadelphia Electric Company I have been engaged in both the design of power plants and operation of both coal-fired and nuclear power plants having been superintendent of each type of station. Since 1968 the design of all power plants (12 units excluding combustion turbines) constructed on the Philadelphia Electric Company system have been under my supervision and control. During this time period I have been responsible for the retirement of approximately 20 generating units having about 800 mw generating capacity.

In addition, I have served on industry committees which cover the design and operational aspects of power plant facilities. We discuss problems of the maintenance of power plant equipment, problems which are industry-wide.

Q. On Page 10 of Trial Staff Statement DLB-1, Dr. Birx states in support of his proposal of a 40-year life span for nuclear plant that "the high initial cost (capital investment) will make it economically feasible to expend a greater amount in maintenance expense to keep it functioning at a high level of efficiency and safety." Is that correct?

A. During the early life of a nuclear plant that is true because an economic cost/benefit analysis would indicate the desirability of keeping the plant in operation. However, as the plant approaches its retirement age, each major maintenance expense must be balanced against the expected benefit to be received

by incurring the cost. Certainly, at the time relicensing is contemplated a major engineering economic cost/benefit analysis will be necessary. However, the amount of money previously spent has no influence on this economic analysis. The analysis is one of balancing the maintenance or retrofit cost against the value of the plant's continued production during its potential remaining life span.

Q. What are some of the factors which will affect the costs of relicensing a nuclear power plant and tend to shorten its economic life span?

A. There are a number of such factors. Principal among these are the safety and environmental regulations which will have been adopted during the plant's lifetime but which will not have been retroactively applied to it during the initial license period. Retrofitting of the equipment required to satisfy such new regulatory standards, which would be expected as a requirement for any relicensing period, could be extremely expensive. For example, upgraded fire protection requirements, security requirements, and requirements to protect the site against increased flood flow will have to be met before Peach Bottom units could be relicensed. To retrofit to meet these requirements could cost hundreds of millions of dollars, even in today's dollars. In addition, there is the potential derating of the units or need for improved containment provisions relating to off-site releases under accident conditions.

Secondly, new technologies for the more efficient use of nuclear energy will likely be developed by the close of the present licensure period. Moreover, the cost of nuclear fuel could rise to levels which would adversely affect the economics of present lightwater reactor technology. The combination of new technologies and increasing cost of fuel, given that lightwater reactors are relatively inefficient users of nuclear fuel, could result in a substantial cost penalty to continued employment of existing plants beyond the termination of their present licenses.

- Q. Please state the basis of the 35 year life employed to depreciate these plants at the present time.
- A. In its prior electric rate proceeding at R.I.D. 438, the Company presented the testimony of Mr. John H. Crowley, Manager of Advanced Engineering of United Engineers and Constructors, Inc., a major nuclear plant Architect Engineer. Mr. Crowley's qualifications also included service as a senior consultant to the Energy Research and Development Administration, the Nuclear Regulatory Commission and the International Atomic Energy Agency. Based on this background and his experience as Chairman of ERDA's Technology Study Panel of the Inexhaustible Energy Resources Study, Mr. Crowley concluded that:

"The imposition of 'retrofit requirement' will have the effect of shortening the economic life expectancy of the Peach Bottom and Salem units as the cost of the retrofit makes continued service uneconomical in contrast with alternatives which will comply with the then existing criteria as well as embodying more efficient and economic fuel cycles."  
(R.I.D. 438 St. 8A, p. 11).

Accordingly, Mr. Crowley concluded that current lightwater reactor plants have a useful life of 25 to 30 years. Based on this testimony and the testimony of Staff witness Dr. N. S. Parate, who recommended a 40-year life similar to Dr. Birx's recommendation, the Commission directed that the Company employ a 35-year life span. Although I believe the 35-year life span to be inappropriate, to avoid controversy, we have employed that life span in our current filing. In my judgment, a life span in the range of that suggested by Mr. Crowley is more appropriate. The recent incident at Three Mile Island, which has resulted in a heightened consciousness of nuclear power, further supports this judgment.

- Q. On Page 8 of his prepared statement, Dr. Birx refers to Dresden No. 1 as currently being retrofitted in preparation for a license extension. Please comment.
- A. Dresden No. 1 is a 200 mw boiling water reactor (BWR) designed by General Electric and built by Bechtel Corporation. The unit went into commercial operation in August of 1960 with a 40-year license with an expiration date of 1996.

The operating license of the plant was suspended by the NRC and it was shut down early in 1978. Substantial design modification and equipment retrofitting to meet current safety standards were required prior to the plant's being restarted. The implication of Dr. Birx' testimony that the unit's shutdown involved a relicensing or "a license extension" is not correct. Rather, the plant's existing license was suspended and will be reinstated.

Q. Has Philadelphia Electric Company had any experience with nuclear generating units reaching the end of their license?

A. Yes. Peach Bottom No. 1 was licensed to run for eight years. At the end of the eight years, before it was retired in 1974, an economic cost/benefit analysis was performed to determine whether the plant should be relicensed. The cost of retrofitting Peach Bottom No. 1 to meet the NRC regulations then in force was more than the economic benefit that could be foreseen at that time; therefore, PECO decided not to relicense the unit.

Q. On Page 9, Dr. Birx states that the experience of 20 years operation of the General Electric Test Reactor (GETR) is "ample evidence" that "the reactor will not be a limiting factor in the life of the plant." Do you agree?

A. No, certainly a sample of one is not "ample evidence" of anything, especially when significant differences exist between the GETR and the reactors at Peach Bottom and Salem. These are substantial as can be seen from the table following.

Comparison of Peach Bottom and GETR Reactors

	<u>Peach Bottom</u>	<u>GETR</u>
Design Temperature	575°F	200°F
Design Pressure	1250 psig	150 psig
Material	Low alloy steel Stainless steel clad	Aluminum (5052)
Dimensions: Length	72 ft.	20 ft.
Inside Diameter	21 ft.	2 ft.
Wall thickness	6-5/16 in.	3/4 in.
Thermal Power Level	3293 mw	50 mw

200a

Peach Bottom's reactors have almost 400 times the volume of the GETR and operates at much higher pressures and temperatures. A most important difference is that the material from which they are constructed is different. Thus any conclusions about the deterioration of the reactor vessel of the GETR do not apply to the Peach Bottom reactors.

- Q. What is the principal concern with regard to the physical life of a nuclear power plant?
- A. The principal concern in the physical life of a nuclear power plant is the reactor vessel. If the reactor vessel should become insufficient for operation in any way, the life of the nuclear plant will have come to its end. While these vessels are designed to have a physical life of 40 years, no commercial nuclear plant has operated that long, thus there is no actual experience which confirms a 40-year life.

There are three major causes for deterioration of the reactor vessel. The first is radiation. The radiation emitted by the reactor core during energy generation may be characterized as lightly ionizing radiation and heavy particle radiation. In a reactor vessel, radiation effects results primarily from the action of fast neutrons. These effects manifest themselves in changes to the physical characteristics of the metal.

The second cause for deterioration is the thermal stresses which the reactor material experiences as a result of being alternately heated and then cooled.

A third cause is the corrosive effects of the coolant material on the metal composition of the reactor vessel.

- Q. Does a 35 year life for nuclear plants allow the Company to recover its capital investment?
- A. No. When the license for the Peach Bottom Units expires the units will be 34 years old. When the license for Salem No. 1 expires the units will be 31

years old, while Salem No. 2 will be but 28 years old. In agreeing to employ a 35 year life at this time, the Company is already assuming a very great risk, because of the uncertainty of relicensing, that its capital investment in these plants will not be recovered without a special amortization allowance. In the case of Salem Nos. 1 and 2, 11% and 20% of the total invested cost is covered by this risk. Under Dr. Birx' 40 year life span proposal, 23% and 30% of the total invested cost would be subject to this risk. If the units are not relicensed, which is likely, then future ratepayers will have to pay for the non-depreciated portion of a plant from which they receive no benefits.

Q. Dr. Birx has recommended a 40 year life for Eddystone No. 1 and No. 2. Do you agree?

A. No. When these two Eddystone generating units were installed, they were state-of-the-art generating units. Eddystone No. 1 was designed for turbine steam conditions of 5000 Psi pressure and 1200°/1050°/1050° temperature (double reheat unit). Eddystone No. 2 was designed for turbine steam conditions of 3500 Psi pressure and 1050°/1050°/1050° temperature (double reheat unit). These supercritical steam conditions with double reheat were selected in order to obtain high efficiency units (about 40%). These units were not designed for cycling operation. Each of these units has only one critical pressure steam generator. Older coal-fired plants usually had more than one boiler and were capable of cycling operation. As a consequence, the Eddystone Units No. 1 and 2 cannot be expected to have as long a life as older coal-fired units.

In addition, the pollution control system (flue gas scrubbers system which are presently being installed) is estimated to have a life of between 10 and 15 years. Since the flue gas scrubber system also is a state-of-the-art system, its life expectancy can be expected to be shorter than normal.

For these reasons we would expect Eddystone Nos. 1 and 2 to have a life expectancy of about 30 years.

202a

Q. Dr. Birx has recommended a 40 year life for the Keystone and Conemaugh units. Do you agree?

A. No. The study by Joseph C. Egg which Dr. Birx bases his conclusions on suffers a number of deficiencies. One major deficiency is that the units used in the analysis are not differentiated by size nor by steam conditions. Another deficiency in the study is the lack of differentiation by the number of boilers used by each generating unit which influences cycling capability. In the past, many of the older lower pressure and temperature units were connected to a common steam header with multiple units using this header as a source of steam. Then when the state of the art advanced to reheat units only one boiler was used to supply each turbine-generator.

The Keystone and Conemaugh units are standard high pressure (3500 psi). high temperature (1000<sup>o</sup>/1000<sup>o</sup>) supercritical single reheat units. The Conemaugh units are expected to have a life of 35 years which is associated with reheat units of the 800 mw-1000 mw size. Keystone is similar to Conemaugh except that the units have forced draft boilers. Since any leakage from the boiler is out, not in, the very hot corrosive gasses tend to destroy the boiler structure. In addition, flyash tends to gather at the inside top of the boiler which causes boiler tubes to fail more often. There has been much concern over the unexpected erosion of turbine blades. As a consequence of these problems the Keystone unit has an estimated life expectancy of only 30 years compared to Conemaugh unit's life expectancy of 35 years.

1 to the best of your knowledge and belief?

2 A It is.

3 MR. HALL: Your Honor, I would ask that there  
4 be identified in this proceeding as Statement No. 9 of the  
5 Philadelphia Electric Company the direct testimony of  
6 Mr. Boyer and as Exhibit VSB-1 and Exhibit VSB-2 of  
7 Philadelphia Electric Company, the various documents which I  
8 have just described.

9 THE ADMINISTRATIVE LAW JUDGE: Without objection,  
10 they will be so identified.

11 (Philadelphia Electric Company Statement No. 9,  
12 being Direct Testimony of Vincent S. Boyer,  
was produced and marked for identification.)

13 (Philadelphia Electric Company Exhibit VSB-1  
14 a document entitled Salient Features of the  
Company's Electric System, was produced and  
15 marked for identification.)

16 (Philadelphia Electric Company VSB-2, a  
17 document entitled Explanation of Load Forecasting  
and of Present and Future Generating Reserve  
18 Capacity, was produced and marked for  
identification.)

19 MR. HALL: Your Honor, Mr. Boyer is available  
20 for cross examination.

21 MR. DASENT: If Your Honor please, I think it  
22 would be appropriate and timely to move at this time that  
23 portions of Mr. Boyer's testimony that relates to cost overruns  
24 at Salem which was specifically litigated in the last case and  
25 the factual scenarios have not changed in any way, shape or

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1 form, the Commission has decided this factual issue which is  
2 not subject to change in terms of policy considerations that  
3 might come into play with other issues regarding such issues  
4 as depreciation that are looked at constantly.

5           The facts in this case have not changed from the  
6 last case. This is merely warmed over testimony that has  
7 already been litigated fully. For those reasons, I move that  
8 sections of Mr. Boyer's testimony relating to cost overruns  
9 on page 6, 7, 8 and the top of page 9 be stricken at this time.

10           MS. BUSH: Your Honor, I would agree with  
11 Mr. Dasent's motion. I think that it is, that the general  
12 principle in the regulatory field that traditional issues are  
13 not considered res judicata. However, with regard to a  
14 question of a finding of mismanagement on the part of the  
15 Commission, for the construction of nuclear plants, this is a  
16 factual determination that has been made and the facts that  
17 existed at that time have not changed subsequent to the  
18 decision.

19           No new evidence that could not have been available  
20 when the issue was litigated has arisen. No facts have changed.  
21 The construction of the plant was completed. The findings  
22 were based on events that occurred and that had ended. Thus,  
23 I think that if the company is dissatisfied with the Commission's  
24 decision in the last case, the appropriate avenue is to appeal  
25 the case to Commonwealth Court and not to relitigate this issue,

1 particularly with - - peripherally, I might say that if the  
2 company is concerned with time issues and having a timely  
3 decision, it is even more appropriate, but my argument is  
4 based on the first point that is this is a factual determination  
5 that is made, nothing has changed since the factual determination  
6 and it is not, a second rate proceeding is not an appropriate  
7 form for appeal of that decision.

8 MR. BOCK: I would also indicate on behalf of the  
9 City of Philadelphia, although it was characterized as res  
10 judicata, technically, it might not be because all the parties  
11 are not the same, but certainly under the related document,  
12 collateral estoppel, the company is estopped from any evidence  
13 in this area.

14 I would join in the motion by Mr. Dasent seconded  
15 by the Consumer Advocate, that the testimony regarding Salem  
16 be stricken.

17 MR. HALL: In response, the company can't appeal  
18 the Commission's last order. The Commission has not concluded  
19 its consideration of that last case. And the company is  
20 prevented from appealing that with regard to Salem which the  
21 company may decide to do when an appeal becomes appropriate.

22 It is therefore necessary for the company to  
23 relitigate the issue in this case simply with regard to keeping  
24 it alive with regard to this particular case. Secondly, there  
25 is, in my experience, no res judicata principle which is applied

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1 to Commission decisions.

2 Issues which are decided by the Commission are  
3 subject to reconsideration and re-evaluation in each and every  
4 case. I would note that these parties are raising, based upon  
5 their pre-hearing memoranda, a number of issues which were  
6 decided by the Commission adversely to them in terms of  
7 specific adjustments to revenues, expenses, capacity adjustments  
8 and so forth in the last case.

9 What is sauce for the other parties, I think is  
10 also sauce for the company and the company can do the same  
11 thing.

12 Finally, I would note that two additional matters,  
13 there have been changed factual circumstances with regard to  
14 this issue. We have at this time, testimony from the plant's  
15 constructor which was not available to us at the time of the  
16 last proceeding.

17 We wish to present this evidence to the  
18 Commission. We think it is important that they consider it.  
19 They have not had the opportunity to consider it before.

20 In addition, we have a decision by the New Jersey  
21 Board of Public Utility Commissioners holding that there was  
22 no mismanagement in the construction of this plant and holding  
23 that there should be no adjustment and rejecting the Theodore  
24 Berry audit. I think the Commission should examine that  
25 decision by the Public Utility Commission which is responsible

1 for the regulation of the utility which built this plant and  
2 should be able to consider it and that is what we are seeking  
3 to do by raising the issue in this proceeding.  
4

5 Finally, we have in this proceeding a question  
6 as to Salem 2. Salem 2, certain parties may assert, should be  
7 considered in the company's rate base. There is a proposed  
8 adjustment to Salem 2 proposed in the Theodore Berry audit.  
9 That is still a relevant issue and probably will be in future  
10 cases of this company.

11 Therefore, this matter is going to be subjected  
12 to repeated reconsideration.

13 MS. BUSH: Your Honor, if I might respond, the  
14 New Jersey decision, any decision that another Commission  
15 might have made is a decision that that Commission made. The  
16 Commission made a decision based on the facts and the evidence  
17 before it. Any subsequent decision from another jurisdiction  
18 that might be different is totally irrelevant and certainly  
19 not a cause for reconsideration on the part of the Commission.

20 With regard to the question of other parties  
21 have relitigated issues, the issues that are being relitigated  
22 are tax issues, policy issues, excess capacity, things that  
23 change as facts change, work has changed. Usage patterns  
24 change. Some of the tax decisions were based on the financial  
25 condition of the company which changes over time. The question  
that is at issue here is a factual determination based on

1  
2 behavior patterns, construction practices that the company  
3 undertook in an historic period.

4           These construction practices have not changed.  
5 Those events are over and the decision was based upon what  
6 events occurred prior to the decision.

7           With regard to any relevance of Salem 2, the  
8 construction audit was of the entire construction of the  
9 project. For the purposes of that proceeding, Salem 1 was  
10 broken out. Any decision was, any quantification was made in  
11 terms of both plants, in terms of both owners, then broken down  
12 for Philadelphia Electric Company and for Salem 1 which was  
13 the plant that was being requested in rate base.

14           But any issues that were determined by the  
15 Commission had to do with the entire construction project.  
16 So that I think that we are not talking about the same kind of  
17 traditional issues that are based on financial conditions or  
18 tax policy decisions that change. No new evidence was  
19 available with regard to Mr. Hall's point about testimony  
20 being available at this time that wasn't available before.

21           There was no reason that the Jersey company  
22 witness could not have testified. The company chose what  
23 rebuttal to put on at that time and they should bear the  
24 responsibility of whatever rebuttal they put on at that time  
25 and not be given a second bite of the apple in a subsequent  
proceeding.

1 MR. BOCK: I agree with Ms. Bush's response.

2 I think Your Honor has to recognize that there is a dichotomy  
3 between issues in terms of what I would characterize as generally  
4 issues of losses, such as tax issues that are raised, a  
5 specific issue of fact. This was a factual determination that  
6 the Commission made. It is not subject to changing policy,  
7 changing public policy, changing mood of the Commission.

8 It was an issue of fact alone and as such,  
9 cannot be relitigated and the items that Mr. Hall refers to  
10 that are relitigated are relitigated traditionally in rate  
11 cases and theories and policies of the Commission change  
12 and they would be, in the law, akin to issues of law that  
13 appellate courts and commissions exchange views.

14 But with regard to an issue of fact, once an  
15 issue of fact is actively litigated, that issue of fact cannot  
16 be relitigated. It is an issue of fact and stands as such.

17 With regard to the new testimony that is now  
18 being offered for the company to allow, the Commission to allow  
19 such testimony, I think it would have to reach the standard  
20 of newly discovered evidence and that is to say that such  
21 evidence is in fact newly discovered and that the company  
22 made a good faith showing as to why the evidence was not  
23 available in the last case and why they did not present it  
24 in the last case and certainly you don't have that before Your  
25 Honor.

1  
2 MR. DASENT: Your Honor, if I might briefly  
3 add, the effect of what the company is trying to do in this  
4 case is to avoid the significant questions raised by Theodore  
5 Berry Associates in the last case. They are not, and I take it  
6 because of fiscal reasons here, to prepare their testimony and  
7 rebut the company's findings in this particular context.

8 The timeliness of the company filing rebuttal  
9 testimony has certainly passed. They had the opportunity to  
10 present their case the last time around and they chose to do  
11 what they did and we suggest that they be allowed to do no more  
12 because in this particular context, we are not in the best  
13 position to present rebuttal testimony again.

14 The problem that arises is is the company  
15 to avoid facing frontally the facts that are before us in terms  
16 of the facts that were in the last case or are they to present  
17 unilaterally their view of the world now, having lost stating  
18 their rebuttal testimony in the last proceeding.

19 MR. HALL: If I could respond to that briefly,  
20 first of all, the company did not have a full opportunity  
21 in the last case to provide a full response to the Berry audit.  
22 The audit was not provided to us until late May. The hearings  
23 closed in late June. We were unable, in that period of time,  
24 to obtain testimony from the Public Service individuals who  
25 were involved in the audit. Primarily because there was a  
separate proceeding going on in New Jersey with regard to that

1 audit, and Public Service desired to present their case first  
2 to their own Commission, which is reasonable or was reasonable  
3 in our view.

4 We therefore did not have the benefit of their  
5 assistance. Now, secondly, I think we should remember that  
6 this issue has not yet been closed. We do have the potentiality  
7 of an appeal from this issue from the Commission's last order.  
8 For that reason, I think, res judicata would not apply or  
9 collateral estoppel.

10 The issue remains open and I think a record as  
11 to it needs to be presented in this proceeding. Rate cases  
12 are somewhat different than your normal litigation in that  
13 there's an on-going process.

14 Finally, I don't think there's any difference  
15 in this issue as opposed to other issues that are being raised  
16 by a number of parties. These other issues are merely  
17 requests for the Commission to change its position with respect  
18 to various adjustments in the case. This is just such a  
19 request and for that reason, I think it is entirely appropriate  
20 and no different than everyone else is seeking to do.

21 MS. BUSH: There are a couple new points that  
22 were raised. I would like to respond to them. The way that the  
23 audit developed in the last case, Your Honor, is that it was  
24 an on-going process in which the auditor met with both  
25 Philadelphia Electric Company officials and Public Service

1  
2 Electric Gas Company on a regular basis over a period of many  
3 months and the chapters, the several chapters that composed  
4 the audit were shared with the companies and their comments  
5 were given back to the auditors and then the chapter was put  
6 in final form and returned to the companies so that the way  
7 the process developed, it wasn't as if the company only had  
8 notice at the last minute.

9 The summary chapter was the last chapter and  
10 that was shorter notice than the others, but all the particular  
11 chapters that were on the basis of the conclusions were  
12 accessible to the company for a long period of time.

13 With regard to Mr. Hall's argument about the  
14 witness from Public Service not being available, I am not  
15 privy to what the problems with getting that witness were, but  
16 at any rate, the company had its opportunity to get its  
17 best evidence forward at that time.

18 In the course of a rate proceeding, parties are  
19 held responsible for putting on their case and the company  
20 had an opportunity at that time. Any appeal that they want to  
21 take from that decision is still open to them and the Commission's  
22 decision not to relitigate this issue in this case that it has  
23 already decided would not harm the company's right to appeal  
24 that out of the decision at RID 438.

25 MR. HALL: Ms. Bush, am I to understand from an  
earlier statement that you made that the Consumer Advocate's

1 Office will not reraise this issue with regard to Salem 2  
2 when that plant comes into service?

3 MS. BUSH: Well, it is our view that the audit  
4 applied to the entire construction project, and the decision  
5 was made specifically and quantified as regards to Salem 1,  
6 that the decision was made as to the entire construction project  
7 which was an integral project.

8 MR. HALL: In other words, it would be your  
9 position in some subsequent case the Consumer Advocate's  
10 office will argue based on res judicata that similar adjustments  
11 be made at some level with regard to Salem 2?

12 MS. BUSH: Yes. The decision has been made by the  
13 Commission as to what was the degree of not -- of acceptable  
14 management practices at the Salem construction project.  
15 The evidence that it had before it quantified and broke down  
16 the Salem 1 because that was the only issue before it at that  
17 time.

18 But the underlying facts were not different  
19 from Salem 2 than they were from Salem 1, and the audit was  
20 of the entire construction project.

21 MR. HALL: Well, Your Honor, I think this  
22 indicates the fallacy of the other party's argument. In the  
23 company's view, the underlying facts are very different.  
24 In the company's view, this issue is a continuing one and one  
25 that should be reviewed by this Commission again. These are

1  
2 two separate units, and they were constructed differently.

3 Mr. Boyer's testimony at this point goes to  
4 Salem 1. If indeed we have an issue arisen as to Salem 2,  
5 that testimony also goes to that point. And we think for that  
6 purpose alone, it is appropriate for the reason as I have  
7 stated the company did not have a full opportunity to respond  
8 to this audit in the last case. The summary report is the  
9 only one that really matters. That is the one in which  
10 dollar figures were assigned and which one could really  
11 understand the audit. One didn't really see what the audit was  
12 saying in a rate case aspect until one received the summary  
13 report.

14 Up until that point, one had some pluses and  
15 one had some minuses throughout the report, a plus being  
16 you are doing a good job in this area and a minus being not  
17 so great in this area.

18 The company's only ability to respond was once  
19 it received that final chapter.

20 Finally, we think this is an important question.  
21 We think we have very substantial evidence to provide to this  
22 Commission with regard to it, and we would request the  
23 opportunity to do so.

24 MR. HERSHEY: Your Honor, just very briefly.

25 Mr. Hall claims this is a continuing issue but  
it is a continuing issue only insofar as he will attempt and

1 he will ask the Commission to apply a standard which has been  
2 set based on a factual determination. He has claimed changes  
3 and facts, but he has cited and claimed only two changes in  
4 those facts. And as Miss Bush indicated, one is the New Jersey  
5 Board decision, which is irrelevant here, and the second is  
6 this new evidence which they should have produced at the earlier  
7 hearing. So, I don't see any changes in facts, and I don't  
8 see any changes in application of any part of this situation  
9 which would change from the last time.

10 THE ADMINISTRATIVE LAW JUDGE: In view of the  
11 importance that all parties seem to place on this issue,  
12 I would like a memorandum from the parties on this question.  
13 I, therefore, will defer ruling on the motion to strike.

14 MR. HALL: Would Your Honor request that at the  
15 time of the next set of hearings Thursday?

16 THE ADMINISTRATIVE LAW JUDGE: Yes. We will be  
17 busy with the certification request for this week. Perhaps  
18 - - yes, the 23rd.

19 Mr. Sayre?

20 CROSS EXAMINATION

21 BY MR. SAYRE:

22 Q Good morning, Mr. Boyer. I am Gregg Sayre.  
23 I represent the Commission Trial Staff.

24 Am I correct that you are licensed to practice  
25 engineering in Pennsylvania?

1 items that contribute to forced outages is a means of doing  
2 it.

3 Q Would you say that in PECO's business, PECO  
4 is willing to tolerate more forced outages than other indus-  
5 tries because there is other plant that can be put on line  
6 or other capacity that can be put into the pool that can  
7 cover you when a forced outage occurs?

8 A No. But qualification in that the duration  
9 of the outage which goes into the PJM figures has been ex-  
10 tended because of the availability of additional capacity.  
11 In other words, where it is non-economical to work overtime  
12 to get the unit back in service with the cost picture on  
13 the interconnection, we would not work overtime. Where we  
14 have had a considerable number of combustion turbines that  
15 are not required to run any considerable amount of time and  
16 you have a forced outage of a combustion turbine, you do  
17 not spend extra man-hours to complete the work as soon as  
18 you might.

19 The forced outage hours, then, will con-  
20 tinue to run, but they are not a cost penalty to the  
21 customer or to the company.

22 Q That's because other generation is available?

23 A Yes. And because of the accounting system  
24 mechanism. But that does not say that we do not, when we  
25 have an outage, make an analysis to the cost-effectiveness

1 the less forced outage rate and the less the reserve require-  
2 ments?

3 A. But the higher the cost. So it is an  
4 economic evaluation, again, that has to put all the factors  
5 into the examination.

6 MR. HALL: Your Honor, I wonder if this  
7 would be an appropriate time for a break. I don't mean to  
8 interrupt your questioning. It is just about an hour and  
9 a half.

10 MR. SAYRE: I'd like to get two or three  
11 more questions and then that would be a good time.

12 THE ADMINISTRATIVE LAW JUDGE: Okay.

13 BY MR. SAYRE:

14 Q Did the company have a cash flow problem  
15 with respect to maintenance in the mid '70's?

16 A That's not my area.

17 Q Do you know whether or not the company cut  
18 back on maintenance in, say, 1974 to 1976?

19 A We were reducing expenses in all areas  
20 and I'm sure maintenance was cut back as well as other oper-  
21 ations.

22 Q And what was the reason for that?

23 A I don't understand your question.

24 Q For the cutback in maintenance, in particular.  
25 That's the cash flow problem.

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PHILADELPHIA ELECTRIC COMPANY  
ELECTRIC OPERATIONS

DIRECT TESTIMONY OF W. C. HOCH, JR.

JULY 1979

TESTIMONY OF  
WILLIAM C. HOCH, JR.

Q. Please state your name and business address for the record.

A. My name is William C. Hoch, Jr., 2301 Market Street, Philadelphia, Pennsylvania.

Q. What is your present position with Philadelphia Electric Company?

A. I am Manager, Technical Services Department, a unit of Commercial Operations.

Q. Will you please state your employment history with the Philadelphia Electric Company?

A. I joined the Company in 1944 after a stint in the Merchant Marine and have been with the Company ever since except for two years in the U.S. Army. I started as an Applications Engineer. In 1953, I was transferred to the Industrial Sales Department as an Industrial Sales Engineer. In 1962, I advanced from Senior Sales Engineer to Supervisor, Governmental Sales. In 1965, I moved to Supervisor, Lighting and Space Conditioning Section. In 1967, I advanced to Assistant Manager, Marketing Services. In 1972, I was appointed Manager, Research and Forecasting. In 1979 the Research & Forecasting Department and the Applications Department were combined into the Technical Services Department and I was appointed Manager.

Q. What is your educational background?

A. I have a BS in Mechanical Engineering from Drexel University and am a Registered Professional Engineer in Pennsylvania. Among additional courses, I completed the summer program known as The Executive Program (TEP) at the G.S.B.A., University of

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Virginia.

Q. Would you briefly describe your experience in the field of utility forecasting?

A. Under the direction of Mr. Morlok, I have had administrative responsibility for preparing the Company's energy forecasts since 1973. Also, I have served as Company liaison in our participation and joint-sponsorship of the regional model developed by Wharton Econometric Forecasting Associates (WEFA), since that time. Beginning two years ago, I led a Company task force assigned to analyze the work and models of seven well-known model makers and econometricians and to recommend a consultant to develop a PECO long-term energy model. I have attended most Electric Power Research Institute (EPRI) conferences and seminars on forecasting and participated in several meetings and seminars. Three years ago, I initiated a PJM Customers Research Group to bring together, at our offices several times a year, forecasting personnel for an interchange of information. I review all material of the Electric Utility Market Research Council (EUMRC) of which our Market Research Supervisor is an elected member.

In the Company's most recent prior electric rate filing, RID 438, I presented testimony in support of the Company's Electric 1977-1987 Budget Forecast.

I am Secretary of the Citizens Advisory Committee on Land Use, Housing and Open Space of the Delaware Valley Regional Planning Commission (DVRPC).

Q. What type of personnel are involved in preparation of the energy forecasts?

A. We try to maintain a blend of analysts with business and technical backgrounds, mostly with some field experience. We have six

masters degrees, mostly Masters of Business Administration (MBA's) but one Masters in Engineering. We have three with engineering degrees, two of whom overlap the MBA's. We include several computer experts as we operate our own data processing operation.

Q. What is the purpose of your testimony?

A. I will describe the Electric 1978-88 Budget Forecast with 1988-98 Projections and discuss various aspects of that forecast. The Budget Forecast has been written in a tutorial fashion with explanations as to how the results were derived.

Q. Have you prepared or had prepared under your direction and supervision an exhibit to support your testimony?

A. Yes, I have.

Counsel:

I ask that the following document be marked for identification:  
Exhibit WCH-1 Electric 1978-88 Budget Forecast with 1988-98 Projections.

Q. Describe the energy sales forecasting methodology.

A. Most of the known forecasting methods are used to some degree in deriving the ten-year forecast. These include trend analysis, correlation analysis with regressions, economic projections, technological forecasting of changes in energy-using equipment, and data derived from a regional econometric model. Models of sensitive parts of the forecast such as air conditioning loads and population analysis have been programmed for a computer and a fully computerized econometric model has recently been programmed. The econometric model was developed by Wharton Econometric Forecasting Associates (WEFA), at our request, as a separate method of establishing future forecasts.

The forecast is produced by estimating energy sales for individual years for each rate class - Residential, House Heating

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Small Commercial and Industrial, Large Commercial and Industrial, Other Public Authorities, Railroads & Railways, Street Lighting, Resale, and Interdepartmental. In order to satisfy the needs for special data to compute revenue, peaks, etc., energy sales for key months are forecasted for each year along with numbers of customers and selected data on special uses such as air conditioning and electric heat.

The forecast is estimated by classes and then aggregated.

Each class in turn is made up of parts. Because of the substantial amount of data collected from field forces as well as trade associations and government agencies, we believe that establishing each component with its own correlations and data - based on uniform assumptions concerning the region and economy - leads to a more precise forecast than deriving a general forecast from a national econometric model. This is especially true of local large manufacturing customers whose use and plans often bear little resemblance to the performance of the national industry. This forecast is also more useful as a future reference source when forecasts for separate applications and appliances are determined.

Q. Describe how residential sales are forecast.

A. The residential energy sales forecast is based on two main determinants; the number of living units and the average use per living unit.

Using Bureau of Census materials including the Census of Population and the Census of Housing, as well as local data, population and housing units are determined for the service area and the relationship between dwelling units and population is established. A component-cohort method is used to advance the population through the year 2000, analyzing the effects of different fertility, mortality and migration rates. Correlations

are determined between various segments of the population (e.g., females over nineteen and total population) and dwelling units. In addition, sociological data is reviewed to determine the effects of change in life style and marriage and divorce rates on the size of household and the mix of dwelling units (e.g., apartment, single dwellings, etc.).

New construction must be estimated because of its large effect on electric space heating and electric water heating sales as well as other applications. Construction data collected from our field representatives, as part of the continuing reporting program, and correlations to various demographic housing and economic factors are used to determine the long term trend in new construction. Short term new construction units are based on information from construction reports, local builders and builder's associations.

The new construction units are forecast by detached houses, townhouses, individually metered apartments and single point-metered-apartments. Single-point-metered apartments are forecast along with the other residential units, although their consumption is included in the Large Commercial and Industrial class.

Demolitions and abandonments are included in a "net losses" category. Demolition numbers are obtained from figures compiled by the Bureau of Census, county planning agencies and Philadelphia Electric Company.

Space heating for new construction is based on historical penetrations in the new housing market, availability of fuels and present and future fuel costs. Space heating conversions are estimated based on past and current trends, projected fuel

prices and the size of the potential market. Electric space heating in both the new construction and conversion markets are divided into resistance and heat pumps, with consideration given to the anticipated improvements in the latter's efficiency.

Residential air conditioning has been tracked since 1947.

Data on size, type of unit and energy efficiency ratio, whenever available, are collected on a continuing basis from distributors and manufacturers through the Electrical Association. Annual residential surveys, conducted since 1972, are used to update the air conditioning data base. Forecast consumption for air conditioning is based on the level of market saturation, the replacement rate and the expected continuation of strong success in our high efficiency air conditioning program.

Other appliances are forecasted separately. The annual residential surveys provide saturation data and the acquisition rate. Monthly sales statistics are also received from the Electrical Association, but these must be adjusted for anticipated replacements. Annual use of appliances is obtained from test data and industry average data (EEI and other utilities).

The consumption for each appliance and application is then summed to obtain the class totals for Residential, House Heating and the single-point-metered apartment component of Large Commercial and Industrial sales.

- Q. Describe how the large commercial and industrial sales are forecast.
- A. This class is broken down into the largest ten manufacturing customers, all other manufacturing, single-point-metered apartments, and other non-manufacturing (commercial, education, government, utilities).

The big ten manufacturer's sales forecasts - which are 40% of the total manufacturing sales - are based on frequent interviews with these customers concerning their plans.

Forecasts of other manufacturing sales were made using three different methods:

Manhours - This method used historic and forecasted manhours and kWh per manhour for the various industrial SIC's. Using actual kWh sales plus manhours per SIC from the Wharton (WEFA) Regional Model, the growth rates in kWh per manhour were calculated for the 1969-77 period. These growth rates were then applied to WEFA's forecasted manhours for the two digit SIC's for the period through 1988. Adjustments were made to SIC's 29 and 33 because the three major oil companies and the two major steel companies in these classes are in the big ten and are forecasted individually.

Relationship of Population and Employment - The ratios of population to employment by two digit industrial SIC's were determined as was the kWh per employee by SIC, by year, for the period 1965 to 1976. Through the use of linear regression, the kWh per employee was projected by year through 1988. Regressions were then run to estimate future employment by SIC using both State of Pa. Dept. of Commerce population forecasts and PE Company's population model. Using the kWh per employee and the estimates of future employment resulting from the two different population models, two slightly different kWh projections were obtained for the 1978-88 period. The average of the two was used as the base case.

Regression Analysis - A total of 30 different models were run and the three which were statistically significant and reasonable in terms of functional form and dependency were selected.

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The three models used have the following independent variables:

(1) Industrial Production Index, (2) the personal consumption expenditures for durable and nondurable goods and the fixed nonresidential investment components of the Gross National Product 1972 \$; and (3) the third model augments the first with a lagged dependent variable of kWh sales to the manufacturing sector which assumes that the stock of electric using equipment in industry does not instantaneously adjust to changes in the economy.

The results of the three methods just described produced 1978/88 growth rates for other manufacturing sales of 2.7%, 2.8% and 2.8% respectively. The manhour method with its 2.7% growth rate was selected for the base case. Value added was also investigated as a possible forecasting technique but was found to have a number of serious deficiencies which precluded its use.

Large commercial sales were forecast using four different methods:

Manhours - The method is the same as described for other manufacturing sales.

Relationship of Population and Employment - This method is also the same as described for other manufacturing sales.

Regression Analysis - 30 different models were run and three were selected because of their reasonableness of structure, their statistical properties and their observed behavior over the estimation period. The three models used have the following independent variables: (1) the services component

of Gross National Product 1972 \$ (2) Real Disposable Income 1967 \$ and the lagged value of kWh sales to the nonmanufacturing sector and (3) the third model uses the services component of Real GNP 1972 \$ and the lagged value of Real Disposable Income 1967 \$.

Commercial Square Footage - An analysis of various data resulted in the assumption that there are 465 square feet of floor space per commercial employee. Using WEFA's regional projection of commercial employment, an estimated 121 million square feet of new commercial construction in the 1978/88 period was obtained. This figure was multiplied by 34 kWh per square foot, which was the average for new construction in PECO's service area for the 1974-77 period. The resultant figure was adjusted for known specific "non-commercial" type loads included in this class such as water and sewer plants, the Navy Yard, oil pumping stations, etc. Existing weather corrected loads were increased 1% for additional equipment, mainly data processing equipment. However, existing weather corrected loads, less the "non-commercial" segment, were also reduced by 7% to allow for additional conservation by existing customers over the 1978-88 period. Conservation in new construction was forecast to lower consumption somewhat less than the maximum impact of ASHRAE 90-75, which is based on pre-1973 construction. The new construction kWh, less conservation, were combined with the adjusted existing kWh sales to produce the final result.

The results of the four methods produced 1978/88 growth rates for large commercial sales of 5.1%, 3.7%, 4.8% and 3.7% respectively. The lower figure was selected as the base case.

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- Q. How are small commercial and industrial sales forecast?
- A. This class was forecast by a method very similar to that just described in the Large Commercial Square Footage method. The Customers in this class are not broken down into SIC's. The forecasted sales for 1988 are 3,520 million kWh which is a 1978/88 growth rate of 2.0%.
- Q. How were the other classes forecast?
- A. The forecasts for the other classes are made based on discussions with the limited number of customers involved and on time-series analysis and the technological changes expected (as in street lighting sources).
- Q. Are high and low ranges of the forecast prepared?
- A. The forecast is prepared as a base forecast based on assumptions considered most likely to occur, with high and low ranges based on variations of these assumptions. The basic assumptions which apply to all classes of service are listed in Appendix A. Many other assumptions are included with the individual discussions of the various classes of service in the Budget Forecast. Ranges are developed because outcomes will vary from forecasts for many reasons. Deviations based on business cycles and errors from the mean economic forecast based on a band of predictions will occur. It is inevitable that the economy will be influenced by factors not now considered probable by most economists. Such things as the effects of government policy changes; OPEC actions; unanticipated technological changes or lack of improvements in appliance efficiencies; and behavioral changes affecting consumer spending, migration, jobs or life style, which, taken together, could greatly influence the growth of regional output and population away from the projected probable trend.

In addition, seldom can the future be counted on to reflect the past. In this century, there was World War I, the boom of the roaring twenties, the crash and Great Depression, World War II, the sustained postwar boom, the wide swings in birth rates, Korea and Vietnam. Since 1970, the economy has been influenced by the oil embargo, the severe recession, and the job and population outflow from the Northeast. None of these major events was foreseeable a few years in advance by the economists of the time. The base case growth rate for 1978/88 is 2.9% while the high range is 4.4% and the low range is 1.3%. In all three scenarios normal weather is assumed.

- Q. How do the results of the WEFA econometric forecast model compare with the Budget Forecast results?
- A. The WEFA model in 1978 forecasted consistently higher kilowatt-hour sales growth than our in-house forecasting methodology. WEFA forecasts prepared in the fall of 1978 projected total electric consumption to grow at 3.8% annually compared to PE Company's forecast of 2.9%. Under the present circumstances, a higher forecast could be expected from the econometric model because it is based on history and might not take into consideration the full impact of government regulation on appliance efficiency and building standards.
- Q. How do you factor into the forecast future fuel prices and technological improvements.
- A. Projections of energy prices are prepared by PE personnel. These are applied to various heating system types as a basis for estimating saturation percentages for each fuel. The assumptions in Appendix A show the ratios currently expected. The cost of electricity and salaries and wages are expected to increase at

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approximately the same rate as the consumer price index over the next ten years. Therefore, with the cost of electricity taking a relatively constant percentage of the consumers' income, no special coefficient of elasticity is used. Past studies here and elsewhere were inconclusive as to values for price elasticity of electricity. However, the forecast does assume that energy conservation will continue because the high price of electricity and the optimum efficiency of energy use will remain facts of life. When forecasting energy sales for each component, whatever is applicable in optimizing energy use, such as full insulation, ASHRAE-90 standards, high efficiency (high EER) air conditioning, accelerating acceptance of heat pumps with continually improving COP's, solid-state appliances, microwave cooking, high efficiency light sources, and others is assumed. A strong restrictive effect is thus derived which reflects the high value of electricity without relying on a fixed coefficient of elasticity with its necessary estimate of future prices. Forecasts of technological changes and data on future improvements are obtained from following a large number of publications such as Futurist, Technology Review, Spectrum, Electrical World, Electrical Week, Business Week, Energy Review, and the U.S. Information Service energy materials.

- Q. How are weather and business cycle effects taken into consideration?
- A. The energy sales forecasts for the base case and high and low ranges are based on normal weather (see Appendix A for description of weather-corrected sales) and normal, average economic conditions. Whether the economy is in a recession or at a peak will cause energy sales to swing considerably from the probable forecast trend line.

**FILE**

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