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SEPTA/Amtrak Statement No. 1

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PENNSYLVANIA PUBLIC UTILITY COMMISSION

v.

PHILADELPHIA ELECTRIC COMPANY

DOCKET NO. R-850152

DIRECT TESTIMONY OF RICHARD J. RUDDEN

on behalf of

THE SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY

and

THE NATIONAL RAILROAD PASSENGER CORPORATION

Concerning Rate Structure

January 22, 1986

DIRECT TESTIMONY OF
RICHARD J. RUDDEN

Q. Please state your name and business address.

A. My name is Richard J. Rudden. My business address is 425 New York Avenue, Suite 207, Huntington, New York 11743.

Q. By whom are you employed?

A. I am employed by R. J. Rudden Associates, Inc., where I hold the position of President. My firm has been retained by the Southeastern Pennsylvania Transportation Authority (SEPTA) and the National Railroad Passenger Corporation (Amtrak) to assist them in their participation in this proceeding.

Q. Please state your professional and educational background.

A. Since 1967, I have been professionally involved in the fields of utility and regulatory economics, financial analysis and management consulting. Since forming R. J. Rudden Associates in March of 1981, I have provided assistance to utilities, industrial firms, and other clients in the areas of utility revenue requirements, cost analysis, rate design, rate case management, financial feasibility analysis, information systems, strategic planning and related areas.

Prior to forming R. J. Rudden Associates, Inc., I was Vice President and Manager of the Regulation Services Division at Stone & Webster Management Consultants, Inc. While there, I was responsible for client projects relating to gas and electric utility rate design, cost analyses, strategic pricing studies, evaluations of PURPA ratemaking standards, load research and related areas. I also directed, or participated in projects relating to load and sales forecasting, management and regulatory audits, computer system applications, and corporate reorganization. I have published an article on regulatory audits in Public Utilities Fortnightly, have lectured on regulatory economics and practices, and have spoken at a number of utility industry seminars and symposiums.

Prior to joining Stone & Webster in 1975, I was employed in the Rate Engineering Department at Con Edison as a Division Analyst, and was responsible for the administration of the Rate Design Division. My duties included revenue forecasting, tariff administration, the preparation of gas, electric, and steam rate and cost analyses for filings before the New York Public Service Commission, rate design, and the preparation of related testimony. Earlier in my employment at Con Edison, I had technical responsibilities in the areas of power generation, electric distribution network load analysis and special gas and electric market analyses. I was employed by Con Edison between May, 1967 and January, 1975, except for three years during which

I served as a commissioned officer in the U.S. Navy. I received a Bachelor of Arts degree in Economics from the Queens College of the City University of New York in 1967. In addition, I have completed a major portion of course work in economics and finance towards an MBA at New York University. I am a member of the Rate Committee of the American Gas Association, the Texas Gas Association and the Southern Gas Association. I am also a current member and past Vice-Chairman of the Energy Committee of the Long Island (N.Y.) Association, a regional Chamber of Commerce.

Q. Would you briefly describe your firm?

A. R. J. Rudden Associates, Inc. provides economic, management and financial consulting services to utility and energy companies throughout the United States. We maintain offices in Huntington, New York; Wellesley, Massachusetts; Houston, Texas; and an affiliate office in Arlington, Texas. Our major practice areas include regulatory economics, rate case preparation, planning and forecasting, organizational analysis and management audits, information systems consulting, decision support, alternative energy system evaluations, and project financing analysis. Our clients include electric and gas utilities subject to both FERC and state regulation, energy producers and consumers, other industrial and commercial organizations, financial institutions, and the Canadian government.

Q. Have you testified before this or any other regulatory bodies regarding utility rate design and cost of service?

A. Yes, I have testified before the Connecticut Public Utilities Control Authority (Dockets 761001 and 780402), the Missouri PSC (Case Nos. EO-77-56 and EO-82-40), the Montana PSC (Dockets 6701 and 83.4.21), the Nevada PSC (Docket 83-111), the New Mexico PSC (Dockets 1499, 1568, and 1689), the North Carolina Utilities Commission (Docket No. E-13, Sub 44), and the Pennsylvania PUC (Docket RID 338), and have appeared before the City Council of Garland, Texas. In addition, I have submitted testimony in FERC Docket Nos. ER82-375, RP82-85, and RP84-77.

Q. What is the purpose of your testimony?

A. My purpose is to provide general support for Philadelphia Electric Company's (PECO) proposal to establish separate traction rates for SEPTA and Amtrak; to propose that the Electric Propulsion - SEPTA (EP-S) rate and Electric Propulsion-Amtrak (EP-A) rate filed by PECO in this case be consolidated into a single Electric Propulsion (EP) rate schedule; to propose certain modifications to the billing demands which PECO used to compute the EP-A rate; and to discuss a concern about, and possible modification to, the A.1 allocator used in PECO's class cost of service study as it applies to Amtrak.

Q. Before addressing the above issues, would you please provide a description of the SEPTA/Amtrak system, with particular emphasis on those factors that have a bearing on the nature and costs of electric service provided by PECO?

A. PECO is the major supplier of electricity to Amtrak and the sole direct utility supplier of electricity to SEPTA. As shown on Exhibit RJR-1, the electrified portion of Amtrak runs generally northeasterly from Washington, DC through Philadelphia, and on up to New York. This segment is known as the Northeast Corridor (NEC). In addition, Amtrak has facilities running generally west from Philadelphia to Harrisburg, which is referred to as the Philadelphia-Harrisburg Corridor (PHC).

Along these corridors, Amtrak shares rights of way and facilities with a number of other transit organizations. These include the Maryland Department of Transportation (MDOT), New Jersey Transit, and SEPTA. In many cases, Amtrak redelivers a portion of the electricity it purchases from its electric utility suppliers to the other transit organizations which share its rights of way and facilities. All power utilized on these rights of way and facilities is 25 Hertz (Hz) in frequency. Other than the railroads, there is no other user of, or market for, this 25Hz power.

Of Amtrak's total electrical requirements on the Northeast and Philadelphia - Harrisburg corridors, PECO provides the majority, approximately 80%. Baltimore Gas and Electric provides approximately 16%, and Pennsylvania Power and Light provides the balance, approximately 4%. However, of PECO's 80%, about one-third represents redeliveries of power initially sold to PECO by PP&L and BG&E. Therefore, the portion of Amtrak's total electricity requirements supplied by power actually generated by PECO is more on the order of 50%. The total proportion of power supplied from the generating facilities of PP&L and BG&E is, therefore, correspondingly higher than indicated above. Amtrak, in turn, redelivers about 20-25% of its power to SEPTA. Thus, Amtrak and SEPTA share both rail facilities and electric supply in common, to a significant degree.

Q. Please identify the facilities shared by Amtrak and SEPTA.

A. As shown on Exhibit RJR-1, these facilities run (1) from Philadelphia north to Trenton; (2) from Philadelphia west to Paoli and beyond; and (3) from Philadelphia south to Marcus Hook. In addition, SEPTA operates three of its own branch lines using 25Hz power delivered to it by Amtrak. Finally, SEPTA's line from Philadelphia International Airport to Philadelphia and the line between 30th Street Station and Suburban Station utilize 25Hz power delivered to SEPTA by Amtrak.

Q. Does SEPTA purchase any power directly from PECO?

A. Yes, at 34 delivery points throughout the balance of the SEPTA system. The balance of SEPTA's electrified transportation system includes the former Reading regional rail lines,as well as SEPTA's subway/elevated, trolley and trackless trolley routes in its City Transit and Subway (Red Arrow) Divisions. Exhibit RJR-2 provides a map of the SEPTA system.

Q. In the last several rate proceedings Amtrak and SEPTA have urged PECO to separate them from the HT class for cost analysis and ratemaking purposes. Has PECO done so in this filing?

A. Yes, Mr. Sundermeir's Cost of Service Study calculates costs separately for Amtrak and SEPTA. As I will testify later, the results show that PECO's costs to serve are significantly lower for the traction service customers than for the HT customers. Mr. Williams has proposed separate rate classifications for the two traction customers as a result.

Q. Would you please highlight the facts that support your conclusion that the costs to serve Amtrak and SEPTA are significantly lower than the costs to serve the HT class.

A. Yes. As I will testify, the most significant difference is in the demand costs. According to the results of PECO's cost of service study, the cost per KW of billed demand for the HT customers is $29.22 per KW as compared with SEPTA's $21.54 and

Amtrak's $18.70. Further, as Mr. Sundermeir testified, if they were served under the proposed Rate HT, the rates of return for SEPTA and Amtrak would be 14.36% and 14.15%, respectively, relative to a system wide return of 12.70% and a proposed Rate HT return of 12.23%. This is a good indication of the over recovery of Amtrak's and SEPTA's costs that would result if the traction customers were served under the HT rate.

Q. Do you support PECO's proposal?

A. Yes, in general I support the separate costing and rate treatment for Amtrak and SEPTA proposed by PECO. My testimony adds further justification for separate treatment. I do however, offer some suggestions for the refinement of PECO's proposals. I will also discuss concerns that Amtrak and SEPTA have regarding the determination of Amtrak's coincident peak responsibility.

Q. Would you please describe those characteristics of the Amtrak and SEPTA systems that distinguish these customers from other PECO customers?

A. Yes. It is my opinion that the characteristics I am about to describe make Amtrak and SEPTA unique. Moreover, these characteristics bear directly on the allocation of costs and generally add support to PECO's proposed separate treatment of traction service.

As previously stated, Amtrak redelivers between 20-25% of its total electricity purchases to SEPTA. Consequently, there is a great deal of commonality between SEPTA's and Amtrak's electrical loads and costs, and the demands they place on PECO's system. Thus, any discussion of the character of service of one of the two customers relates to the other. Moreover, Amtrak and SEPTA have distinctive operating characteristics and facility configurations that in my opinion underscore the unique nature of traction service within the PECO service territory.

Q. Please explain.

A. PECO provides power to Amtrak at six points: three within PECO's service territory, at which power is converted through frequency changers from 60Hz to 25Hz; one outside PECO's service territory, at which power is also converted; and two at which power is simply metered as it passes into PECO's service territory from neighboring utilities (or, as is less frequent, it passes from PECO to the neighboring utilities). I will now explain each of these three different groups of delivery points and supply configurations.

The three delivery points that are within PECO's franchise area are Lamokin, Richmond and Somerset. At these points, which are shown on Exhibit RJR-1, PECO converts its standard 60Hz electricity to 25Hz, which Amtrak then receives, transforms as

necessary, and utilizes on its own 138KV transmission system and 12KV catenary system. Once Amtrak takes possession of this electricity, it transmits or uses it along its own right of way, over Amtrak owned and operated transmission facilities. Once PECO delivers this power to Amtrak, PECO incurs no additional cost or obligation for the transmission of the power to those portions of the railroad system where Amtrak uses it.

Metuchen is the delivery point outside of PECO's service territory that is governed by Amtrak's contract with PECO, and at which a frequency changer is located. It is located in New Jersey, approximately half way between Trenton and Newark along the Northeast Corridor. At Metuchen, 60Hz electricity is physically supplied by Public Service Electric and Gas of New Jersey (PSE&G), although it is accounted for as if it were sold by PECO to Amtrak at that point. The 60Hz power is converted to 25Hz through a single 25 MW frequency changer.

Thorndale and Perryville are the two remaining delivery points governed by Amtrak's contract with PECO. Unlike the other four points at which PECO delivers 60Hz power and converts it to 25Hz, Thorndale and Perryville are simply metering points located at the borders between PECO and PP&L (in the former case) and PECO and BG&E (in the latter case.) At these points, 25Hz energy and power are metered as they flow along Amtrak's facilities either into, or out of, PECO's service territory.

Q. Please explain the nature of, and the accounting procedure for, energy and power transactions at Thorndale and Perryville.

A. As stated earlier, electricity is provided to Amtrak by PP&L and BG&E, as well as by PECO. Electricity provided by PP&L and BG&E is generated primarily at the hydroelectric plant owned and operated by Safe Harbor Water Power Corporation which is located on the Susquehanna River in Lancaster County, PA. Safe Harbor is owned jointly by PP&L and BG&E and generates both 60Hz and 25Hz power. The 25Hz power, which is ultimately sold to Amtrak and redelivered in part to SEPTA, is generated by two 25 MW water wheels. Additional 25Hz power can be supplied through a 25 MW frequency changer that converts 60Hz electricity generated at the hydro facility (and elsewhere on the PP&L system) to 25Hz. The frequency changer is also capable of operating in the reverse direction, thereby converting 25Hz power to 60Hz. Except for any 25Hz power that is converted to 60Hz, the only market for the 25Hz output of the plant is Amtrak. In recognition of this, Amtrak is given the contractual right to coordinate the dispatch of the 25Hz power out of Safe Harbor with the railroad's requirements, although in practice there are constraints on this dispatch.

The 25Hz power generated at Safe Harbor is initially delivered to PP&L and BGE at PP&L's Conestoga substation adjacent to the hydro plant. It is then delivered to Amtrak in three ways. Some of the power generated is immediately delivered to Amtrak

by PPL at the Conestoga sub for transmission to, and ultimate use along, the Philadelphia-Harrisburg Corridor. Referring to Exhibit RJR-1, this power is delivered to Amtrak's own 138 KV transmission system, which runs from the Conestoga sub both northwesterly towards Harrisburg and easterly towards Thorndale. This transmission system runs along a section of Amtrak right of way that is not presently used for electric rail transportation, and is maintained by Amtrak exclusively for the purpose of transmitting power from Safe Harbor to the PHC. Any power not used along that portion of the PHC within PP&L's territory is metered at Thorndale, where it is regarded as a delivery by PP&L to PECO under the PJM interchange agreement. Simultaneously, the amount metered at Thorndale is also regarded as a retail sale of power by PECO to Amtrak, under the terms of Amtrak's contract with PECO.

Q. Please explain the second way that 25Hz power generated at Safe Harbor is delivered to Amtrak.

A. Additional 25Hz power generated at Safe Harbor, but not immediately delivered to Amtrak at Conestoga sub, is sent east out of Conestoga to Perryville over transmission lines owned by PP&L. At a point of interchange between PP&L and BG&E (approximately at the Pennsylvania-Maryland border), BG&E picks up the power, continues to transport it, and ultimately delivers it to Amtrak at Perryville. Power so delivered at Perryville is

regarded as a simultaneous interchange delivery by PP&L to BG&E and a retail sale by BG&E to Amtrak. Any power not consumed by Amtrak south of Perryville, but rather that flows north into PECO's service territory is regarded as a simultaneous interchange delivery by BG&E to PECO and a retail sale by PECO to Amtrak.

Q. Please explain the third way that 25HZ power generated at Safe Harbor is delivered to Amtrak.

A. This power is initially delivererd to BG&E at Conestoga sub and then transmitted east for direct sale to Amtrak by BG&E for use by Amtrak generally south of Perryville.

Q. Can power flow from East to West through Thorndale?

A. Yes. In that event the transaction is regarded as a delivery of PJM interchange energy by PECO to PP&L. The energy so flowing is deducted from Amtrak's energy consumption for billing purposes.

Q. Can power flow South through Perryville?

A. Yes. There, the transaction would be a delivery of PJM interchange energy by PECO to BG&E. Energy flowing south is deducted from Amtrak's bill.

Q. Historically, have the net energy flows at Thorndale and Perryville been in a direction into, or out of, the PECO system?

A. The energy flows have been generally into the PECO system, to a significant extent. This is true at the time of PECO's system peak, at the time of each month that Amtrak establishes its peak billing demand, over the entire month, and over the entire year.

Q. On what information do you base this statement?

A. I base my statement on the data shown in PECO's response to IR-SEPTA/Amtrak-1-17(Revised), and to DR-WFS8-SEPTA/Amtrak (1/6/86). I have consolidated this information into Exhibit RJR-3.

Q. What does Exhibit RJR-3 show?

A. Exhibit RJR-3 shows that over the time periods for which data were available, energy and power delivered at Thorndale and Perryville provided:

1. Nearly 38% of Amtrak's total energy (MWH) requirements;
2. About 21% of the demand for which Amtrak was billed; and
3. Approximately 32% of Amtrak's requirements at the time of PECO's four system peaks.

Q. What is your conclusion?

A. My conclusion is that historically, Amtrak has received a significant portion of both its energy and power requirements from sources other than PECO. Moreover, since energy delivered to PECO at Thorndale and Perryville is transmitted over Amtrak transmission facilities, Amtrak: (1) comprises an integral part of the PJM pool, (2) provides substantial amounts of net energy to PECO from the PJM pool, (3) facilitates the operation of the PJM pool, and (4) as a consequence, provides a significant benefit to PECO and PJM. However, Amtrak receives no direct compensation for this service from either PECO or PJM.

Q. Does Amtrak receive any non-monetary benefit from its involvement in the PJM system?

A. Yes, the benefit is obtained in the form of diversity of supply, and therefore increased reliability of power. As an integral part of PJM, it can and does receive power from PECO, PP&L and BG&E.

Q. Does Amtrak pay for any of these benefits?

A. Yes. Amtrak makes substantial separate payments to its suppliers, over and above the rates charged to it under each supplier's standard tariff for the purchase of power. These payments are to cover the costs of: (1) the operation and maintenance of PP&L's 132,000 volt transmission line running between Conestoga Sub and the Maryland-Pennsylvania border and

between Conestoga Sub and the Maryland-Pennsylvania border and other related lines and facilities; (2) the costs of transmission and related facilities interconnecting PECO with PSE&G and Metuchen; (3) the operating and maintenance costs associated with the frequency changers at Metuchen, Richmond, Somerset and Lamokin; and (4) the costs of facilities operated by BG&E on behalf of Amtrak. These specific facilities charges total more than $2.5 million a year. In addition, Amtrak also pays for any capital improvement to facilities directly serving Amtrak.

Q. Does Amtrak's diversity of supply also provide benefits to PECO?

A. Yes. To the extent power is available from these other sources, it is less likely that PECO will have to supply, from PECO's own generation and transmission facilities, Amtrak's full requirements at or near the time of PECO's system peak. Moreover, as a member of PJM, PECO benefits from the economics of pooled dispatch. Since Amtrak facilities enhance the interchange of economic pooled power, it stands to reason that PECO and its customers benefit from Amtrak's role.

Q. Please explain how these matters relate to SEPTA.

A. Many of these issues affect the allocation of costs to Amtrak, and therefore the rates charged to Amtrak. Since Amtrak redelivers between 20-25% of its electricity to SEPTA, any change in electricity costs to Amtrak resulting from the

disposition of these issues will directly affect SEPTA's bill for electricity.

Q. What other factors make electrical service to Amtrak and SEPTA unique?

A. There are a number of factors which, when taken in their totality, make SEPTA and Amtrak very different from other customers. Although any one or two of these factors may be similar to the characteristics of other customers on the PECO system, it is my opinion that when all of Amtrak and SEPTA's use, service and facilities characteristics are considered together, these two customers indeed stand out from all other PECO customers.

First, both SEPTA and Amtrak are very large customers, both individually and collectively. Combined, they purchase about 700 million kwh per year, and provide in excess of $56 million a year in revenue, excluding ECR revenues. These two customers account for about 2.5% of PECO's total system - wide sales.

Secondly, both customers exhibit distinct and systematic twin peak daily load patterns, with very high peaks relative to most other customers in both the morning and evening. Further, they are generally winter-peaking customers.

Thirdly, while other customers may have multiple delivery points as do Amtrak and SEPTA, none have as many (40 points combined) over the wide geographic area as do SEPTA and Amtrak, nor is the mode of delivery as complex as described previously, especially for Amtrak.

Fourth, as previously discussed, many of the facilities that service Amtrak and SEPTA are large, dedicated and unique, and costly to maintain. These dedicated facilities are either paid for directly by Amtrak, or owned by SEPTA.

Finally, to complete the description of the differences between Amtrak/SEPTA and other customers, we must reiterate and add to the list above, the items from my previous testimony. These are:

1. The uniqueness of 25Hz power to traction use.
2. The dispatching of Safe Harbor power by Amtrak.
3. The integral physical part that Amtrak plays in PJM.
4. The pool benefits that Amtrak provides, and the benefits it receives, through parallel operation with PECO and other utilities.
5. The back up to PECO capacity that Amtrak provides through the availability of PP&L and BG&E power at the time of PECO's peak.

Q. Do all of these differences actually result in differences in the costs of service between Amtrak/SEPTA and other customers?

A. Yes. The most relevant comparison for the purpose of demonstrating this would be between the railroads and the HT class, since the HT class contains customers who are perhaps the most nearly comparable to the railroads, and since the HT rate is the rate under which Amtrak and SEPTA are presently served.

Based on Mr. Sundermeir's cost of service study, the customer costs per delivery point per month for Amtrak and SEPTA are $1,583 and $1,279, respectively, as compared with $268 for customers in the HT class. There is clearly a significant difference in the customer cost of service between the traction service customers and the average HT customer.

Turning to demand-related costs, Mr. Sundermeir's study shows that the average cost per billed KW for the HT class is $29.22 per KW. (This would be somewhat higher if Mr. Sundermeir had imputed the higher system-wide average return of 12.70% that Amtrak and SEPTA would pay under the proposed rates, instead of the lower 12.23% that the HT class is being asked to pay.) The comparable demand cost per billed KW for SEPTA is $21.54, and for Amtrak it is $23.16. Thus, the cost per KW of billed demand for HT customers is 36% higher than for SEPTA, and 26% higher than for Amtrak. Later in my testimony, I will address my

proposal for certain justified modifications to the demand billing determinants used in computing Amtrak's rates. Should these modifications be adopted, Amtrak's demand-related costs per billing KW would be even lower relative to the HT demand costs. In fact, based on the results of PECO's cost of service study, they would drop to $18.70 per KW, and the HT unit cost would then be 56% higher than Amtrak's cost.

Q. What is your conclusion regarding PECO's proposal to break out the traction loads from the HT class?

A. My conclusion is that it is appropriate and desirable to do so. The separation of traction loads is justified by the significant differences that exist between the HT class and the railroads in their operation, end-use and cost characteristics.

Q. What would be the consequence if the PUC were to disapprove PECO's proposal to separate the traction loads from the HT class?

A. In my opinion, that would result in a highly inequitable situation. As previously shown, the proposed HT class rates are based on costs that are, overall, substantially higher than the costs to serve SEPTA and Amtrak. To require these two customers to receive continuing service under the HT rate, in the face of the cost evidence submitted by PECO and my earlier testimony, would be inappropriate.

Q. Do you support PECO's proposal in its entirety?

A. I support it to the extent that it gives traction loads separate cost and ratemaking treatment. However, I do not support the proposition that there should be separate EP-A and EP-S rates. I support and propose a consolidated EP rate.

Q. Please explain why.

A. Ratemaking theory generally prescribes the grouping of customers with similar end-use, load and cost characteristics into separate rate classes. This argues for the separation of traction loads from the HT class into a separate class. It does not, however, support the creation of two separate traction classes. While there are significant differences between traction and other HT loads, there are compelling similiarities between the end-use, load and cost characteristics of SEPTA and Amtrak. Briefly, these similarities are:

1) Joint use of facilities.
2) Redelivery of energy from Amtrak to SEPTA and a significant sharing of energy costs.
3) Similar load profiles.
4) Identical end-use (i.e., passenger electric traction).
5) Similar cost characteristics.
6) Nature of electricity used (25Hz).

Q. Would a consolidation of the proposed EP-A and EP-S rate schedules result in any change to the revenues required from any other class?

A. No. A consolidation would affect only Amtrak and SEPTA. There would be no revenue or rate impact on other customers.

Q. Earlier, you indicated that the diversity of electricity supply to Amtrak provided benefits to PECO, in that it reduced the chances that PECO would have to supply all of Amtrak's requirements at the time of PECO's system peak. Would you please elaborate?

A. Amtrak tends to peak one to two hours, and sometimes more, after the time of PECO's system peak. Consequently, Amtrak already provides some diversity benefit to PECO. In addition to this benefit, however, Amtrak provides "back-up" through the availability of power from PP&L and BG&E at the time of PECO's peak. Should PECO experience difficulties in meeting peak load for any reason, or experience more localized distribution problems affecting the three on-system frequency changers, Amtrak could call on power out of Safe Harbor, or from BG&E out of the Benning Sub (shown on Exhibit RJR-1), to relieve the PECO problem. This is a benefit to PECO and its customers that is real, albeit difficult to quantify.

Q. Could this supply diversity benefit have any bearing on Mr. Sundermeir's cost of service study?

A. Yes. When Mr. Sundermeir allocated production and transmission costs to Amtrak, he used a 4CP allocator (allocation factor A.1.) that included the demands registered at Thorndale and Perryville. In other words, he used the 52,707 KW registered at all six delivery points in 1984, as shown on Exhibit RJR-3, and adjusted that number for losses, to arrive at the 56,249 KW shown under Amtrak's A.1 allocation on page 29 of Exhibit WFS-1.

Q. In your opinion, was that entirely appropriate?

A. No. It does not provide credit for the benefits conveyed by Amtrak, and its back-up power supplies, to PECO. The allocation methodology results in Amtrak being assigned costs as if all the power delivered at Thorndale and Perryville were supplied by PECO production and transmission facilities, when it appears from the historical data available and contained in Exhibit RJR-3 that PECO has never supplied all of Amtrak's requirements at the time of PECO's four system peaks. In fact, demands at Thorndale and Perryville have provided, on average, 32% of Amtrak's requirements at the time of PECO's system peak, as shown on Exhibit RJR-3.

Q. What were the actual Thorndale and Perryville contributions to the four coincident peaks in the allocation used by Mr. Sundermeir?

A. They were 26,750 KW, or about one half of Amtrak's 4CP responsibility.

Q. Would you suggest completely removing the Thorndale and Perryville demands from Amtrak's 4CP responsibility ?

A. No, not completely, although some downward adjustment may be appropriate. The present A.1 factor allocates too much demand cost to Amtrak. The 4CP demands could be reduced by a reasonable and conservative amount to reflect the minimum contributions that Thorndale and Perryville have made historically to PECO's four coincident peaks. Based on the data shown on Exhibit RJR-3, this minimum contribution could be regarded as the lesser of: (1) the lowest absolute KW contribution to the 4CPs made at Thorndale and Perryville, which is about 16,000 KW; or (2) the lowest proportionate share of Amtrak's total 4CP that has been historically delivered at Thorndale and Perryville, applied to Amtrak's total test year 4CP contribution. This latter approach would yield a Thorndale and Perryville contribution of approximately 13,000 KW (24.5% multiplied by 52,707 KW). The use of either of these two numbers could result in a significant reduction in Amtrak's revenue requirements, and ultimately in electricity costs to both Amtrak and SEPTA.

Q. Have you estimated the amount by which Amtrak's revenue requirement could be reduced by such an adjustment?

A. Yes. Under the most conservative case, Amtrak's revenue requirement could be reduced by about $5 million. Under the second case, the reduction could be approximately $6 million. If Thorndale and Perryville demands were eliminated from the test year altogether, the reduction would be about $10 million.

Q. How do you recommend the Commission resolve this issue of the Thorndale and Perryville demands as related to Amtrak's 4CP responsibility?

A. Before responding directly, I would like to state that SEPTA and Amtrak are, at this time, reserving judgment on the overall issue of revenue requirements in this case, and on the impact the resolution of this issue may have on the allocation of the rate increase to the customer classes. SEPTA and Amtrak are also of the opinion that, in general, they have received reasonable treatment by PECO in this case with respect to the proposed creation of separate traction rates, the allocation of costs, and the design of rates. The major exceptions to this statement are that: (1) Amtrak/SEPTA strongly prefer a single consolidated traction, or Electric Propulsion (EP), rate; and (2) Amtrak/SEPTA are concerned that the Thorndale and Perryville demands have been incorrectly treated in the development of the 4CP allocator, resulting in a significant over allocation of

demand costs to Amtrak in the order of approximately $5-6 million.

SEPTA and Amtrak understand the practical limitations that both the PUC and Company face in equitably distributing to all of PECO's customers the large rate increase that PECO is requesting in this case, and resolving the multitude of complex issues presented. At this point we are not requesting any specific reduction in the revenues PECO proposes to recover from Amtrak and SEPTA. We are, however, requesting the parties to this case, the Administrative Law Judge, and the Commission to take note of our disagreement with PECO on the matter of the inclusion of 100% of the Thorndale and Perryville concident peak demands in the A.1 allocator. In addition, should the Commission modify PECO's total revenue requirements, its cost allocation methodology, or the formula used for distributing the final rate increase in any way that adversely affects SEPTA and Amtrak relative to their present position, Amtrak and SEPTA reserve the right to use the Thorndale and Perryville 4CP demand issue in establishing their new position.

Q. At the beginning of your testimony you indicated that you are proposing to modify the billing demands that PECO has used to compute the EP-A rate. Please explain.

A. Unlike the issue of the inclusion or exclusion of Thorndale and Perryville demands in the computation of the 4CP allocator,

which affects the total demand costs allocated to Amtrak, the matter of billing demands affects only the number of billing units over which the costs allocated to Amtrak will be recovered. This has a direct effect on the computation of the unit demand rate, i.e., the cost per KW billed to Amtrak. Given a fixed level of demand costs to be recovered, the unit rate per billing KW will be lower if a higher number of billing KW are assumed in the test period. Conversely, the unit rate will be higher if lower billing KW are assumed.

A new contract between Amtrak and PECO became effective in January, 1984. The major change to the contract was to exclude from Amtrak's billing demands the demands recorded at Thorndale and Perryville. PECO has reflected this contract modification in the billing demands used in this rate case to compute the proposed EP-A rates, and the revenues the proposed EP-A rates would produce in the test period.

Pursuant to recent conversations between PECO and Amtrak, the two companies have entered into a stipulation, shown as Exhibit RJR-4, that they agree to modify the existing contract to include the demands at Thorndale and Perryville in the determination of Amtrak's billing demand. Accordingly, I am proposing to increase the test year billing demands for Amtrak to reflect this stipulation. It is our understanding that PECO is agreeable to this, and will modify its filing in this regard.

Q. What is the result of doing this?

A. Based on information provided to me by PECO, the result is to increase Amtrak's billing demand from 1,068,926 KW to 1,324,000 KW, reflecting the addition of 255,074 KW of billing demands at Thorndale and Perryville.

Q. Have you designed a consolidated EP rate?

A. Yes. I have prepared Exhibit RJR-5 which shows the EP rate that SEPTA and Amtrak are proposing. It is simply a consolidation of PECO's proposed EP-S and EP-A rate schedules. This rate assumes: (1) the revenues produced by the EP rates will be approximately the same as the sum total of the revenues produced by PECO's proposed EP-A and EP-S rates; and (2) the demands metered at Thorndale and Perryville are included in the billing determinants, as stipulated between PECO and Amtrak.

Q. Do you propose the Commission adopt the EP rate?

A. Yes, provided the Commission grants PECO the revenue increase that it has requested. Should the Commission grant PECO some lesser amount of rate relief, we would ask for an opportunity to provide our comments on cost allocation and rate design before the Commission renders its final decision.

Q. Do you have any comments regarding the wording of the proposed EP-A, EP-S and EP Tariffs?

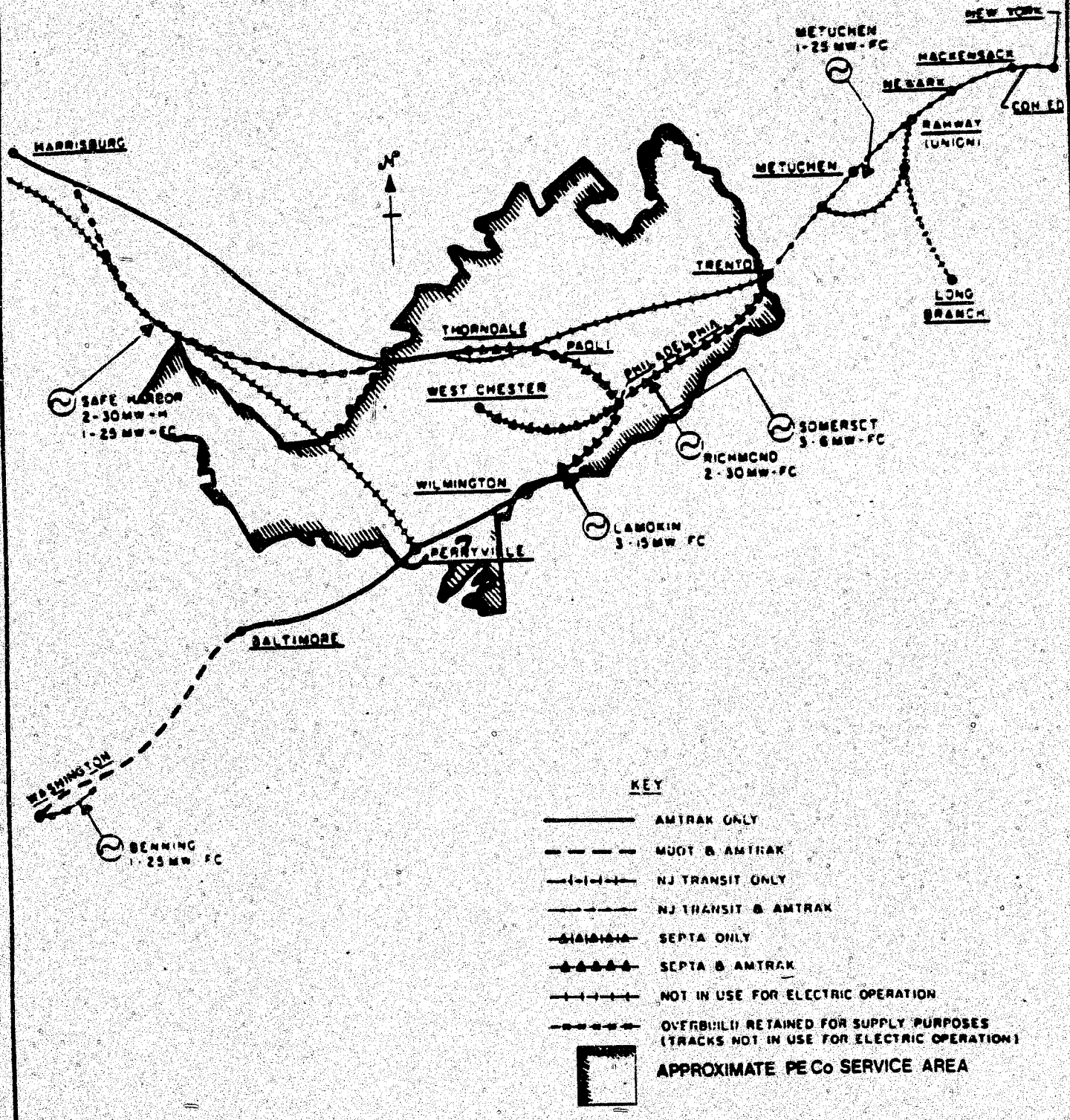
A. Yes. There was some confusion over the wording of the "Delivery Points" section of the EP-S tariff. To clarify the matter, I am proposing the modifications and wording shown on Exhibit RJR-6. These modifications also address changes that would be necessary upon a consolidation of the proposed EP-A and EP-S rate schedules into a general EP rate.

Q. Does this complete your testimony?

A. Yes, it does.

SEPTA/AMTRAK FACILITIES

RELATIVE TO PE Co SERVICE AREA



SEPTA High Speed System

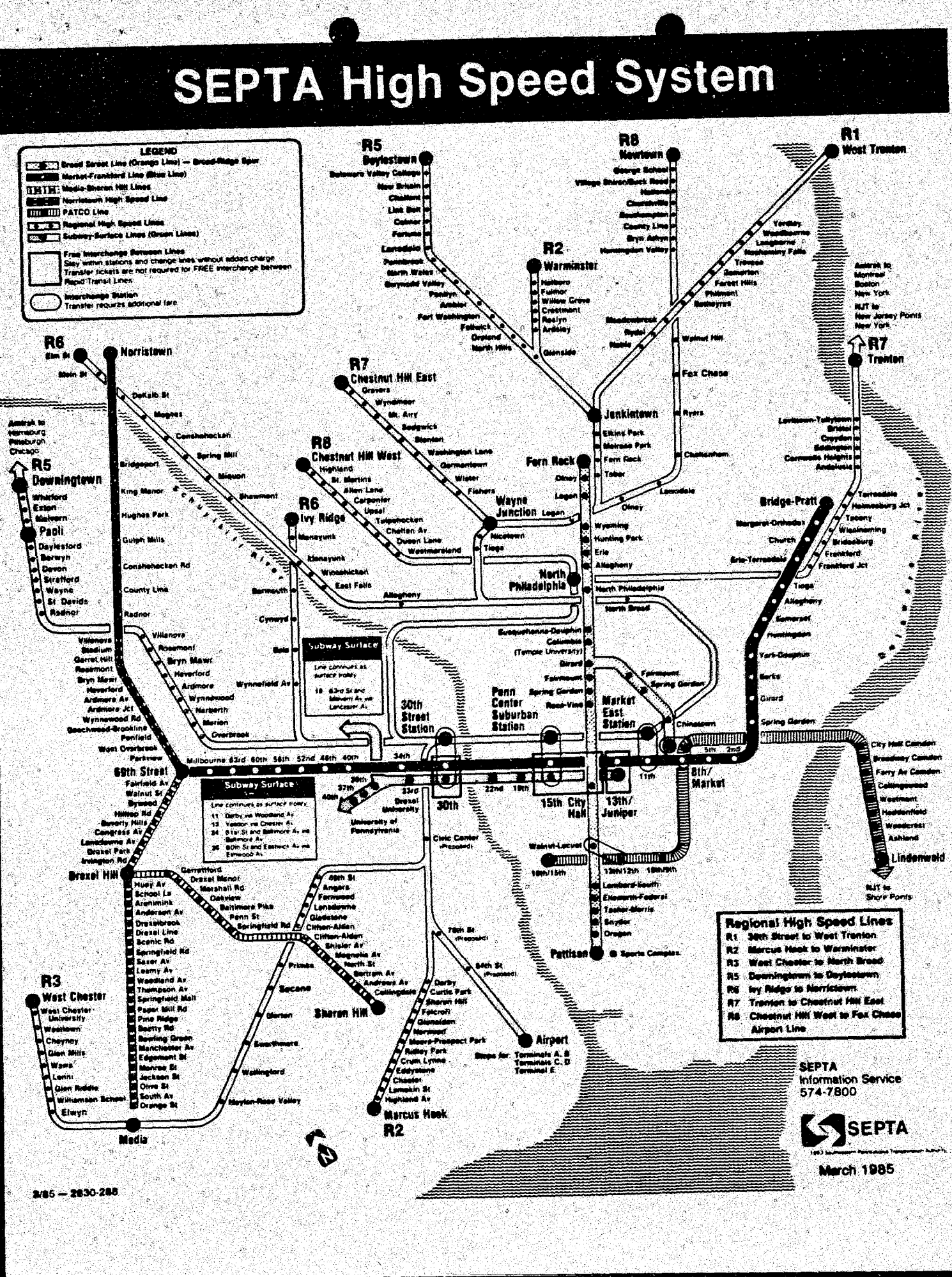


Exhibit RJR-3

Summary of Energy and Demands Recorded at Thorndale & Perryville

Megawatt Hours (MWH)

Year	Thorndale & Perryville	Total Amtrak	Percent that Thorndale and Perryville are of total
1982	161,707	411,205	39.3%
1983	158,864	388,909	40.8
1984	175,071	423,336	41.4
3 Year Total	495,642	1,223,450	40.5
11 Mos. Ending 11/85	119,124	405,362	29.4
Total, All Information	614,766	1,628,812	37.7%

Billing Demand (KW)

1982	260,000	1,279,984	20.3%
1983	234,000	1,196,382	19.6
1984	330,000	1,413,526	23.3
3 Year Total*	824,000	3,889,892	21.2%

Contribution to System 4CP(KW)

1981	16,500	66,135	24.9%
1982	23,000	71,059	32.4
1983	16,333	66,673	24.5
1984	26,750	52,707	50.8
3 Year Total	66,083	190,439	34.7%
Total, All Information	82,583	256,574	32.2%

* Complete 1985 data for billing demands are not available.

Amtrak

January 21, 1986

Mr. Raymond C. Williams,
Manager, Rate Division
Philadelphia Electric Company
230 Market Street
Philadelphia, Pennsylvania 19109

Re: Electric Traction Contract

Dear Mr. Williams:

The purpose of this letter is to amend the agreement between the parties, dated January 1, 1984, for Electric Service and Maintenance and Operation of Frequency Conversion Facilities for Railroad Traction Service (hereafter the Agreement) coincident with a possible change in the Philadelphia Electric Company (PE) tariff applicable to Amtrak's purchase of electric power from PE. The revised tariff has been proposed by PE in a proceeding that is currently pending before the Pennsylvania Public Utilities Commission.

The parties hereby agree to revise Paragraph 10 of the Agreement in its entirety to read as follows:

"10. Determination of Billing Kilowatts and Kilowatts Hours

The monthly billing demand of Amtrak shall be the greatest sum of the coincidental 30-minute demands measured at the Lamokin, Richmond, Somerset, Metuchen, Perryville, and Thorndale delivery and metering points, adjusted for the power factor and not less than 49,000 kilowatts.

The monthly billing kilowatt hours of Amtrak shall be the sum of the kilowatt hours measured at the Lamokin, Richmond, Somerset, Metuchen, Perryville, and Thorndale delivery and metering points. For the purpose of billing, meter registrations indicating energy flows north at Perryville and east at Thorndale will be deemed positive, and meter registrations indicating energy flows south at Perryville and west at Thorndale will be deemed negative."

This agreement to revise Paragraph 10 of the Agreement shall take effect only in the event a new tariff is adopted by the PUC which establishes a separate rate for Amtrak (either individually or jointly with SEPTA) and is based on inclusion of the units of billed demand metered at Perryville and Thorndale in the determination of the unit demand charges payable by Amtrak. If such a new tariff is adopted, this amendment shall be effective on the effective date of the new tariff.

In consideration hereof, PE agrees to modify the rates contained in its currently proposed EP-A tariff to reflect the inclusion of the units of billed demand metered at Perryville and Thorndale in the determination of the proposed unit demand charges payable by Amtrak.

Please have a duly authorized representative of PE sign the extra copy of this letter that is enclosed in the space indicated below in order to reflect PE's agreement to this revision.

Sincerely,

D. F. Sullivan
Vice President
Operations and Maintenance

Concurrence:

_____ Date: _____

SEPTA/Amtrak Proposed EP Rate

(A Consolidation of PECO's Proposed EP-A and EP-S Rate Schedules)

Monthly Rate Table

Service Charge:	$1,354.00 per delivery point.
Capacity Charge:	$14.22 per KW.
Energy Charge:	3.75¢ per KWH.

See Exhibit RJR-6 for suggested modifications to tariff wording.

Proposed Modifications to the Language of the EP-A and EP-S Tariffs

1. Add to Determination of Billing Demand "....For the portion of the Southeastern Pennsylvania Transportation Authority (SEPTA) operating on the rights-of-way of the former Reading system, the billing demand shall be calculated as if delivered at a single point, designated SEPTA-Reading, regardless of the number of points of actual delivery. For all other service delivered for the operation of other portions of SEPTA transit system, the billing demand shall be calculated as if delivered at a second single point designated SEPTA-Transit."

2. Revise and combine "DELIVERY POINTS" to read: "As set forth in separate agreements with AMTRAK and SEPTA."

3. Revise and combine "AVAILABILITY" clause to provide traction service to AMTRAK and SEPTA.

4. Revise and combine "TERM OF CONTRACT" clause to read: "As set forth in separate agreements with AMTRAK and SEPTA."

2-20-86
R-850152

SEPTA/Amtrak Statement No. 2

PENNSYLVANIA PUBLIC UTILITY COMMISSION

v.

PHILADELPHIA ELECTRIC COMPANY

DOCKET NO. R-850152

DIRECT TESTIMONY OF VUKAN R. VUCHIC, Ph.D.

on behalf of

THE SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY

and

THE NATIONAL RAILROAD PASSENGER CORPORATION

Concerning Rate Structure

January 22, 1986

DIRECT TESTIMONY OF
VUKAN R. VUCHIC, Ph.D.

Q: Please state your name and position.

A: I am Dr. Vukan R. Vuchic. I am a Professor of Civil Engineering - Transportation at the University of Pennsylvania.

Q: Please summarize your educational and professional experience in the area of public transportation.

A: I have a diploma from the University of Belgrade, and a Masters degree in Engineering and Ph.D. from the University of California in Transportation Engineering. Most of my academic and professional work has been in urban transportation, particularly public and rail transportation. I have published approximately 80 articles, reports and sections of books in the United States and other countries. My book Urban Public Transportation Systems and Technology, published in 1981, is the only comprehensive book on that subject published in several decades. I have served as a consultant on the planning of rail transit in many cities, including San Francisco, Caracas, Venezuela, and Edmonton, Canada. I have lectured at about 40 universities on several continents. In addition, I have testified before several committees of the United States Congress and before the Pennsylvania Public Utilities Commission in R-842590. My resume is attached as Exhibit VRV-1.

Q: What is the purpose of your testimony?

A: I will testify concerning the indispensable role of SEPTA and Amtrak in the society, economy and environment of southeastern Pennsylvania, the adverse effects on the society, economy, and environment which would occur if the operations of SEPTA and Amtrak were curtailed, and the reasons supporting separate rate classification for these transit companies.

Q: Please summarize your conclusions.

A: 1. SEPTA and Amtrak provide an indispensable service to the citizens, the economy and environment of Philadelphia and the surrounding region. In particular, the electrically-powered transit systems operated by SEPTA and Amtrak offer transportation services in a heavily populated urban area which cannot feasibly be provided by any other means. Moreover, SEPTA and Amtrak serve many people who have no other means of transportation.

2. Public transportation companies such as Amtrak and SEPTA have unique characteristics and financial problems as compared to other institutions that provide public services. Their special importance and particular needs have long been recognized by governmental policy.

3. Sound public policy dictates that the unique and important role of public transportation systems be recognized in the electric rates charged to these customers.

Q: Could you describe the role that public transportation has played in the society, economy and environment of southeastern Pennsylvania?

A: In very few cities has development been as clearly linked with the development of public transportation as is the case with Philadelphia and its suburbs. The highest concentration of all activities -- commercial, governmental, retail, cultural, and tourist -- is found in Philadelphia's central business district, which is the hub of all public transportation services.

Recently, most of the office development in Philadelphia (Penn Center, Center Square, Reading One and others), as well as retail complexes (the two Galleries), would not have taken place had there been no improvement in the transit services in these areas, such as modernization of subways and construction of the regional rail system's Center City Commuter Tunnel.

Historically, a number of major activity centers within the City of Philadelphia and its suburban areas were created or their development intensified by their close connection with transit stations and terminals. Examples of this are Bridge Street and Olney in Philadelphia, and such areas as 69th Street in Upper Darby, Lansdowne, Swarthmore, Bryn Mawr, Ardmore, and Jenkintown in the suburbs. It should be noted that in all of these instances <u>electric</u> transit has been a major influence on the region's development and urban form.

Q: Could you briefly describe the role that SEPTA and Amtrak play today as providers of mass transportation service in southeastern Pennsylvania?

A: Together, SEPTA and Amtrak provide a variety of electric transportation services in and through southeastern Pennsylvania. SEPTA's regional rail, subway/elevated rapid transit and subway-surface trolley lines provide one of the most basic services which an efficient urban area must have: virtually ubiquitous transportation at all hours when reasonable demand exists, at prices acceptable to most people. Similarly, Amtrak's inter-urban services represent a basic means of travel in the most populated corridor in the country, of which Philadelphia is one of the largest parts.

Q: Are there feasible alternatives to a public transportation system, such as that provided by Amtrak and SEPTA, in the Philadelphia area?

A: No. A comparison of mass transit with alternative modes of travel gives a good indication of the significance and indispensability of mass transit. If the present transit travel were replaced, even in part, by private automobiles, adverse consequences would follow. The capacity of the expressway/street system would become inadequate in all areas of major concentrations of activities. Extensive congestion would result and existing parking facilities would be grossly inadequate. Moreover, about 30% of families in the city do not own cars; a substantial portion are not licensed drivers. Many of these people would be deprived of

convenient transportation absent SEPTA's and Amtrak's electric transit services.

Q: Which population groups are most affected by reductions in the quantity and/or quality of transit services and by increased fares?

A: While transit in Philadelphia is used by all economic groups, low income groups particularly depend on SEPTA's services. More than 50% of SEPTA riders who purchase TransPasses (i.e. passes which permit unlimited rides during a certain period) have annual incomes of less than $15,000. The fact that transit disproportionately benefits low income groups is one of the rationales for supporting public funding of mass transit.

Q: Has the importance of the public services provided by mass transportation systems been recognized by governmental policy?

A: Since electric transit was invented near the end of the 19th century, its vital role for cities has been recognized in a number of governmental policies and legislation, from federal to local levels. For instance, it was the City of Philadelphia which built the Broad Street Subway and leased it to the Philadelphia Rapid Transit Company and to its successor, the Philadelphia Transportation Company, and since 1968, to SEPTA.

The Pennsylvania Legislature has recognized the importance of public transportation through enactment of the Metropolitan Transportation Authorities Act of 1963, SEPTA's original enabling legislation, and that Act's successor, enacted in 1980 -- the Pennsylvania Urban Mass Transportation Law. One of the findings of the Pennsylvania General Assembly in the Urban Mass Transportation Law was that "efficient and coordinated urban common carrier mass transportation systems, facilities and services will promote the public health, safety, convenience and welfare."

The role of long-distance public transportation, part of which is now performed by Amtrak today, has always been considered to be an essential service for the country and for the cities and regions it serves, and it too has been supported by government in various forms.

A recent and relevant example of support for long-distance transit is the statement of "Congressional Findings and Declaration of Purpose" in the Rail Passenger Service Act of 1970 which established Amtrak. There, Congress found "that the public convenience and necessity require that the National Railroad Passenger Corporation provide, to the extent that the Corporation's budget allows, modern, cost-efficient, and energy-efficient intercity railroad passenger service between crowded urban areas and in other parts of the country [and] that rail passenger service can help in alleviating the overcrowding of airways, airports, and

highways." Congress further found that "modern, efficient commuter rail passenger service is important to the viability and well-being of major urban areas and to the national goals of energy conservation and self-sufficiency."

Q: Although SEPTA and Amtrak provide an important public service, should they receive treatment any different from the treatment afforded other customers that provide public services such as airports, the Navy Yard, the city water department, or private industries in the region?

A: Yes, they should. Public transportation services are <u>not</u> the same as many other urban services. Public transportation has a distinct combination of characteristics which render it quite unique among other urban services. Those characteristics are relevant to the issue being discussed here.

First, public transportation is one of the basic services which affect many aspects of the society, economy and environment. Besides its obvious and essential contribution in transporting people from place to place, mass transit provides significant indirect benefits to the community. Examples of such indirect benefits include increased mobility, which is important for lower unemployment; improved health care and educational opportunities; the availability of a broader geographical area from which skilled and unskilled labor can be drawn; and a more livable urban

environment. For this reason, a region with good transit, such as Philadelphia, has major advantages over regions with poor transit. By the same token, curtailment of mass transit can deprive people of education, health service and jobs.

Second, raising additional revenue for mass transit is extremely difficult because increasing transit fares results in serious problems. Most notably, ridership drops, decreasing some of the revenue gains. In some cases, the additional revenue generated by raising fares may not be worth the increase because of the significant demand elasticity for transit use. Moreover, some of the passengers shift to driving their automobiles. This produces a "Catch 22" situation which would ultimately result in curtailment of essential services, thus affecting the remaining passengers, and a loss of the direct and indirect benefits which flow from a fully operational system. Not only are these benefits lost, but the increased driving by former transit riders negatively affects other automobile drivers, as well as the entire urban environment.

Q: Do not other facilities, such as the airport or the Navy Yard, have problems comparable to those of SEPTA and Amtrak?

A: No, the problems of public transit companies are distinguishable. Taking the airport as one example, the differences can be summarized as follows:

(1) For numerous reasons, the funds to finance airports are more readily available than funds to finance transit. Available sources of investment and operating funds for airports are more adequate than those for SEPTA and Amtrak.

(2) Electricity is a much less essential element of an airport's operation than it is in the operation of SEPTA and Amtrak;

(3) Demand for air travel is less elastic (and particularly insensitive to electric rates) than is the demand for electric public transportation; and

(4) Air travellers represent, on the average, a considerably higher than average income segment of the population, while the opposite is generally true for the riders of SEPTA and Amtrak.

Q: What are the implications for public policy if SEPTA and Amtrak are paying disproportionately more for traction power than the cost of serving them?

A: It is clearly in the public interest that public transportation in the Philadelphia metropolitan area -- both intraurban and interurban -- be maintained and improved. To achieve this goal, public policy should encourage and create conditions favorable for maintenance and modernization of transit facilities. Public policy should support increased use of electric traction

power and assist SEPTA and Amtrak in achieving their maximum economic efficiency and in reducing their reliance on uncertain governmental financial assistance. If it is the case that SEPTA and Amtrak pay disproportionately more for propulsion power than the cost of providing that service, these policy goals are being defeated. Electric rates that closely reflect the costs incurred by PECO would produce widespread benefits to transit riders and the Philadelphia area in general.

Q: In its present rate filing, PECO has proposed separate rate classification for SEPTA and Amtrak under which SEPTA and Amtrak will pay the system average rate of return based on a cost of service study for these customers by PECO. Do you agree with separate rate classification for SEPTA and Amtrak?

A: Yes. As discussed above, public transportation systems, such as those operated by SEPTA and Amtrak, play a unique and important role in the society and economy of southeastern Pennsylvania. Sound public policy dictates that this unique and important role be reflected in a separate electric rate reflecting the lower costs of serving these companies, as discussed in the testimony of Richard J. Rudden and as evidenced in PECO's cost of service study.

Q: Does that conclude your testimony?

A: Yes.

VUKAN R. VUCHIC

1. Personal

1.1 Born: 1935 in Belgrade, Yugoslavia.
1.2 Immigrated in 1961; U.S. citizen since 1968.
1.3 Married, four children.

2. Education

2.1 Diploma in Transportation and Traffic Engineering - University of Belgrade, Yugoslavia, 1960.

2.2 M.Eng. in Civil Engineering - Transportation - I.T.T.E., University of California, Berkeley, 1965.

2.3 Ph.D. in Engineering - Transportation - I.T.T.E., University of California, 1966.

2.4 Languages: English, German, Russian and Serbo-Croatian (mother tongue).

3. Academic Appointments

3.1 University of California, School of Business Administration, Berkeley - 1966, Acting Assistant Professor.

3.2 University of Pennsylvania - 1967, Assistant Professor; 1970, Associate Professor; 1975, Professor of Civil Engineering - Transportation (present position).

4. Professional Experience

4.1 Hamburger Hochbahn AG (Public Transport Co.), Hamburg, Germany, 1960-1961, Planning Engineer.

4.2 Wilbur Smith & Associates, Consulting Engineers, New Haven, CT, 1961-63 and in San Francisco part-time 1964-65, Principal Engineer.

4.3 University of California, College of Engineering, Operations Research Center, Berkeley, 1966, Junior Specialist.

5. Consulting Activities

5.1 Wurster, Bernardi & Emmons, Consulting Architects; San Francisco, 1964-66.

5.2 Lawrence Halprin and Associates, Landscape Architects; San Francisco, 1965-66.

5.3 Wallace Holm Associates, Consulting Architects; Monterey, California, 1966.

5.4 Wilbur Smith & Associates, Consulting Engineers, Washington, 1967.

5.5 David A. Crane, Urban Planning and Design; Philadelphia, 1967-68.

5.6 Dechert, Price and Rhoads, Attorneys; Philadelphia, 1969-70.

5.7 Turnpike Engineers, Inc., Consulting Engineers; Philadelphia, 1970.

5.8 University City Science Center; Philadelphia, 1971.

5.9 Vincent Kling Associates, Consulting Architects; Philadelphia, 1972-76.

5.10 Transportation Systems Center, U.S. D.O.T., Cambridge, MA 1971-72.

5.11 Township of Middletown, PA, 1972-80.

5.12 Interplan Corporation, Consulting Planners; Santa Barbara, CA, 1971-75.

5.13 MITRE Corporation; McLean, VA, 1974.

5.14 Office of Technology Assessment, U.S. Congress; Washington, 1975.

5.15 Urban Mass Transportation Administration (U.M.T.A.), D.O.T., Washington, 1975-77.

5.16 DeLeuw, Cather and Co., Consulting Engineers, Washington, 1975-77.

5.17 Township of Springfield, PA, 1978-79.

5.18 Venturi and Rauch, Architects and Planners, Philadelphia, PA, 1978-79.

5.19 Mattioni, Mattioni, & Mattioni, Attorneys, Philadelphia, PA, 1979-81.

5.20 Gellman Associates, Consultants, Philadelphia, PA, 1979.

5.21 City of Philadelphia, Mayor's Office, 1980.

5.22 Boston College, School of Education, on UMTA-sponsored project about assisting rail transit use by the blind, 1980-81.

5.23 City of Edmonton, Alberta, Canada; member of a 3-person international team of consultants for light rail transit network planning, 1982.

5.24 Systema Transporte Regional, Caracas, Venezuela, 1981-82.

5.25 Cambridge Systematics, Cambridge, MA, 1981-83.

5.26 Bruinette, Kruger, Stoffberg, Pretoria, South Africa, 1982-83.

5.27 Southeastern Pennsylvania Transportation Authority - SEPTA, Philadelphia, PA, 1983-85.

5.28 Certainteed Corporation, Tredyffrin, PA, 1984.

5.29 William T. Coleman, Jr. (on Thompson-Coleman's report on SEPTA's Regional High Speed Lines), 1985.

5.30 Westinghouse Electric Corporation, Pittsburgh, 1985.

6. Professional and Honorary Societies

6.1 Association of Transportation Engineers and Technicians of Yugoslavia, Belgrade, Yugoslavia - Member (since 1959).

6.2 International Union of Public Transport, Brussels, Belgium - Personal Associate Member (1962).

6.3 Institute of Transportation Engineers, Washington - Member (1965). Member of three technical committees (1968, 1970, 1980); Assistant Chairman, Planning Applications Division (1971/72).

6.4 Chi Epsilon.

6.5 Operations Research Society of America - Member (1976-80); Transportation Science Section Council Member (1969/70).

6.6 Transportation Research Board - Representative of the University of Pennsylvania (1968). Member of several committees; chairman of the Rail Transit Committee 1977-83.

6.7 American Society of Civil Engineers, New York City - Member (1971).

6.8 Theodore M. Matson Memorial Corporation - Member (1972).

6.9 Transportation Subcommittee, Mayor's Science and Technology Advisory Committee, Philadelphia, Vice-Chairman (1972-80).

7. Awards

7.1 Award for high academic grade score; University of Belgrade, Yugoslavia, 1960.

7.2 Automotive Safety Foundation Fellowship for Doctoral Studies, University of California, Berkeley, 1964/65 and 1965/66.

7.3 M.S. honoris causa - University of Pennsylvania, Philadelphia, 1971.

7.4 Co-recipient of the 1980 Urban Design Administration Honor Award given by the Department of Housing and Urban Development for a project on Old City renovation in Philadelphia (as consultant to Venturi & Rauch).

7.5 Recipient of the first "Dr. Friedrich Lehner Medal", given by the "Dr. Friedrich Lehner Stiftung (Endowment)" in Hannover, F.R. Germany, to "persons who have dedicated a life work to urban public transportation and excelled in that effort"; received in Munich, 15 June 1982.

8. Publications - Books

8-A Gray and Hoel (Editors), Public Transportation: Planning, Operations and Management (Vuchic author of two chapters); Prentice Hall, 1979.

8-B Urban Public Transportation Systems and Technology; Prentice Hall, Inc., 1981, 673 pages.

Publications - Articles

8.1 "Some Remarks about the Traffic Regulation in W. Germany and Denmark" - Transportation 2/1959, pp. 317-319 (in Serbian, summary in German).

8.2 "Highway and Urban Traffic in Great Britain" - Transportation 5/1959, pp. 866-871 (in Serbian, summary in English).

8.3 Review of the book: H. K. Evans (Editor): "Traffic Engineering Handbook" - Transportation 10/1959, p. 1660 (Serbian).

8.4 "Public Transportation in London" - Urban Transportation 10-11/1959 pp. 11-30 (Serbian). Also published with modifications, in Transportation 1/1961, pp. 154-161 (Serbian, summary in English).

8.5 "Development of Road Networks in Scandinavian Countries" Transportation 4/1960, pp. 824-828 (Serbian, summary in English).

8.6 Review of the book: W.W. Hay: "Railroad Engineering" - Transportation 4/1960, p. 832 (Serbian).

8.7 Review of the Road Research Laboratory (England) reports: "Road Research in 1956" and "Road Research in 1957" - Transportation, 4/1960, pp. 832-833 (Serbian).

8.8 Review of the book: Baker and Funaro: "Parking" - Transportation 8/1960, p. 1602 (Serbian).

8.9 "Traffic Signals" - Transportation 6/1961, pp. 1115-1123 (Serbian, summary in German).

8.10 "Role of Public Transportation in Hamburg, Germany - Traffic Quarterly, January 1964, pp. 118-140.

8.11 Discussion on the paper "Airport Accessibility Affects Passenger Development" in the Journal of the Aero-Space Transport Division, Proceedings of the ASCE, 1/1966.

8.12 "Pedestrian Crossing Time in Determining Widths of Signalized Traffic Arterials" - Transportation Science, Vol. 1, No. 3, Aug. 1967, pp. 224-231.

8.13 (with Gordon F. Newell)* "Rapid Transit Interstation Spacings for Minimum Travel Time" - Transportation Science Vol. 2, No. 4, December, 1968, pp. 303-339.

8.14 "Fahrplanstorungen - zusatzliche Faktoren, betriebliche Massnahmen" - Verkehr und Technik Vol. 22, No. 4, April 1969, pp. 97-100.

8.15 "Propagation of Schedule Disturbances in Line-haul Passenger Transportation" (in French, English and German) - Revue de l'UITP, No. 4, 1969; Brussels, Belgium (an expanded version of paper #8.14).

8.16 "Rapid Transit Interstation Spacings for Maximum Number of Passengers" - Transportation Science Vol. 3, No. 3, August 1969, pp. 214-232.

8.17 "A System View at the Urban Highway Transportation Situation" - Proceedings of the Pennsylvania Highway Transportation Conference, Pennsylvania State University, 1969.

8.18 "Minicar Transit System - A New Concept and Its Evaluation" - Highway Research Record 318, pp. 27-39; Washington 1970.

8.19 (with Wolfgang S. Homburger) "Federation of Transit Agencies as a Solution for Service Integration" - Traffic Quarterly, July 1970, pp. 373-391.

8.20 "Concept of Flexibility in Transportation System Analysis" - High Speed Ground Transportation Journal Vol. 5, No. 1, 1971, pp. 53-61.

8.21 (with Bernard F. Byrne): "Public Transportation Line Positions and Headways for Minimum Cost"; in Traffic Flow and Transportation; Editor: G.F. Newell; American Elsevier, 1972, pp. 347-360.

8.22 (with Wolfgang S. Homburger): "Transit Federation - A Solution for Service Integration"; (in French, English and German) - Revue de l'UITP No. 2, 1972, pp. 73-100; Brussels, Belgium (an updated version of paper #8.19).

8.23 (with Richard M. Stanger)*: "Lindenwold Rail Line and Shirley Busway - A Comparison"; Highway Research Record 459, pp. 13-28; Washington, 1973.

8.24 (with Michael J. Weston)*: "Urban Transportation Improvements Through Low Cost Traffic Engineering Measures"; Highway Research Record 461, pp. 30-24, Washington, 1973.

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*Vuchic principal author.

8.25 "Skip-Stop Operation as a Method for Transit Speed Increase"; Traffic Quarterly, April 1973, pp. 307-327.

8.26 Discussions of Reports 3a, 3b, and 6; Proceedings of the 39th UITP Congress in The Hague; UITP, Brussels, 1973.

8.27 "Quo Vadis, ASCE?"; Civil Engineering, June 1973, pp. 59-61.

8.28 "Rapid Transit Automation and the Last Crew Member"; Railway Gazette International, October 1973, pp. 382-385; London, England.

8.29 (with S. Kikuchi)*: "Design of Outlying Rapid Transit Station Areas"; TRB Record 505, 1974, pp. 1-12.

8.30 (with E. Tennyson and W. Underwood)*: "Application of Guidelines for Improvement of Transit Service and Operating Efficiency"; TRB Record 519, 1974 pp. 66-72.

8.31 "National Transportation Policy - The Basic Prerequisite for Progress"; Hearings, Subcommittee of the Committee on Appropriations, U.S. House of Representatives; Part I, pp. 217-253. U.S.G.P.O. Washington, 1974.

8.32 (with R. Stanger)*: "New Transit Technologies: An Objective Analysis is Overdue"; Railway Gazette International, October 1974, pp. 384 - 387; London, England.

8.33 (with B. Day and R. Stanger)*: "Rail Transit: Characteristics, Innovations and Trends"; TRB Record 552, pp. 1-18, 1975.

8.34 (with B. Day)*: "Some Comments on Bus Capacity Analysis" - Discussion of a paper by Levinson/Hoey; TRB Record 546, pp. 41-42, 1975.

8.35 Discussion of a paper by Boyd, et al.; TRB Record 559, pp. 45-47, 1976.

8.36 "Comparative Analysis and Selection of Transit Modes"; TRB Record 559, pp. 51-62, 1976.

8.37 "Schnellbahn Automation und "der Letzte Mann" am Zug"; translation of #8.28; Verkehr und Technik, March 1975, pp. 90-94.

8.38 "Urban Transportation Policy: Time for Reorientation"; written testimony to the Transportation Committee of the National Conference of Democratic Mayors; New Orleans, 22 March 1975.

8.39 "Place of Light Rail in the Family of Transit Modes";TRB Special Report 161, pp. 62-76, 1975. Also published in Saobracaj u gradovima (in Serbian); Belgrade, 1977.

8.40 (with B. Day and B. Anderson)*: "Theoretical and Practical Capacities of Transit Modes" - presented at the Intersociety Conference of Transportation, Atlanta, 1975.

8.41 "Evaluating UMTA's Work" - Proceedings of the R & D Priorities Conference, DOT/UMTA with APTA, Washington, February 1976, pp. 97-99.

8.42 "Skip-Stop Operation: High Speed with Good Area Coverage" (in French, English and German), UITP Revue, No. 2, Brussels, 1976.

8.43 "Transit Regulation: Improve It, or Eliminate It?" - Transit Journal November 1976, pp. 5-14. Also published in: Urban Transportation Economics, TRB Special Report 181, 1978, pp. 76-79.

8.44 Discussions of Reports 3a, 4 and 8; Proceedings of the 41st UITP Congress in Montreal; UITP, Brussels, 1977.

8.45 "Rail Transit in Perspective" - Rail Transit Conference of APTA, Washington, June 1977.

8.46 "Heavy Obstacles for Light Rail"; Highlights from the presentation of the paper #8.49; Railway Age, 12 September 1977, pp. 62-63.

8.47 "Which Mode can Save Most Energy? No Simple Answer Exists", written testimony for the Senate Committee on Environment and Public Works, 5 October 1977.

8.48 "Integrated Urban Transportation - A Major Challenge for Transportation Engineers", Proceedings of the 47th Annual Meeting of the Institute of Transportation Engineers, Mexico City, October 1977.

8.49 "Current Trends: Problems and Prospects of Light-Rail Transit"; TRB Special Report 182, "Light-Rail Transit: Planning and Technology"; pp. 8-12, 1978.

8.50 "Die Bedeutung des offentlichen Nahverkehrs aus Nordamerikanischer Sicht"; Schriftenreihe fur Verkehr und Technik, Heft 67, pp. 76-100; Bielefeld, W. Germany, 1978.

8.51 "Light Rail Transit in Boston - Symbol of a New Era"; Proceedings of the International Symposium "Roads in Towns", sponsored by Asahi Shimbun, Tokyo, 16-18 May 1979; pp. 17-1 to 17-18. Also published in Japanese translation of the Proceedings, pp. 17-1 to 17-12.

8.52 (with R.M. Stanger), "The Design of Bus-Rail Transit Facilities"; Transit Journal, APTA, Washington, Fall 1979, pp. 61-72.

8.53 "High-Performance Transit Planning, Modes and Networks"; Proceedings of Mass Rapid Transit System Seminar; Taipei, Taiwan, December 1980; pp. 17-72.

8.54 "Designers Widen the Urban Rail Options" - Railway Gazette International, January 1982, (4 pp.), London, England.

8.55 (with S. Kikuchi), "Transit Vehicle Stopping Regimes and Spacings" - Transportation Science, Vol. 16, No. 3, August 1982, pp. 311-331.

8.56 "Javni gradski promet: sistemi i tehnologija" (adapted sections from Vuchic's book, #8-B); Suvremeni promet 3/1982, pp. 239-243; Zagreb, Yugoslavia.

8.57 "Transportation Technologies for Cities in Developing Countries" - paper in English, French and Spanish, presented at CODATU II Conference, Caracas, Venezuela, October 1982.

8.58 (with T.J. Potter)* "Train Crew Reduction for Increased Productivity of Rail Transit"; TRB Record 980, pp. 51-57, 1983.

8.59 "Analytical Review of Guided Transit Systems"; Proceedings of the Conference on Advanced Rapid Transit Systems, held in Amalfi, Italy, October 1983 (in preparation).

8.60 "The Auto Versus Transit Controversy: Toward a Rational Synthesis of Urban Transportation Policy"; Transportation Research Special Issue on Public Policy; Vol. 18A, No. 2, Spring 1984.

8.61 "Transit Technology Today"; Proceedings, Symposium on Recent Developments of Urban Transit Technology, pp. A-1 - A-30; November 1984, Taipei.

8.62 "O-Bahn - Description and Evaluation of a New Concept"; TR Record 1011, pp. 8-15, Washington, 1985.

8.63 (with R.M. Stanger) "Automated Guided Transit versus Conventional Rail"; TR News 120, Sep.-Oct. 1985, pp. 8-13; Washington.

8.64 "Light rail transit - Ugly duckling becomes a swan"; Railway Gazette International 11/1985, pp. 829-835; London.

8.65 (with S. Kikuchi) "Planning an Integrated Regional Rail Network: the Philadelphia Case"; TR Record (in preparation); Washington, 1985.

8.66 "Spurgefuhrter Bus - Auswertung eines neuen Konzepts"; Der Nahverkehr (in preparation).

9. Published Reports and Manuals

9.1 Interstations Spacings for Line-haul Passenger Transportation; report of the Operations Research Center, University of California, Berkeley, to the National Bureau of Standards, 1966; 144 pages.

9.2 (with David E. Boyce), A Critique of the D.V.R.P.C. 1985 Regional Transportation Plan; University of Pennsylvania, October 1969; 19 pages.

9.3 (Editor and co-author), Minicar Transit Systems - Final Report of the multidisciplinary research group, University of Pennsylvania, to UMTA - U.S. Department of Transportation; September 1970; 274 pages.

9.4 Value of Speed in Public Transit Services; Transportation Studies Center, University of Pennsylvania, 1970; 57 pages.

9.5 Light Rail Transit Systems - A Definition and Evaluation; report to UMTA through the Transportation Systems Center, Cambridge, MA, 1972; 111 pages.

9.6 (with S. Kikuchi)* Design of Outlying Rapid Transit Stations - report to UMTA - U.S. Department of Transportation; NTIS, Springfield, Virginia, 1973; report PB 223279, 52 pages.

9.7 Integration of Transit Systems - report UMTA RI-06-0005-73-3 by Interplan Corporation, Vuchic co-author; 4 volumes; NTIS, Springfield, Virginia, June 1973.

9.8 (As panel member): Automated Guideway Transit; O.T.A. - U.S. Congress, 1975.

9.9 Light Rail Transit--A State-of-the-Art Review - report to UMTA-DOT by De Leuw, Cather & Company, Vuchic consultant; 1976.

9.10 Transit Operating Manual; Pennsylvania DOT, 1976; second edition, 1978; 220 pages.

9.11 Land Use Impacts of Rapid Transit: Implications of Recent Experience; report by DeLeuw, Cather & Company to the Department of Transportation; Vuchic consultant; August 1977.

9.12 (with S. Hessami)*, Parking Policy as a Transportation System Management Measure; report to UMTA-U.S.D.O.T.; NTIS, Springfield, Virginia, 1978; 67 pages.

9.13 Report on Interstate 476; Congressman Edgar's Transportation Advisory Committee (Vuchic Chairman); February 1979; 51 pages.

9.14 Timed Transfer Systems Planning, Design and Operation; Report to UMTA; program report DOT-I-83-28; 124 pages.

9.15 Train Crew Reduction for Increased Productivity of Rail Transit; report to UMTA - U.S. DOT; NTIS, Springfield, Virginia, 1982; 86 pages.

9.16 DeLeuw, Cather & Company; Light Rail Transit: Surface Operations (a report; b. Technical Appendix); Vuchic co-author. Report to UMTA/DOT-IT-06-0103; Washington, 1981.

9.17 (with H. Felz and D. Howard), South Edmonton Light Rail Transit Plan Review; report to the City of Edmonton, Canada, April 1982; 46 pages.

9.18 Levinson and Weant (Editors), Urban Transportation Perspectives and Prospects (includes an adapted version of paper #8.29 by Vuchic and Kikuchi, pp. 275-281); Eno Foundation, Westport, CT, 1982.

9.19 Transportation in Philadelphia; report of the Task Force on Transportation, co-chaired by Vuchic and W.B. Allen, part of the study "Philadelphia Past, Present and Future", 1982; (Vuchic wrote a section on Passenger Transportation, 29 pages).

9.20 (with S. Kikuchi)*, General Operations Plan for the SEPTA Regional High Speed System; report to SEPTA, Philadelphia, PA, 1984; 220pp.

9.21 Contributor to the "Report on the Regional High Speed Lines" by Thompson and Coleman, submitted to SEPTA, Philadelphia, 1985.

10. Presentations

a. Major Seminars

10a-1 Sole lecturer at a one-day seminar on "Transit Planning" organized by the Ministry of Transport, Province of Ontario, Toronto, 6 May 1975.

10a-2 "Mass Rapid Transit Planning Seminar", organized by the Taiwan Ministry of Communications, Taipei, 9-11 December 1980; Vuchic one of the five invited speakers.

10a-3 Sole lecturer at a one-day seminar on "Urban Transportation Issues and Policies" in the Department of Transportation, Republic of South Africa; Pretoria, 3 August 1981.

10a-4 Transit Policy Planning, Management and Operation", course for SEPTA Management Personnel; Vuchic organizer and principal lecturer (32 out of 44 hours). The course given at the University of Pennsylvania, Philadelphia, PA, Fall 1980 and Spring 1982.

10a-5 Sole lecturer of a 3-day continuing education course on "Urban Public Transport Planning", University of Stellenbosch, 13-15 July 1983.

10a-6 "Light Rail Transit" - one-day seminar organized by BKS, Pretoria, 1 August 1983.

10a-7 Five lectures in a 4-day "Seminar on Guided Transit Systems" organized by COVITUR, Mexico, 24-27 October 1983.

b. Testimonies

10b-1 Hearings on the National Transportation Policy; Transportation Subcommittee of the Committee of Appropriations, U.S. House of Representatives; Washington, 6 March 1974 (#8.31).

10b-2 Hearings on the National Urban Transportation Policy; Transportation Committee, National Conference of Democratic Mayors, New Orleans, 22 March 1975 (#8.38).

10b-3 Hearings on the 1975 Highway Federal Aid Act, Transportation Subcommittee, Public Works Committee, U.S. House of Representatives, Washington, 8 September 1975.

10b-4 "Let Us Treat Transportation as a Coordinated System"; testimony to the Subcommittee on Surface Transportation, House Committee on Public Works and Transportation; U.S. House of Representatives; Washington, 15 July 1981.

c. Presentations at Professional Societies, Meetings, Lectures in Major Transportation Agencies

10c-1 Association of Transport Engineers and Technicians of Yugoslavia (DITJ), Belgrade, 1960, 1970, 1976.

10c-2 Operations Research Society of America (ORSA): New York 1967, Miami Beach 1969, Detroit 1970, Atlantic City 1972.

10c-3 Institute of Engineering Education (IEE): Andover, NH, 1967.

10c-4 Hamburger Hochbahn AG, Hamburg: 1968, 1971.

10c-5 Transportation Research Board (TRB): 1970, 1973, 1974 (2), 1975 (3), 1976, 1977, 1980 (2), 1981, 1983.

10c-6 Regional Science Association of America (RSA): Philadelphia 1972, 1985.

10c-7 International Union of Public Transport (UITP): The Hague 1973, Montreal 1977.

10c-8 Caltrans' course "Public Transportation State-of-the-Art": Sacramento 1974, San Diego 1974, San Mateo 1975.

10c-9 American Public Transit Association (APTA): New York 1974, Washington 1977, Philadelphia 1981, San Diego 1983.

10c-10 Engineering Society of Detroit: 1975.

10c-11 American Society of Civil Engineers (ASCE), Philadelphia Section: 1975, 1983.

10c-12 Urban Mass Transportation Administration (UMTA): R&D Conferences in Washington, 1976 (2); TTS Conference in Portland, OR 1983.

10c-13 German Scientific Transport Association (DVWG): Hamburg 1976.

10c-14 Institute of Transportation Engineers (ITE): Mexico 1977.

10c-15 German Association of Transit Agencies (VOV): Frankfurt 1978, Munich 1982.

10c-16 Oahu Development Conference, Honolulu: 1978.

10c-17 International Conference on Urban Transport organized by Asahi Shimbun: Tokyo 1979.

10c-18 Teito Rapid Transit Authority (TRTA), Tokyo: 1979.

10c-19 International Association of Traffic and Safety Sciences (IATSS), Tokyo: 1979.

10c-20 Northeast-Midwest Coalition, U.S. Congress: 1979.

10c-21 Chartered Institute of Transport: Cape Town 1981.

10c-22 International Center for Transportation Studies (ICTS): Amalfi, Italy, 1983.

10c-23 Symposium on Recent Developments of Urban Transit Technology, Keynote speech: "Transit Technology Today" (#8.61); Taipei, 27-29 November 1984.

10c-24 China Road Federation Annual Meeting, Keynote speech: "Present and Future of Highway Transportation"; Taipei, 30 November 1984.

11. Invited Lectures at Universities

11.1 University of Belgrade, Faculty of Transportation and Traffic Engineering: invited lecturer in the graduate program (16 hrs.- in Serbo-Croatian); December 1970.

11.2 University of Zagreb, Faculty of Civil Engineering: "Trends in Urban Transportation Systems Development" (in Serbo-Croatian); 21 December 1970.

11.3 University of Pennsylvania, Towne School, Colloquium on Urbanism: "Urban Transportation in Future Perspective"; Philadelphia, 3 March 1971.

11.4 Southern Illinois University: "Planning and Environment - A Comparative Review of European and American Approaches"; Carbondale, IL, 2 June 1971.

11.5 Technische Universitat Munchen, Department of Transportation Engineering and City Planning: "Urban Transportation Models and Technologies in the United States" (in German); 15 June 1972.

11.6 University of Salford, Department of Civil Engineering: "Light Rail Transit Systems"; Salford, England, 21 June 1972.

11.7 Pennsylvania State University, Transportation and Safety Center: "Urban Transportation Modes: Characteristics, Relationships and Optimal Domains"; State College, PA; 11 January 1973.

11.8 Ohio State University, Department of Civil Engineering: "Comparative Analysis of Transportation Modes"; Columbus, OH; 22 February 1973.

11.9 Temple University: "Urban Transportation Systems: New Technology"; Philadelphia, 13 and 15 March 1973.

11.10 Technische Universitat Munchen, Department of Transportation Engineering and City Planning: "New Transportation Systems: Real Potential or Misdirection?" (in German); 24 May 1973.

11.11 Carnegie-Mellon University, Pittsburgh - Professional Program in Urban Transportation; lecturer on topics: transit scheduling, rail and bus transit, comparative analysis of modes; 3-7 hrs. each year, 1973-1979.

11.12 Ohio State University, Department of Civil Engineering: "Toward Formation of Urban Transportation Systems"; Columbus, OH, 13 November 1973.

11.13 University of California - ITS, "Comparative Analysis of Transit Modes"; Berkeley, 27 March 1974.

11.14 Princeton University, Department of Civil Engineering: "Automated Transit Systems"; November 1974.

11.15 University of Wisconsin, Seminar on Light Rail Transit; speaker at two sessions; Milwaukee, 25-26 April 1975.

11.16 University of Pennsylvania, Department of Civil and Urban Engineering, "Society, Professionals and Academia"; Herbert Spencer Lecture Series; Philadelphia, 11 December 1975.

11.17 University of Hawaii, Department of Civil Engineering, with Oahu Development Conference: "Urban Design and Transportation Planning"; Honolulu, 4 January 1978.

11.18 Universitat Karlsruhe, Institut fur Wirtschaftspolitik und Wirtschaftsforschung: "Methodology for Comparison of Transit Modes" (in German); 16 June 1978.

11.19 Portland State University, School of Urban Affairs, keynote speaker at the Workshop on Light Rail Transit; Portland, OR; 14 September 1978.

11.20 Universidad Simon Bolivar, Department of Civil Engineering, a series of lectures (10 hrs.) in the Graduate Seminar on Urban Transportation Planning; Caracas, 2-6 October 1978.

11.21 Georgia Institute of Technology, School of Civil Engineering, "Family of Transit Modes: Definitions and Characteristics"; Atlanta, 19 April 1979.

11.22 University of Tokyo, Department of Civil Engineering, "Trends in Rail Transit"; 24 May 1979. Also three lectures in an undergraduate course, 4-6 June 1979.

11.23 University of Hokkaido, Department of Civil Engineering, "Interchange Design"; Sapporo, 28 May 1979.

11.24 Tokyo Institute of Technology, Department of Social Engineering, "Trends in Rail Transit", 31 May 1979.

11.25 University of Kobe, Department of Civil Engineering, "Trends in Rail Transit", 18 June 1979.

11.26 University of Kyoto, Department of Civil Engineering, "Trends in Rail Transit", 19 June 1979.

11.27 Taiwan Technical University and Transportation Planning Board, "Urban Transportation Trends: Theoretical Analyses and Practical Policies". Taipei, 26 June 1979.

11.28 Dartmouth College, Thayer School of Engineering, "Urban Transportation Policies under Prospects of Limited Energy"; Charles C. Jones Seminar Series, Andover, NH, 4 October 1979.

11.29 Polytechnic Institute of New York, Department of Transportation Planning and Engineering, "Present and Future Role of Transit in U.S. Cities"; Seminar Series in Transportation, New York, 20 February 1980.

11.30 Villanova University, Department of Civil Engineering, "Definitions and Characteristics of Urban Transportation Modes"; Philadelphia, 26 February 1980.

11.31 Massachusetts Institute of Technology, Center for Transportation Studies, "Are Current Urban Transportation Policies Responsive to the Needs of Our Cities?"; Cambridge, MA, 19 September 1980.

11.32 National University of Taiwan, Department of Civil Engineering, "Trends in Rail Transit"; Taipei, 12 December 1980.

11.33 University of Alberta, Light Rail Transit Study Program, lectures on LRT Network Planning, Infrastructure and Rolling Stock (4 hrs.); Edmonton, Alberta, Canada, 25-26 May 1981.

11.34 University of Calgary, Department of Civil Engineering, "Urban Transportation Developments in the Light of Environmental and Energy Aspects"; Calgary, Alberta, Canada, 27 May 1981.

CEPA ET AL. STATEMENT
R-850152

PENNSYLVANIA PUBLIC UTILITY COMMISSION

V.

PHILADEPHIA ELECTRIC CO.

DIRECT TESTIMONY

OF

GEORGE GRIER

CONCERNING IMPACT OF RATE STRUCTURE

ON LOW-INCOME HOUSEHOLDS

ON BEHALF OF: CONSUMERS EDUCATION AND PROTECTIVE ASSOC.
ACTION ALLIANCE OF SENIOR CITIZENS
PHILADELPHIA CITIZENS IN ACTION
ASSOCIATION OF COMMUNITY ORGANIZATIONS
FOR REFORM NOW
MR. BRADSHAW

January 22, 1986

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS

A. My name is George Grier. My business address is The Grier Partnership, 6532 East Halbert Road, Bethesda, Maryland, 20817.

Q. PLEASE DESCRIBE YOUR BACKGROUND AND QUALIFICATIONS

A. I am a principal in The Grier Partnership, a research and consulting firm which specializes in analysis of policy- and program-related questions in the public and private sectors. The firm's work has been in several areas including energy, demographics, and analysis of social and economic impacts. Recent activities of the firm in which I have been involved include:

- Analyses of patterns of energy use and expenditures by low-income and elderly households, the characteristics of these households, and the implications of both for utility rate structures, need for energy assistance, and implications for weatherization and other conservation measures.
- Development of computerized data systems and computer models for estimating household energy expenditures under varying conditions such as energy prices, climate, principal fuel used, and characteristics of the household, as well as the budgetary impact of these expenditures.

- o Preparation of expert testimony for various legal and administrative proceedings concerning the setting of energy price schedules for different classes of consumers.
- o Extensive work with Census Bureau and other federal data files, including the computer tape formats of these files, in demographic and economic analyses for public and private clients.

Prior to forming The Grier Partnership in 1976, a principal member of the firm was Research Staff Director for the Washington Center for Metropolitan Studies, a private non-profit "think tank." In that capacity, she directed the 1975 National Survey of Household Energy Use, which was conducted by the Washington Center for Metropolitan Studies for the Federal Energy Administration, a predecessor agency of the U. S. Department of Energy (DOE). That survey, which was known as the WCMS Household Energy Survey, was the prototype for the closely-similar Residential Energy Consumption Surveys now conducted by DOE.

Since that time, the Partnership has conducted a number of analyses of energy price impacts and related matters for a variety of clients in both the public and private sectors. These have included the U.S. Community Services Administration, the Congressional Research Service,

the National Council of Senior Citizens, the National Consumer Law Center, and the New England Regional Energy Project.

My firm has presented testimony in a number of energy price and utility rate cases before the Federal Energy Regulatory Commission, the Illinois Commerce Commission, the New Jersey Board of Public Utilities, the Pennsylvania Public Utility Commission, and the Public Service Commission of the District of Columbia, among others.

In addition, we have presented papers on energy price impacts and related matters before meetings of the National Conference on Optimal Weatherization, the University of Chicago, the University of North Carolina, the Congressional Research Service of the Library of Congress, the U.S. Community Services Administration, and others.

My own professional experience includes nine years as a principal of The Grier Partnership and nine years as a Vice President and Senior Associate of the Washington Center for Metropolitan Studies, plus service with the Brookings Institution, the District of Columbia Government, and the New York State Government. I hold a Master's Degree in Social Psychology from the University of Pennsylvania, with specialization in survey design and statistics.

My background is more fully described in my resume attached hereto as Exhibit GG-1. A list of my reports and publications on energy issues is included in that exhibit.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. In my testimony I shall demonstrate the following facts:

1. Low income consumers (i.e., those who qualify for low-income energy assistance) make up a substantial proportion of all Philadelphia Electric Co. ratepayers.

2. The incomes of these PECo ratepayers are very low. They are much lower, on the average, than generally recognized, and considerably lower than the maximum limits for energy assistance.

3. Many of these low-income consumers have little chance of increasing their incomes through their own efforts, since they consist largely of elderly and handicapped persons and single-parent families with children.

4. Most of these customers already have serious and unavoidable budgetary burdens other than their electricity bills--such as housing, food, and other energy bills.

5. Thus, to impose PECo's requested rate increase on them would impose severe

hardship.

6. Relatively few of these low-income electric ratepayers have air conditioners, and hence they do not contribute substantially to high peak loads. In fact, on the average and as a group, they consume considerably less electricity than high-income ratepayers.

Q. WHAT EVIDENCE DO YOU OFFER FOR YOUR CONTENTIONS?

A. My statements are based chiefly on data from federal sources, mainly the U.S. Census Bureau and the Bureau of Labor Statistics. I have supplemented these sources with data from the Company's studies of its own customers. My data sources are specifically referred to in my exhibits.

Q. WHY DO YOU RELY HEAVILY UPON FEDERAL DATA SOURCES?

A. Because these data are specifically applicable to defining the low-income customer population, and to analyzing its characteristics and its economic situation relative to the affordability of the proposed rate increase. Using Census Bureau computer tapes, I was able to focus in particularly upon low-income electricity consumers in the parts of the Philadelphia metropolitan area under the jurisdiction of this Commission and to draw out data specific to that group. In addition, federal

data are objective and have been produced by agencies with no interest in the current case.

Q. HOW DO YOU DEFINE LOW-INCOME PHILADELPHIA ELECTRIC RATEPAYERS FOR THE PURPOSES OF YOUR TESTIMONY?

A. They are those electricity consumers residing in Philadelphia and its Pennsylvania suburbs within the metropolitan area who have incomes at or below 150 percent of the federal poverty limits. These customers qualify for low-income home energy assistance (LIHEAP) under the standards of both the federal government and the Commonwealth of Pennsylvania.

Q. WHAT ARE THE FEDERAL POVERTY LIMITS?

A. These limits vary with household size, and are adjusted regularly by the U.S. Office of Management and Budget based on increases in the Consumer Price Index. The current limits at the 150-percent-of-poverty level are shown in my Exhibit GG-2. At current levels, a household of one person (say, an elderly widow living alone) may have an income no higher than $7,875 to qualify. The maximum income rises for larger households, to $13,275 for a family of three and to $26,775 for a family of eight.

Q. SO A SINGLE ELDERLY WIDOW ELIGIBLE FOR LOW-INCOME ENERGY ASSISTANCE HAS AN AVERAGE INCOME OF $7,875, IS THAT CORRECT?

A. No. That is the maximum income she may have and still qualify. Actually, few have incomes as high as the maximum limits. Often they are much lower. It is very important to understand this, because some people confuse the poverty income limits with the incomes actually received by households below those limits. Some assume that all eligible households have incomes this high, while many others think that the average household does. Neither of these things is true.

Q. WHAT IS THE AVERAGE INCOME FOR A SINGLE-PERSON ELECTRIC RATEPAYER HOUSEHOLD UNDER 150 PERCENT OF POVERTY IN THE PHILADELPHIA AREA?

A. It is about $4,641, as shown in my Exhibit GG-2. That is less than three-fifths of the maximum income limit for LIHEAP eligibility.

Q. DO LOW-INCOME ELECTRIC RATEPAYERS OF ALL HOUSEHOLD SIZES HAVE AVERAGE INCOMES LOWER THAN THE FEDERAL MAXIMUM LIMITS FOR ELIGIBILITY?

A. Yes, at every household size the average income is well below the maximum which allows them to qualify. In my Exhibit GG-2, I show the comparison between the maximum level for each household size and the average income received by low-income electric ratepayers of this household size in the Pennsylvania portion of the Philadelphia metropolitan area.

Q. PLEASE GIVE SOME FURTHER EXAMPLES OF THESE LOWER AVERAGE INCOMES.

A. A four-person household can qualify for energy assistance with a maximum income of $15,975. Actually, however, the average income of four-person households under 150 percent of the poverty line is only $10,556. For a six-person household, the maximum is $21,375, but the average is only $14,154.

Q. WHAT PROPORTION OF THE MAXIMUM ELIGIBILITY LEVEL FOR LIHEAP BENEFITS IS THE AVERAGE INCOME OF THESE LOW-INCOME HOUSEHOLDS?

A. Again, this proportion varies with the size of the household, but not in any regular fashion. In most cases, it ranges between roughly three-fifths and about two-thirds of the maximum, as shown in my Exhibit GG-2.

Q. WHY DO YOU PLACE SO MUCH STRESS ON THE RATEPAYER POPULATION BELOW 150 PERCENT OF POVERTY?

A. Because these customers are recognized under the laws of both the United States and the Commonwealth of Pennsylvania as having incomes so low that they require special financial aid from the government if they are to meet their energy bills. I might note that the City of Philadelphia has indicated in its testimony in this case that low-income people will be particularly hard-hit by the job losses that the City expects to result from the proposed

rate increase, if implemented. The thrust of my testimony is to indicate that they will also feel the impact in terms of further strain on budgets that are already severely overloaded by today's high living costs.

Q. IN YOUR OPINION, ARE THESE THE ONLY CUSTOMERS WHO WILL HAVE DIFFICULTY MEETING PHILADELPHIA ELECTRIC'S PROPOSED RATE INCREASE?

A. Not at all. There are many more customers who will be harmed by such an increase, and who will have trouble meeting the additional budgetary burden it imposes. But low-income customers obviously will have particular difficulty, just because their incomes are so low.

Q. HAVE YOU COMPARED THE INCOMES OF LOW-INCOME RATEPAYERS WITH THOSE OF HIGHER-INCOME RATEPAYERS?

A. Yes, and the comparison is shown in my Exhibit GG-3. As is evident from this exhibit, the average incomes of low-income ratepayers are much lower than the average for those above 150% of the poverty level or of the population as a whole.

Q. YOU SPEAK OF "PHILADELPHIA AND ITS PENNSYLVANIA SUBURBS." IS THIS EQUIVALENT TO PHILADELPHIA ELECTRIC'S SERVICE TERRITORY WITHIN PENNSYLVANIA?

A. Not precisely, but it is close enough to provide a reasonably accurate representation of the situation of Philadelphia Electric customers under the jurisdiction of this Commisssion. The Pennsylvania

portion of the Philadelphia metropolitan area, as defined by the U.S. Office of Management and Budget for Census and other purposes, includes the City of Philadelphia plus all of four suburban counties: Bucks, Chester, Delaware and Montgomery. PECo's territory excludes some of the northern portions of this four-county area. But most of this territory is included. Furthermore, the portions missing from PECo's territory are among the less heavily populated. A small part of York County is also included in PECo's service area, although it is not within the metropolitan area. However, the population of this York County portion is not very great. So for practical purposes, the ratepayer population of PECo's service territory within Pennsylvania is quite well represented by the statistics.

Q. HOW DO THE INCOMES OF LOW-INCOME ELECTRIC RATEPAYERS IN THE CITY OF PHILADELPHIA COMPARE WITH THOSE FOR THE ENTIRE PENNSYLVANIA PORTION OF THE METROPOLITAN AREA?

A. They are somewhat lower. The average income for electric ratepayers under 150 percent of poverty in the City of Philadelphia is $7,662. For the entire Pennsylvania portion it is $7,826. Approximately the same differential exists for all household size categories, as shown in my Exhibit GG-4.

Q. YOU SPEAK OF "ELECTRIC RATEPAYERS." IS THIS SHORTHAND FOR THE ENTIRE POPULATION, OR ARE THE CENSUS STATISTICS YOU CITE ACTUALLY PRECISE ENOUGH TO GIVE YOU DATA ON RATEPAYERS AS SUCH?

A. I used Census Bureau computer tapes in my analysis. These tapes allowed me to focus specifically on households that reported in the Census that they paid their own electric bills. It is important to look at this population, because it excludes apartment dwellers whose electric bills are included in their rent. These people's situation may well be different from that of the ratepayer population, even at the same below-150-percent-of-poverty income level.

Q. WHEN WERE YOUR DATA OBTAINED?

A. They are principally from the 1980 Census.

Q. DOES THIS MAKE THEM OUT-OF-DATE?

A. Not to a degree that would affect the validity of my conclusions. There is no reason to believe that the low-income population of metropolitan Philadelphia has decreased since the 1980 Census. In fact, more recent data from the Census Bureau indicate that it probably has increased. In addition, the data on incomes and budgetary burdens which I present for these customers have been adjusted for inflation, and are stated in 1985 dollars.

Q. HOW MANY LOW-INCOME ELECTRIC RATEPAYERS, AS YOU HAVE DEFINED THEM, LIVE IN THE PENNSYLVANIA PORTION OF THE PHILADELPHIA METROPOLITAN AREA?

A. There are about 226,100 ratepayer households--containing nearly 600,000 persons. That is about one-fifth of all PECo customers in this area. In the City of Philadelphia itself, low-income ratepayers are nearly three ratepayers in ten. So when I speak of these low-income customers I am not talking about small numbers. Over two-thirds of low-income ratepayers in the area--some 155,000 households, containing over 400,000 persons--live in the City of Philadelphia. About 71,000 reside in the suburbs. (Exhibit GG-4)

Q. EARLY IN YOUR TESTIMONY YOU SAID THAT LOW-INCOME ELECTRICITY CUSTOMERS "CONSIST LARGELY OF ELDERLY AND HANDICAPPED PERSONS AND SINGLE-PARENT FAMILIES WITH CHILDREN." WOULD YOU PLEASE GO INTO MORE DETAIL ON THIS POINT.

A. Yes. Here I was talking about the population under 150 percent of the federal poverty limits, which as I indicated earlier makes up nearly one-fifth of Philadelphia Electric's ratepayers in the entire Pennsylvania portion of its service area, and nearly 30 percent of electricity customers within the City of Philadelphia. A lot of people have the idea that these are mainly large families with children. In fact, the largest size category is

single persons living alone. They make up nearly two-fifths of the total. One- and two-person households combined make up a three-fifths majority, as shown in my Exhibit GG-5.

Q. YOU HAVE STATED THAT SMALL HOUSEHOLDS OF ONLY ONE OR TWO PERSONS ARE A THREE-FIFTHS MAJORITY OF ALL LOW-INCOME ELECTRIC RATEPAYERS. WHAT PROPORTION OF LOW-INCOME RATEPAYERS CONTAIN SIX PERSONS OR MORE?

A. Only about eight percent are this large. Five-person households make up another eight percent. So, in combination, only about one low-income household in six contains five persons or more.

Q. IS A HOUSEHOLD THE SAME THING AS A FAMILY?

A. No, households include families but not the other way around. A household is all the inhabitants of a housing unit. A family is persons who are related. A household may be a family, or as I have already indicated, a single person living alone. It may also consist of two or more unrelated people sharing living quarters, or occasionally two or more families. As I have indicated, however, most low-income households are quite small.

Q. WHAT CAN YOU SAY ABOUT THE NEARLY TWO-FIFTHS OF LOW-INCOME PECO CUSTOMERS WHOM YOU HAVE INDICATED TO BE SINGLE PEOPLE LIVING ALONE?

A. Among these low-income single ratepayers, almost 49,000 households--nearly 57 percent of the total--

are elderly. Still others are not elderly but are disabled.

Q. IS THERE ANY OTHER IMPORTANT FACT ABOUT LOW-INCOME ELECTRIC CUSTOMERS WHO LIVE ALONE WHICH BEARS ON THEIR VULNERABILITY?

A. Yes. About three-fourths of them (and nearly 85 percent of those aged 65 and older) are women. Most of these women are widowed.

Q. WOULD IT BE CORRECT TO STATE THAT THE MOST TYPICAL LOW-INCOME PECO CUSTOMER IS AN ELDERLY AND/OR DISABLED WOMAN WHO LIVES ALONE?

A. Yes, in thinking of the situation and needs of such a customer, the most accurate image to keep in mind is your elderly mother or grandmother--not a young welfare mother with a lot of children.

Q. EARLIER, HOWEVER, YOU HAD MENTIONED SINGLE-PARENT FAMILIES WITH CHILDREN AS ONE OF THE VULNERABLE GROUPS AMONG RATEPAYERS. IF THEY ARE NOT THE MAJORITY, HOW MANY OF THEM ARE THERE?

A. Just under one-fifth of all low-income ratepayers, about 44,000 in all, are single-parent families with children. Over 90 percent of these families, about 41,000, are headed by women.

Q. AND ARE THESE SINGLE-PARENT FAMILIES WITH CHILDREN PREDOMINANTLY LARGE?

A. No. Most have only one or two children.

Q. RETURNING TO THE SINGLE-PERSON HOUSEHOLDS AMONG THE LOW-INCOME RATEPAYERS, YOU STATED THAT THEIR

INCOMES AVERAGED ONLY ABOUT $4,641 PER YEAR. WHAT DOES THAT AMOUNT TO ON A MONTHLY BASIS?

A. It is an average of $387 per month, and that amount must cover all expenses including the electric bill. This is the average; there are many customers with less.

Q. BUT SINCE THE DATA YOU USE COME FROM THE 1980 CENSUS, AND THERE HAS BEEN CONSIDERABLE INFLATION SINCE, DON'T THEY GREATLY UNDERSTATE THE INCOMES THAT LOW-INCOME RATEPAYERS RECEIVE TODAY?

A. No. I have increased the census income figures based on the change in the Consumer Price Index, or CPI, since the Census was taken. This is a method often used by statisticians to update incomes for inflation in the absence of more recent survey data.

Q. PLEASE DESCRIBE EXACTLY HOW YOU UPDATED THE CENSUS INCOME FIGURES TO TAKE ACCOUNT OF INFLATION.

A. I obtained the CPI for the Philadelphia area for the most recent month for which it was available when this testimony was prepared. That month was November of 1985. I divided it by the annual average CPI for calendar year 1979, which is the year for which persons responding to the 1980 Census were asked to report their incomes. This gave me the inflation factor.

Q. HOW DID YOU APPLY THIS INFLATION FACTOR?

A. I instructed the computer to multiply the income of

every household in the census data tape by this factor. This gave me updated incomes for late 1985, which are the ones I use throughout this testimony. Since inflation is currently low, they can be considered to apply to the present date.

Q. IN YOUR OPINION, DOES THIS METHOD OF UPDATING INCOMES BY THE CONSUMER PRICE INDEX YIELD ACCURATE RESULTS FOR THE LOW-INCOME POPULATION OF THE PHILADELPHIA ELECTRIC COMPANY SERVICE AREA?

A. Probably not as accurate as might be wished, even though the method is an accepted one. I believe that it almost certainly overestimates the growth in incomes since the 1980 Census--especially for low-income households.

Q. ON WHAT DO YOU BASE YOUR BELIEF THAT THE METHOD YOU HAVE USED TO UPDATE INCOMES FOR INFLATION PROBABLY OVERSTATES THE INCOME GROWTH FOR LOW-INCOME HOUSEHOLDS?

A. First, there is a lot of evidence from periodic surveys by the Census Bureau that the incomes of households at the lower end of the income scale have not been increasing in accord with inflation, and that for this reason the poverty population is growing.

Q. BUT THESE ARE NATIONAL STUDIES. DO YOU HAVE ANY EVIDENCE THAT THE INCOMES OF LOW-INCOME HOUSEHOLDS IN THE PHILADELPHIA AREA HAVE NOT BEEN KEEPING UP WITH INFLATION?

A. Yes. I have data on the increase in benefit levels under AFDC--Aid to Families with Dependent Children--between 1980 and 1986. These data indicate that benefit levels have risen by about 10 percent for a two-person family (typically an unwed, divorced or deserted mother with a single child) to about 15 percent for a family of three and about 27 percent for a family of six. This compares with an increase of about 40 percent in the Consumer Price Index for the same period. (Exhibit GG-6)

Q. SO NO AFDC FAMILIES HAVE RECEIVED AN INCREASE IN BENEFITS EQUAL TO INFLATION?

A. That is correct. And smaller families have received smaller increases, much below the inflation rate. I would reiterate that most low-income families are small.

Q. YOU INDICATED THAT YOU ALSO EXAMINED THE BUDGETARY BURDENS PLACED UPON LOW-INCOME ELECTRIC RATEPAYERS BY THE COSTS OF SUCH NECESSITIES AS SHELTER AND FOOD. WOULD YOU PLEASE DISCUSS SHELTER COSTS AS THEY RELATE TO THE INCOMES OF THESE HOUSEHOLDS.

A. Yes. My findings on shelter costs are summarized in my Exhibits GG-7 and GG-8. The first deals with homeowners, the second with renters. All figures are for electric ratepayers.

Q. ARE THESE FIGURES IN UPDATED DOLLARS?

A. Yes, they have been updated by the computer using the Consumer Price Index for the Philadelphia area.

Q. PLEASE DISCUSS THE SHELTER COSTS OF LOW-INCOME HOMEOWNERS.

A. Homeowners are a majority of low-income ratepayers in the Pennsylvania portion of the Philadelphia metropolitan area. For all households combined, these ratepayers have an average income of $673 per month, according to the updated census figures. Monthly owner costs, which include mortgage and tax payments, insurance, fuels and utilities (including electricity), but not maintenance costs, take just over half this amount, or $370 per month. That leaves $303 per month or just about $70 per week for all other expenditures including food, clothing, medical care and other necessary and discretionary items.

Q. PLEASE DISCUSS THE SHELTER COSTS OF LOW-INCOME SINGLE HOMEOWNER-RATEPAYERS LIVING ALONE.

A. Low-income single homeowner-ratepayers of all ages living alone have a much lower monthly income than the average for homeowner households of all sizes. In fact, it is less than three-fifths as great--only $400. Their shelter costs, while lower also, are not sufficiently lower to compensate. They total $286 per month, leaving only $114 per month or about $26 per week for all other living

costs. As I have noted earlier, a majority of single-person low-income households are elderly.

Q. PLEASE DISCUSS THE SHELTER COST SITUATION OF LOW-INCOME RENTERS.

A. While homeowners are a majority, renters are a sizeable minority among the low-income group of ratepayers. There are about three-fourths as many of them as there are of homeowners. They are somewhat worse off than homeowners in most cases. Their incomes are lower overall; and their shelter costs--while lower also in most cases--are higher for small households. Overall, and particularly for single-person households, the combination of low incomes and high shelter costs leaves little remaining for other necessities.

Q. WHAT DO THE DATA SHOW ABOUT RENTER HOUSEHOLDS OF ALL AGES AND SIZES?

A. Their incomes average $625 monthly, about $48 less than owners. Their shelter costs average $350, about $20 lower. This leaves them an average of $275 per month or about $63 per week for all other expenditures.

Q. WHAT ABOUT SINGLE-PERSON RENTER HOUSEHOLDS OF ALL AGES?

A. They are the worst off of all. Their incomes average only about three-fifths as much as the total--$369 monthly. Shelter costs average $297,

leaving them with only $72 per month on average for all other expenses. That is about $17 per week.

Q. DO YOU HAVE DATA ON THESE HOUSEHOLDS' EXPENDITURES FOR OTHER ESSENTIALS?

A. We have data on food expenditures from the 1981 national Consumer Expenditure Survey, conducted on behalf of the U.S. Bureau of Labor Statistics by the U.S. Bureau of the Census.

Q. ARE THESE DATA ALSO SPECIFIC TO THE PHILADELPHIA AREA?

A. No. Only broad regional data are available from the Consumer Expenditure Survey. I obtained the data for the metropolitan areas in the Northeast--which is the region in which Philadelphia is included for Census purposes. This region includes New England as well as the Middle Atlantic states of New York, New Jersey, and Pennsylvania.

Q. AND DID YOU UPDATE THESE FIGURES IN THE SAME FASHION AS ELSEWHERE IN YOUR TESTIMONY?

A. Yes, following the same procedure discussed earlier.

Q. WHAT IS LEFT OF LOW-INCOME HOUSEHOLDS' BUDGETS AFTER BOTH SHELTER AND FOOD COSTS ARE TAKEN OUT?

A. The data bearing on this question are summarized in my Exhibit GG-9. Obviously, low-income single-person renter households fare by far the worst in terms of money remaining. They have a deficit, on average, of $26 or $6 per week. As a

group, however, renter households have somewhat more left than homeowners, largely because they spend less on food. After food and shelter costs, they have $116 monthly remaining, or about $27 per week, to pay for all other expenses. Homeowner households as a group have $52 monthly remaining, or $12 per week. But homeowner households with only a single person have only $2 left per month--pennies per week--which still makes them slightly better off than single renters.

Q. WHICH TYPE OF HOUSEHOLDS HAVE THE LARGEST AMOUNTS REMAINING AFTER SHELTER AND FOOD COSTS?

A. Dollar-wise, the best situation is that of renter households of all sizes, who have an average of $116 remaining which works out to $27 per week. However, it must be understood that some of these people also have dependents whose expenses must be paid, while single-person households must pay only for themselves.

Q. HOW IS IT POSSIBLE FOR LOW-INCOME HOUSEHOLDS TO HAVE INCOME DEFICITS--ACTUALLY SPENDING MORE MONEY TO LIVE THAN THEY RECEIVE?

A. One explanation is that they can and often do fall behind in their bills. Low-income households with members of working age often have irregular incomes from employment. Thus, when they are unemployed they fall behind, and when they are working they

try to catch up. Some of these deficits may be made up in this way.

Q. WHAT DO YOU CONCLUDE OVERALL FROM YOUR EXAMINATION OF BUDETARY BURDENS?

A. I conclude that a large proportion of low-income ratepayers are operating close to or even past the edge of solvency. Any increase in their electric bills must be drawn from budgets which, in most cases, are squeezed to the limit and often beyond the limit by recent years' increases in the costs of such essentials as housing, food, and energy--including electricity itself.

Q. WHAT WILL BE THE BUDGETARY IMPACT OF PECO'S REQUESTED RATE INCREASE, IF GRANTED, ON LOW-INCOME RATEPAYERS?

A. The increase will be extremely serious for many, in light of both the large amount of the increase and their already-overtaxed household budgets. The company has stated in materials supplied to consumers that "the annual cost of service to the average residential user (500 kilowatt-hours per month) would increase from $700 to $910, or by 58 cents per day". To estimate the impact on low-income consumers, I have turned to the figures previously cited from DOE's Residential Energy Consumption Survey. I would first note that the figures given in that survey for average annual electricity consumption is 6.1 thousand (6,100)

KWH. This is very close to the 6,000 KWH obtained by multiplying PECo's 500 KWH per month by 12. Taking the average cited in the Residential Energy Consumption survey of 4.4 thousand (4,400) KWH consumed annually by low-income households, I find that this amount is 72 percent of the average. Applying this ratio to the increase of $210 annually for the average customer stated by the company, I obtain a figure of about $151 annually, or slightly under $13 per month for low-income customers. This is approximate, of course, but will serve to give an idea of the impact of the increase. It can be compared to the following amounts:

- The $2 per month left after shelter and food costs for low-income single person homeowner ratepayers.
- The $26 per month deficit for low-income single person renter ratepayers.
- The $52 per month remaining after food and shelter costs for low-income homeowner ratepayers of all household sizes.
- The $116 per month left after food and shelter costs for low-income renter ratepayers of all household sizes.

These are meagre amounts at best, and PECo's requested rate increase will cut severely into even the largest of them. Under the new rate, if

granted, electricity will cost the average low-income ratepayer about $655 per year. This will be more than eight percent of the total income of the average low-income ratepayer (all household sizes combined); over 14 percent of the total income of the average low-income single person living alone; and 15 percent of the AFDC benefit for a family of three in Philadelphia. These percentages must be evaluated in the context of the fact that these incomes are now strained to the limit, and beyond, by essential living expenses.

Q. AS I UNDERSTAND IT, AIR CONDITIONING IS LARGELY RESPONSIBLE FOR HIGH PEAK LOADS. DO LOW-INCOME HOUSEHOLDS CONTRIBUTE MUCH TO THESE PEAKS?

A. They contribute much less, proportionately, than higher-income ratepayers. Among ratepayers at or below the 150-percent-of-poverty level in PECo's Pennsylvania service territory, only 8.5 percent have central air conditioning. This compares with 20.5 percent among higher-income ratepayers. About half as many in this low-income group, proportionately, have two or more room air conditioners as do higher-income ratepayers. In all, low-income ratepayers with <u>any</u> form of air conditioning are only about one-sixth as numerous as higher-income ratepayers with air conditioning of any type. (Exhibit GG-10)

Q. DO LOW-INCOME HOUSEHOLDS CONTRIBUTE AS MUCH TO DEMAND FOR ELECTRICITY, AND HENCE TO THE NEED FOR NEW GENERATING FACILITIES, AS DO HIGHER-INCOME HOUSEHOLDS?

A. They do not. On average, low-income households use substantially less electricity than those of all income levels combined, and much less than high-income consumers.

Q. WHAT IS YOUR EVIDENCE FOR THIS STATEMENT?

A. It comes from a periodic national survey by the U.S. Department of Energy which is the most complete and detailed source of data on energy consumption in relation to consumer characteristics. This survey is known as the Residential Energy Consumption Survey, and the most recent available data are for the year from April of 1982 through March of 1983.

Q. DOES THE RESIDENTIAL ENERGY CONSUMPTION SURVEY PROVIDE DATA SPECIFICALLY FOR THE PHILADELPHIA AREA?

A. No. However, it does provide figures for the Middle Atlantic Census Division, which consists of the three States of New York, New Jersey and Pennsylvania, as well as for the U.S. as a whole and for a number of other sub-regions.

Q. WHAT DOES THE SURVEY SHOW ABOUT CONSUMPTION RELATED TO INCOMES IN THE MIDDLE ATLANTIC AREA?

A. It shows that consumers with incomes under 125 percent of the poverty line use an average of 4.4 thousand KWH of electricity annually, compared to 6.1 thousand KWH for customers of all income levels. That is less than three-fourths as much as the average. (Exhibit GG-11)

Q. AND HOW DOES THIS CONSUMPTION COMPARE TO THAT OF HIGH-INCOME HOUSEHOLDS IN THE SAME AREA?

A. Consumers with 1981 family incomes of $35,000 or more consume an average of 8.6 thousand KWH annually. That is almost twice as much as the average for consumers with incomes below 125 percent of poverty.

Q. DO YOU HAVE ANY EVIDENCE SPECIFIC TO THE PHILADELPHIA AREA FOR YOUR CONTENTION THAT LOW-INCOME RATEPAYERS USE LESS ELECTRICITY?

A. Yes. It comes from two reports prepared by PECo itself. These are reports of the Company's 1980 Residential Electric Service Load Study. They are Reports Nos. 48482-A and 48482-B, and were obtained under discovery.

Q. WHAT EVIDENCE IS CONTAINED IN THESE REPORTS ON LOW-INCOME HOUSEHOLDS' ELECTRICITY CONSUMPTION?

A. The evidence is partially inferential yet nonetheless strong, and particularly so since it closely confirms the findings of the Residential Energy Consumption Survey. Because the PECo reports themselves contain no data on incomes, I

had to infer income levels from other evidence. The reports do contain information on occupation of the household head, number of persons in the household, number of household members under age 18, and number of rooms in the home.

As will be recalled from my earlier testimony and from my Exhibits GG-2, GG-3 and GG-4, census data show that household size and income are related. Most low-income households are small, containing only one or two persons. The most common size is one person. By the same token, these small households contain few or no children. In fact, most single-person low-income households are elderly. The converse is true as well: most higher-income households are larger than one person, and most of them are not elderly.

With these facts in mind, I compared the data in the Company's survey report No. 48482-A dealing with customers in the lowest and highest consumption classes out of six into which the sample of customers (all in Rate Class R) were divided. The lowest consumption category was 201-300 KWH monthly, and the highest was 1001-1500. These were December usage figures, and December is a month in which air conditioning does not usually play a role in consumption. Note also that space heating (Rate Class RH) and off-peak water heating (Rate Class OP) customers were not included in the

survey. Hence 1001 to 1500 KWH in a December month is indeed high consumption.

Q. WHAT WAS YOUR OVERALL CONCLUSION BASED UPON THE DATA IN THESE REPORTS ON CONSUMPTION AS RELATED TO THE CHARACTERISTICS OF RATEPAYERS?

A. I concluded that the data in these reports demonstrated a strong relationship between consumption and income levels, as the latter could be inferred from occupations and household sizes.

Q. WHAT DID YOU CONCLUDE ABOUT THE INCOME-RELATED CHARACTERISTICS OF RATEPAYERS IN THE LOWEST ELECTRICITY CONSUMPTION CATEGORY?

A. These low-consumption ratepayers were predominantly retired elderly persons and people in low-paid jobs. Most had very small households, and few had children.

Q. PLEASE STATE HOW YOU REACHED THESE CONCLUSIONS.

A. In the lowest consumption class, 201-300 KWH, 39 percent reported the occupation of the head as retired. An additional 14 percent reported it as housewife. All the housewives were single persons living alone. I think it is reasonable to assume that they were usually widowed and in many cases elderly. Only one retired household had more than two persons. I therefore conclude that about half of the sample of customers in the lowest consumption category were probably elderly couples and widowed individuals.

Q. AND THE REST?

A. Many of them reported occupations which generally pay low wages. In all, 17 percent reported that their occupations were such as laborer, porter, house cleaner, maintenance, clerk, and bank teller. Some other reported occupations were less clearly low-income, but homes and apartments were generally small and suggested that most of these people were living modestly.

Q. WHAT DID YOU CONCLUDE ABOUT THE INCOME-RELATED CHARACTERISTICS OF RATEPAYERS AMONG THE HIGHEST CONSUMPTION CATEGORY IN RATE CLASS R?

A. They were predominantly professionals, managers, and members of other highly-paid occupations. The number of people in the household tended to be larger, and the homes they occupied were larger as well.

Q. ON WHAT DO YOU BASE THIS CONCLUSION?

A. In this highest consumption category, with December consumption of 1001 to 1500 KWH, most household heads reported occupations that clearly placed them in the higher-paid professional and managerial categories. More than 10 percent of the sample were doctors; there were also other highly-paid professional categories such as judge, accountant, and engineer. In all, 31 percent were business executives, owners, managers, or supervisors. While many of the other reported occupations were

less clearly high-income, such as salesman and insurance agent, the sizes of the homes they lived in generally suggested that they were economically successful. Most contained ten rooms or more. Not a single household head was either retired or a housewife.

There was only one single-person household in the high-consumption group, and fewer than ten percent contained two persons. All the rest of the households consisted of three persons or more, and over 70 percent contained persons under the age of 18. This figure contrasted with only 11 percent in the lowest consumption category.

Q. WERE THE VERY DIFFERENT DECEMBER CONSUMPTION LEVELS IN THESE TWO CATEGORIES ACCOMPANIED BY DIFFERENT LEVELS OF SUMMER PEAK ELECTRICITY USE?

A. Decidedly. Both the August non-coincident maximum demand and the maximum annual recorded demand for the highest consumption category were more than three times as great as the comparable figures for the lowest usage group.

Q. AND DID THESE DIFFERENT CONSUMPTION LEVELS APPEAR TO BE ASSOCIATED WITH DIFFERENTIAL POSSESSION OF AIR CONDITIONERS?

A. Yes, definitely. In the lowest consumption category, only six percent of the ratepayers had central air conditioning systems, and only 36 percent had room air conditioners. In the great

majority of these cases there was only one room unit. In the highest consumption category, by contrast, 41 percent of the households had central air systems and 44 percent had room units. In such cases there was usually more than one unit, and in several instances as many as four or five.

Q. TAKING INTO ACCOUNT ALL THE EVIDENCE YOU HAVE CITED ON THE RELATIONSHIPS BETWEEN INCOMES, CONSUMPTION LEVELS, AND POSSESSION OF AIR CONDITIONERS, WHAT DO YOU CONCLUDE THAT IS OF RELEVANCE TO THE IMPACT OF THE REQUESTED PECO RATE INCREASE ON LOW-INCOME RATEPAYERS?

A. I conclude that all the evidence indicates that low-income ratepayers contribute little to the large peak demands. These are summer peaks related largely to air conditioning, and especially to use of central air and multiple room-unit systems.

Q. WHAT HAVE YOU CONCLUDED ABOUT THE ADEQUACY OF THE PROGRAMS WHICH ARE NOW IN PLACE TO AID LOW-INCOME RATEPAYERS TO REDUCE OR COPE WITH THEIR ELECTRIC BILLS?

A. My overall conclusion is that these programs, whatever benefits they provide, serve far too few ratepayers to be of much value in reducing the burdens on this group.

Q. PLEASE DESCRIBE THE PROGRAMS OF THIS TYPE OF WHICH YOU ARE AWARE.

A. They are:

(1) The Low-Income Home Energy Assistance Program (otherwise known as LIHEAP). Properly speaking, this is not a PECo program, but a governmental program from which low-income customers of PECo and other energy utilities can get financial assistance. The benefits are paid directly to the company to reduce arrearages.

In the 1984-1985 program year, LIHEAP provided benefits to 10,800 PECo customers. The average grant was $281.

(2) The Utility Emergency Services Fund (UESF). This program is also governmental, and provides benefits only to low-income residents of the city of Philadelphia. Like LIHEAP, it is available to customers of other utilities than PECo. The utilities provide matching funds on a 50-50 basis. The benefits under UESF are available only to customers under 125 percent of the poverty level--unlike other programs which use a more generous (150 percent) cutoff. It also has certain other restrictions. Grants of up to $500 are available only every two years. They are made only if,

with their help, the customer can reduce his or her arrearages to zero. That means that if a customer owes $800, no benefit will be available under UESF unless he can come up with another $300 out of his own pocket.

In 1985, through the date for which figures were made available by the company, this program had provided benefits to 1,326 customers. The average grant was $475.

(3) Project Heat. This program is jointly sponsored by PECo, the United Way of Bucks County, and the Bucks County Government. Naturally, it serves only customers residing in Bucks.

The project was begun in 1985, and through the date of reporting by the company had served 61 customers. The average grant was $213.

(4) Chester County Cares Utility Fund (CCCUF). This project is limited to Chester County residents who have had shutoff notices or whose service has been terminated. Grants, which are limited to $500, must zero out the account, or the customer must enter into a payment

agreement with regard to any remaining deficit.

In 1985, through the date of reporting, this project had served 56 customers. The average grant was $118.

(5) Customer Assistance Program (CAP). This is a PECo project which can aid customers through limiting their electric bills to amounts judged by the company to be within their ability to pay. The exact amount is determined by the company after examination and verification of the customer's income and expenses. The company also requires the customer to engage in certain conservation activities, and may recommend discontinuance of certain appliances judged to be too high in electricity consumption.

This program is presently in a pilot stage and reaches only about 500 customers.

(6) Tighten up - Low Cost Conservation Program (TLC). This conservation project provides low-income customers with an optimal audit to RCS which offers information on expected quick pay-back measures only. (These measures are defined by the company as including such

items as a water heater wrap and thermostat setback, reusable plastic storm windows, weatherstripping and caulking, door sweeps, and "other miscellaneous cost-effective measures".) This assistance, including audit, materials and installation, is currently provided free to eligible low-income customers (mainly LIHEAP recipients). However, a charge for materials used is apparently under consideration.

About 2,100 customers had been served through this program in a period of slightly less than one year ending August 31, 1985. The average cost of a TLC audit and treatment is $165, according to information provided by the company.

Q. HOW MANY CUSTOMERS ARE CURRENTLY SERVED ANNUALLY UNDER THESE PROGRAMS?

A. I could not calculate an exact annual figure because the time intervals for which data are available vary somewhat. However, in total the six programs served approximately 15,000 PECo customers in the latest year or major part of a year for which figures are available. Of this total, however, more than two-thirds is accounted for by LIHEAP, and more than 80 percent by the LIHEAP and UESF programs combined. PECo's own efforts, either

alone or in collaboration with other organizations, have served only a minor fraction of the total number.

Q. AND THIS 15,000 ANNUAL TOTAL OF CUSTOMERS SERVED, OF WHICH MORE THAN TWO-THIRDS ARE ACCOUNTED FOR BY LIHEAP, IS WHAT PERCENTAGE OF ALL LOW-INCOME ELECTRIC RATEPAYERS IN PECO'S PENNSYLVANIA SERVICE TERRITORY?

A. 15,000 customers served out of 226,000 low-income ratepayers is somewhat under seven percent. The number served by PECo's own programs is around one percent of the total number of low-income ratepayers.

Q. IF MORE IS NOT DONE TO ASSIST LOW-INCOME CUSTOMERS IN MEETING INCREASING ELECTRIC BILLS, WHAT WILL BE THE PROBABLE RESULT?

A. There are only two possibilities. Either they will default on their bills in still larger numbers, or they will be unable to pay for essentials of other kinds--including food and shelter.

Q. ARE TERMINATIONS OF SERVICE LIKELY TO INCREASE?

A. That result seems probable, although the amount of the increase is impossible to estimate since I cannot be sure how many low-income customers will elect to do without electric service or without other essentials. They will clearly have to do without something. I would note that residential terminations have been increasing. According to

information furnished by the company under discovery, in response to IR-OCA-11-7, the increase was from 22,855 terminations for the full year 1980 to 31,758 for 1984, the last full year for which data were made available by PECo. For 1985 through September, the total number of terminations was 29,093--already approaching the number for 1984, even though data for the last three months of the year were missing.

Q. HOW WOULD YOU RECOMMEND THAT THE COMMISSION DEAL WITH THE SITUATION OF LOW-INCOME CONSUMERS, IF IT SHOULD GRANT PHILADELPHIA ELECTRIC ITS REQUESTED INCREASE IN WHOLE OR IN PART?

A. The Commission must recognize that low-income customers are particularly vulnerable to further increases in energy costs, which already consume substantial percentages of their budgets. Electricity costs alone are already a burden for many. The Commission should therefore look favorably upon rate design proposals that protect the interests of this category of consumers. Most low-income ratepayers use substantially less electricity than the 500 kwh per month that is the approximate average for all customers. Hence, one way to help protect low-income citizens would be to distribute any downward adjustment in PECo's revenue requirement allocated to the residential class predominantly in the lowest KWH rate block.

This block, if set in the range of 350 to 500 KWH, will encompass most or all electricity use by the majority of low-income ratepayers.

Q. WHAT SHOULD BE DONE TO HELP LOW-INCOME CUSTOMERS WHO USE MORE THAN THE AVERAGE?

A. These customers can best be protected both through low-income energy assistance programs and through stepped-up conservation measures. In many instances, their excessive consumption is due largely to energy-inefficient homes and appliances, and conservation programs can help reduce reduce this consumption.

Q. BUT WOULDN'T THIS BENEFIT SOME HIGH-INCOME LOW-USE CUSTOMERS AS WELL?

A. Yes, no policy instrument is ever perfect. However, this approach would benefit most low-income people, plus many more whose incomes are not much over the 150-percent-of-poverty line. If the Commission should be concerned about a policy that might benefit some who are rich while protecting most of the poor, then one possibility would be to limit the rate to those under 150 percent of poverty. I would point out, however, that this approach would leave out many people whose incomes are just high enough to take them out of the low-income category, but whose budgets are nonetheless under severe strain. In many cases, their effective purchasing power for essentials other than electricity may

well be cut by PECo's increase to less than that of some who are already below the 150 percent limit. In my view, this would be a more serious fault than benefiting some customers who are better off--especially since these customers are conserving more electricity than most, and thus helping to limit the need for additional expensive generating capacity.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

Exhibit GG-1

GEORGE GRIER
Principal
The Grier Partnership

Qualifications

Mr. Grier has specialized in statistical analysis of demographic, economic, and housing data and design of data systems, with particular concentration on policy applications. He has been responsible for direction of a number of major studies; has written, published and spoken extensively; and has testified before Congressional committees, courts, and public regulatory commissions.

Principal Staff Experience

1976 to Present—Principal, The Grier Partnership, Bethesda, Maryland

As a partner in this research and consulting organization, Mr. Grier has had responsible roles in the design and direction of several dozen projects for clients in the public, private non-profit, and profit-making sectors. In the energy field, these projects have included:

- Statistical analyses to determine the characteristics and energy expenditures of low-income and elderly households and to assess the budgetary impact of rising energy prices on these households, drawing upon data from the computer tapes of Census Bureau, DOE, and other survey data bases:

  —for the nation as a whole; and

  —in various regions, states and local areas, including New England, Illinois, New Jersey, Pennsylvania, Milwaukee County, and the District of Columbia.

- Assessment of energy burdens for low-income households in all states of the continental U.S. under alternative scenarios as to energy prices, weather, and conservation practices, using specially-designed computer simulation models.

- Analyses of the relationship of energy burdens to benefits provided under LIHEAP and other federal programs at the level of all individual states of the continental U.S. and the District of Columbia.

- Analysis of the amount of subsidy required in each state to keep the energy expenditures of elderly and low-income citizens within specified percentages of their incomes.

- Coordination and analysis of several national surveys of energy prices and utility rates, collecting data from energy suppliers in all parts of the nation for all commonly used fuels.

- Evaluations of several alternative strategies for alleviating energy burdens on low-income households, including:
  - "Lifeline" utility rate proposals in Illinois, New Jersey, and Pennsylvania;
  - The Illinois SACCC 12-Percent-of-Income Plan;
  - The Wisconsin Gas Company's Guaranteed Service Plan;
  - The Potomac Electric Power Company's "Residential Aid Rider"
- Analysis of demographic and developmental constraints on efforts to meet energy conservation goals through urban planning and design.
- Preparation and presentation of expert testimony in utility rate cases in several states, including Illinois, New Jersey and Pennsylvania as well as the District of Columbia. Mr. Grier has personally presented the testimony in some of these cases.

In the area of demographic and economic analysis, Mr. Grier has had responsible roles in a number of projects, including:

- Studies of demographic and housing patterns, utilizing data from Census Bureau computer tapes and other sources:
  - for the U.S. as a whole and for all major U.S. metropolitan areas, plus special in-depth studies
  - for the Baltimore, MD metropolitan area;
  - for the Chicago, IL metropolitan area;
  - for the Houston, TX metropolitan area;
  - for the Philadelphia, PA metropolitan area;
  - for the Washington, DC metropolitan area.
- Preparation of a widely-used handbook for local policy makers and planners interested in obtaining up-to-date demographic, economic and housing data on their local areas.
- Specification of data requirements for a major national survey by a federal agency.
- Two national studies of the problem of human displacement resulting from urban revitalization.
- An evaluation of several widely-marketed commercial demographic data systems.

- A number of proprietary market analyses for private clients, including housing and shopping center developers and health care providers.

1967 to 1976--Vice President and Senior Associate, The Washington Center for Metropolitan Studies, Washington, DC

For this non-profit urban studies center, Mr. Grier was responsible for design and direction of several major projects. These projects involved not only written products but also the calling of conferences of various sizes to communicate the results to policy-makers. Mr. Grier often convened and chaired these conferences.

- An area-wide census updating survey for metropolitan Washington, DC. Taken midway between the 1970 and 1980 censuses, this survey brought all major census items, including demographic, economic and housing data, up to date for the metropolitan area, its central city, and its major suburban jurisdictions.

- Studies of the implications of demographic changes for public policy and the planning of housing, public facilities and services in the District of Columbia, the Nation's Capital.

- Design of a prototype manpower information system for the District of Columbia government, and direction of a project to develop manpower information for affirmative action programs in the District.

- Design of improved techniques for estimating population and housing markets.

- A study of the implications of the decline in the birthrate for educational facilities planning at all levels, including public schools in newly-developed areas and institutions of higher education.

- Several studies of emergent population and housing trends in the nation and metropolitan Washington and their policy and program impacts.

1964 to 1967--Director of Social Program Coordination, District of Columbia Government, Washington, DC

In this position, Mr. Grier served as deputy to the District's Director of General Administration. One of his chief duties was to plan new and expanded human resources programs through assembly and analysis of demographic and economic data.

1962 to 1964--Staff Associate, Washington Center for Metropolitan Studies, Washington, DC

Responsible for several policy-focused analyses. On loan for part of this period to design a research program for the United Planning Organization, Washington's federally-funded anti-poverty agency.

1960 to 1962--Senior Staff Member, The Brookings Institution, Washington, DC

One of Mr. Grier's chief responsibilities in this position was to help local public officials in a number of metropolitan areas to achieve an improved understanding of the application of social science techniques to local needs and problems. He convened and chaired two series of community conferences in Cincinnati, Ohio and Lansing, Michigan.

Selected Memberships and Professional Honors

Member, Board of Directors, Lambda Alpha, the international land economics honor society.
Founding Member, Board of Directors, DC Municipal Research Bureau
Member, Economic and Financial Management Advisory Group, U.S. Conference of Mayors
Founding Member, Executive Committee and Board of Directors, Housing Opportunities Council of Metropolitan Washington
Chairman, Committee on Poverty, Society for the Psychological Study of Social Issues
Recipient of two Ford Foundation personal study grants
Received Melvin C. Hazen Award as outstanding young man in District of Columbia Government
Phi Beta Kappa

Education

B.A. with Honors in Psychology, University of Pennsylvania, 1950. Elected to Phi Beta Kappa.
M.A. with Honors in Social Psychology, specialization in survey design and statistics, University of Pennsylvania, 1952.

EXHIBIT GG-2

AVERAGE INCOMES OF LOW-INCOME ELECTRIC RATEPAYERS
COMPARED TO FEDERAL POVERTY LIMITS
PENNSYLVANIA PORTION OF PHILADEPHIA METROPOLITAN AREA

(In November 1985 Dollars)

Persons	150% of Federal Poverty Income Limit	Average Income	Percent Averag Income of Limi
1	$ 7,875	$ 4,641	59%
2	$10,575	$ 7,497	71%
3	$13,275	$ 8,216	62%
4	$15,975	$10,556	66%
5	$18,675	$12,047	65%
6	$21,375	$14,154	66%
7	$24,075	$15,061	63%
8	$26,775	$18,602	69%

Source: Average Incomes - 1980 U.S. Census Public Use Microdata Sample File, updated by Consumer Price Index.
Federal poverty limits - U.S. Department of Health and Human Services

Exhibit GG-3

AVERAGE INCOMES OF ELECTRIC RATEPAYERS
BELOW AND ABOVE 150% OF POVERTY,
AND OF ALL ELECTRIC RATEPAYERS,
BY HOUSEHOLD SIZE
PENNSYLVANIA PORTION OF PHILADELPHIA METROPOLITAN AREA

(In November 1985 Dollars)

Persons	Below 150% of Poverty	At or above 150% of Poverty	All Ratepayer Households
1	$ 4,641	$22,011	$15,901
2	$ 7,497	$34,886	$30,932
3	$ 8,216	$40,396	$35,984
4	$10,556	$44,322	$39,766
5	$12,047	$47,470	$41,477
6	$14,154	$49,881	$42,595
7	$15,061	$52,808	$42,075
8 or more	$18,602	$55,516	$42,423
Average - All Sizes	$ 7,826	$37,524	$31,767

Source: 1980 Census Public Use Microdata Sample File, updated by Consumer Price Index.

Exhibit GG-4

AVERAGE INCOMES OF LOW-INCOME ELECTRIC RATEPAYERS
IN THE CITY OF PHILADELPHIA
COMPARED TO ENTIRE PENNSYLVANIA PORTION
OF PHILADELPHIA METROPOLITAN AREA

(In November 1985 Dollars)

	Average Income - Under 150% of Poverty	
Persons	Philadelphia	Pennsylvania Portion of Phila. Metro Area
1	$ 4,546	$ 4,641
2	$ 7,455	$ 7,497
3	$ 8,019	$ 8,216
4	$10,262	$10,556
5	$11,603	$12,047
6	$14,172	$14,154
7	$14,370	$15,061
8 or more	$17,559	$18,602
Average - All Sizes	$ 7,662	$ 7,826
Total No. of Ratepayers	155,140	226,080

Source: 1980 U.S. Census Public Use Microdata Sample File, updated by Consumer Price Index

Exhibit GG-5

SIZE DISTRIBUTION OF LOW-INCOME
ELECTRIC RATEPAYER HOUSEHOLDS
PENNSYLVANIA PORTION OF PHILADELPHIA METROPOLITAN AREA
1980

Persons	Number of Households	Percent of Total
1	86,140	38%
2	50,120	22%
3	28,880	13%
4	24,860	11%
5	17,420	8%
6	9,340	4%
7	6,000	3%
8 or more	3,320	1%
Total	226,080	100%

Source: 1980 U.S. Census Public Use Microdata Sample File.

Exhibit GG-6

AID TO FAMILIES WITH DEPENDENT CHILDREN (AFDC)
BENEFIT LEVELS - 1980 AND 1986
PENNSYLVANIA PORTION OF PHILADELPHIA METROPOLITAN AREA

Philadelphia and Delaware Counties

Family Size	Monthly Benefit Levels Jan. 1, 1980	Jan. 1, 1986	Pct. Change 1980-86
1	$172	$186	8.1%
2	$262	$287	9.5%
3	$318	$365	14.8%
4	$381	$451	18.4
5	$438	$535	22.1%
6	$478	$608	27.2%
Add'l persons	$ 58 each	$ 75 each	29.3%

Bucks, Chester, and Montgomery Counties

Family Size	Monthly Benefit Levels Jan. 1, 1980	Jan. 1, 1986	Pct. Change 1980-86
1	$181	$195	7.7%
2	$273	$299	9.5%
3	$332	$382	15.1%
4	$395	$466	18.0%
5	$451	$551	22.2%
6	$490	$623	27.1%
Add'l persons	$ 58	$ 75	29.3%

Source: Leon Cerullo, Supervisor of Research and Statistics, Pennsylvania Department of Public Welfare (by telephone)

Exhibit GG-7

MONTHLY HOUSEHOLD INCOMES AND OWNER COSTS
FOR LOW-INCOME ELECTRIC RATEPAYER-OWNERS
PENNSYLVANIA PORTION OF THE PHILADELPHIA METROPOLITAN AREA

(In November 1985 Dollars)

Persons	Monthly Household Income	Monthly Owner Costs*	Remainder
1	$ 400	$286	$114
2	$ 614	$329	$285
3	$ 690	$451	$239
4	$ 924	$490	$434
5	$1065	$523	$542
6	$1236	$479	$757
7	$1354	$436	$918
8 or more	$1588	$495	$1093
Average - All Sizes	$ 673	$370	$303

*The sum of payments for real estate taxes, fire and hazard insurance, electricity, gas and other fuels, water, and mortgage. Owner costs as shown here do not include payments for maintenance and repairs.

Source: 1980 Census Public Use Microdata Sample File, updated by Consumer Price Index.

Exhibit GG-8

MONTHLY HOUSEHOLD INCOMES AND GROSS RENTS
FOR LOW-INCOME ELECTRIC RATEPAYER-RENTERS
PENNSYLVANIA PORTION OF THE PHILADELPHIA METROPOLITAN AREA

(In November 1985 Dollars)

Persons	Monthly Household Income	Monthly Gross Rents*	Remainder
1	$ 369	$297	$ 72
2	$ 641	$348	$293
3	$ 681	$374	$307
4	$ 817	$398	$419
5	$ 925	$405	$520
6	$1110	$444	$666
7	$1075	$417	$658
8 or more	$1382	$465	$917
Average - All Sizes	$ 625	$350	$275

*Contract rent plus the estimated average monthly cost of electricity, gas and other fuels, and water, to the extent that these are paid by or on behalf of the renter, in addition to the rent.

Source: 1980 Census Public Use Microdata Sample File, updated by the Consumer Price Index.

Exhibit GG-9

MONTHLY AVERAGE AMOUNT REMAINING
AFTER BOTH SHELTER AND FOOD COSTS FOR
LOW-INCOME ELECTRIC RATEPAYERS
PENNSYLVANIA PORTION OF PHILADELPHIA METROPOLITAN AREA

(In November 1985 Dollars)

	Remainder After Shelter Costs	Food Costs	Remainder After Food and Shelter
All Low-Income Homeowner Ratepayers	$303	$251	$ 52
Single-Person Low-Income Homeowner Ratepayers	$114	$112	$ 2
All Low-Income Renter Ratepayers	$275	$159	$116
Single-Person Low-Income Renter Ratepayers	$ 72	$ 98	- $ 26

Source: Remainder After Shelter Costs - see Exhibits GG-7 and GG-8.
Food Costs - 1981 Consumer Expenditure Survey, U.S. Bureau of Labor Statistics, updated by Consumer Price Index.

Exhibit GG-10

POSSESSION OF AIR CONDITIONING
AMONG ELECTRIC RATEPAYERS ABOVE AND BELOW 150% OF POVERTY
PENNSYLVANIA PORTION OF PHILADELPHIA METROPOLITAN AREA
1980

	Number	Percent
Below 150% of Poverty		
No air conditioning	121,760	53.9%
Central air conditioning	19,280	8.5%
One room unit	55,120	24.4%
Two or more room units	29,920	13.2%
Total Households	226,080	100.0%
150% of Poverty and Above		
No air conditioning	279,360	29.7%
Central air conditioning	193,160	20.5%
One room unit	224,140	23.8%
Two or more room units	243,400	25.9%
Total Households	940,060	100.0%

Source: 1980 U.S. Census Public Use Microdata Sample File.

Average Electricity Consumption and Expenditures

Table 5. (Continued) Census Division: Middle Atlantic

HOUSEHOLD CHARACTERISTICS	ANY ELECTRICITY USED					ELECTRICITY USED AS MAIN HEATING FUEL			
	NUMBER OF HOUSE-HOLDS (MILLIONS)	AVG. AMOUNT CONSUMED PER HOUSEHOLD (THOUSAND KWH)	AVG. AMOUNT CONSUMED PER HOUSEHOLD (MILLION BTU)	AVG. EXPEND-ITURES PER HOUSEHOLD (DOLLARS)	AVG. PRICE (DOLLARS PER MILLION BTU)	NUMBER OF HOUSE-HOLDS (MILLIONS)	AVG. AMOUNT CONSUMED PER HOUSEHOLD (THOUSAND KWH)	AVG. AMOUNT CONSUMED PER HOUSEHOLD (MILLION BTU)	AVG. EXPEND-ITURES PER HOUSEHOLD (DOLLARS)
TOTAL HOUSEHOLDS	13.7	6.1	21	588	28.28	1.0	14.3	49	1109
AREA TYPE									
METROPOLITAN	12.2	5.9	20	596	29.55	.9	14.8	51	1163
CENTRAL CITY	5.1	4.2	14	523	36.42	Q	Q	Q	Q
OUTSIDE CENTRAL CITY	7.1	7.2	24	650	26.63	.8	15.1	51	1222
NON-METROPOLITAN	1.5	7.6	26	526	20.30	Q	Q	Q	Q
ELECTRICITY PAID BY HOUSEHOLD									
YES	12.0	6.3	22	597	27.61	.9	14.9	51	1153
NO	1.8	4.4	15	525	34.71	Q	Q	Q	Q
TYPE OF HOUSING STRUCTURE									
MOBILE HOME	.3	6.4	22	428	19.50	Q	Q	Q	Q
SINGLE FAMILY	8.3	7.5	25	666	26.12	.7	16.9	58	1301
2 OR MORE UNITS	5.2	3.9	13	473	35.54	.3	9.4	32	741
NUMBER OF ROOMS									
1 TO 3	2.3	3.5	12	396	33.01	.3	10.6	36	738
4 TO 5	4.6	5.3	18	523	29.06	.4	12.8	44	1065
6 OR MORE	6.8	7.5	26	697	27.15	.3	19.4	66	1479
MEASURED HEATED SPACE OF RESI-DENCE (IN SQUARE FEET)									
LESS THAN 999	4.8	3.9	13	423	31.73	.4	10.5	36	832
1,000 TO 1,999	5.2	6.6	23	618	27.36	.4	15.7	54	1214
2,000 OR MORE	3.7	8.2	28	759	27.17	.2	18.9	64	1418
YEAR HOUSE BUILT									
BEFORE 1950	7.0	4.9	17	499	29.55	Q	Q	Q	Q
1950 TO 1974	5.6	6.8	23	660	28.40	.5	14.7	50	1197
AFTER 1974	1.2	9.5	32	773	23.93	.4	15.0	51	1064
OWN/RENT									
OWN	8.5	7.2	24	670	27.39	0.5	17.8	61	1412
RENT	5.2	4.3	15	454	30.67	.6	11.6	39	865
1981 FAMILY INCOME									
LESS THAN $10,000	4.4	4.5	16	440	28.34	.4	12.2	42	912
$10,000 TO $19,999	4.2	5.7	20	540	27.67	.3	14.9	51	1155
$20,000 TO $34,999	2.0	6.2	21	612	28.77	Q	Q	Q	Q
$35,000 OR MORE	3.2	8.6	29	837	28.53	.3	17.4	59	1373
TOTAL BELOW 100 PERCENT OF POVERTY LINE	2.0	4.6	16	464	29.57	Q	Q	Q	Q
TOTAL BELOW 125 PERCENT OF POVERTY LINE	3.0	4.4	15	449	29.64	.2	12.4	42	921
AGE OF HOUSEHOLD HEAD									
UNDER 35 YEARS	3.5	6.4	22	601	27.53	.5	13.7	47	1082
35 TO 59 YEARS	5.8	6.9	24	678	28.63	.2	17.5	60	1386
60 YEARS AND OVER	4.4	4.7	16	458	28.41	.3	12.9	44	942
HOUSEHOLD MEMBERS									
ONE PERSON	3.6	3.8	13	362	28.07	.4	10.4	36	739
2 TO 4 PEOPLE	8.3	6.5	22	630	28.21	.6	16.7	57	1362
5 OR MORE PEOPLE	1.8	8.7	30	851	28.70	Q	Q	Q	Q

See footnotes at end of table.

RECS: Consumption and Expenditures, April 1982 Through March 1983: Regional Data
Energy Information Administration

STATEMENT NO. 2

CEPA et al

R-850152

2/20/86

Phila PA

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PENNSYLVANIA PUBLIC UTILITY COMMISSION V. PHILADELPHIA ELECTRIC COMPANY

DOCKET NO. R-850152

Direct Testimony of

GEORGE J. STERZINGER

on behalf of

Consumers Education and Protective Association,
Action Alliance of Senior Citizens
Association of Community Organizations for Reform Now,
Philadelphia Citizens in Action, and
Mr. Bradshaw

January 21, 1986

I. QUALIFICATIONS AND PUBLICATIONS

Q. WOULD YOU PLEASE STATE YOUR NAME AND BUSINESS ADDRESS?

A. My name is George J. Sterzinger. My business address is the National Consumer Law Center, 11 Beacon Street, Boston, Massachusetts 02108.

Q. WILL YOU OUTLINE YOUR QUALIFICATIONS AND EXPERIENCE RELEVANT TO THE FIELD OF PUBLIC UTILITIES?

A. I received a B.A. in Economics with Honors from St. Joseph's College in Rennselaer, Indiana, in 1964. By 1968 I completed all the requirements at Purdue University for a doctorate in Economics with the exception of my dissertation. My major field of study was quantitative methods as applied to economic theory. At Purdue University, St. Joseph's College and Dean Junior College in Franklin, Massachusetts, I taught courses in economics ranging from principles, through basic theory, to honors seminars in mathematical economics.

I began work at the National Consumer Law Center in September of 1981.

From 1976 to 1980 I worked with the New England Regional Energy Project. In both places, I have worked on electric and gas rate design, cost allocation, and other regulatory issues. I have testified on electric and gas rate design issues before the regulatory commissions of 21 states: Colorado, Connecticut, Georgia, Illinois, Maine, Maryland, Massachusetts, Michigan, Nevada, New Hampshire, New Jersey, New Mexico, Oklahoma, Pennsylvania, Rhode Island, Texas, Utah, Vermont, Virginia, Washington, and West Virginia. In addition I have served as a consultant on PURPA investigations for the Tennessee Valley Authority.

My article entitled "A Critique of the Peaker Methodology for

Calculating Marginal Costs of Electric Service" appeared in the Sept. 29, 1983 issue of Public Utilities Fortnightly. The July 2, 1981 issue of the same publication carried my article entitled "The Customer Charge and Some Problems of Double Allocation of Distribution System Costs." My paper entitled "Conservation Program Financing: Some Analytic Concerns" was presented at the NARUC Biennial Regulatory Information Conference, and published as part of the Proceedings of the Third Annual Conference. Another paper entitled "Ratemaking, Financing Arrangements, and Diversification: Utility Proposals and Regulatory Responses" was presented at the 1982 Eastern Economic Association Annual Meeting. I have also had published "An Introduction to Statistical and Rate Making Issues Underlying Load Data and Costing Requirements of Sec. 133 of PURPA," "Oil Shale Development and Electric Generation Requirements: Regulatory Policy Reforms," and many other analyses of economic issues that arise in regulating utilities.

II. INTRODUCTION AND SUMMARY OF TESTIMONY

Q. WOULD YOU PLEASE STATE THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to review the cost allocation practices utilized by the Company in this proceeding, to identify incorrect or questionable practices, and where appropriate to suggest remedies to these practices. In addition, my testimony will include a review of some of the information available to the Commission concerning the income and the relationship between income and usage for residential customers on the Philadelphia Electric Company (PECO) system. This review is included in order that the recommended reallocation or reforms to the cost allocation procedures of the Company can be done in such a way as to both reflect policies which are consistent with sound economics and consideration of the effect of the changes on residential consumers', and especially low-income consumers', real income. In addition, to the extent possible, the recommended changes in the allocation of costs will be followed through to suggest reforms or redesign of the residential tariffs.

Q. WOULD YOU BRIEFLY SUMMARIZE YOUR RECOMMENDATIONS?

A. The cost allocation procedures adopted by the Company should be reformed in the following areas:

- Production plant allocation should be changed so that both peak demand and overall energy usage are assigned responsibility for production plant investment in the allocation of these costs;
- The distribution plant classification scheme utilized by the Company should be abandoned, and in its place, the distribution plant from Accounts 360 through 368 should be classified and allocated on a consistent demand basis;

- Income from rental of utility property should be allocated to classes reflecting the nature of the property rented.

The cost allocation policies referred to above have the effect of overcharging residential customers in the residential cost allocation scheme. The approximate overcharging per residential customer is $197 per year. For customers of Philadelphia Electric with incomes at or below 150% of poverty, the overcharge alone represents 2.5% of their real income. In other words, the effect of allowing the highly questionable allocation practices of the Company to continue will be to overcharge residential customers at or below 150% of poverty, an amount equal to 2.5% of their total real income.

With respect to the implication for these changes on rate design, my recommendation is that the customer charge be lowered to approximately $4.00 per month, and that the remaining revenue be collected on a per KWH basis but that the per KWH collection be delayed, depending upon a reassessment of the cost of providing service to the RH class.

III. REVIEW OF COST ALLOCATION AND RATE DESIGN

Q. TURNING TO THE AREA OF COST ALLOCATION AND RATE DESIGN, WOULD YOU BRIEFLY SUMMARIZE THE AREAS OF YOUR CONCERN?

A. There are three areas of concern having to do with the Company-proposed cost of service study. At the present time, the Company uses a coincident peak allocation factor to allocate the total cost of production plant. This method looks at only one of the dimensions that must be considered in order to properly determine the economic level of investment in production plant, and as a result misallocates these costs.

In classifying distribution plant, the Company relies upon a "predominant method" to choose the type of equipment considered to be customer-related. Although no good definition of precisely what is meant by the predominant piece of equipment has been given by the Company, it is obvious that the method as developed charges all customers on a per customer basis for equipment well above the minimum sized employed by the Company. This results directly in a double charging of low-use residential consumers for distribution equipment. Finally, the Company allocates the revenue received from the rental of Company equipment on a production-based allocation factor. Although the precise determination of the equipment rented remains to be supplied by the Company, it is highly likely that the Company's present treatment does not take adequate consideration of the amount of distribution equipment rented and therefore misallocates these revenues.

Q. TURNING FIRST TO THE ALLOCATION OF PRODUCTION PLANT, WOULD YOU BRIEFLY DESCRIBE HOW THE COMPANY AT PRESENT ALLOCATES THAT PLANT, AND OUTLINE

YOUR CONCERN WITH IT?

A. As stated earlier, at the present time the Company allocates all of its investment in production plant on the basis of a coincident peak factor, in this case the average of four summer-month coincident peaks. This factor is applied to the production plant in service, and is subsequently used throughout the Company study in the allocation both of directly related O and M expenses and in a host of other indirectly allocated costs.

Since the level of investment in production facilities depends critically upon both the level of coincident peak and the overall energy use experienced by the Company, the present allocation of costs is inadequate. The overall allocation of production plant in the cost of service study should be altered so that the dual use of both coincident peak and overall energy is reflected in the cost allocation. Moreover, at this time, when the Company is bringing on line and into the rate base a large investment in a nuclear generating facility, the problems raised by the use of the coincident peak allocation factor are greatly aggravated.

Q. WHY DOES THE LEVEL OF INVESTMENT IN PRODUCTION PLANT DEPEND UPON BOTH THE COINCIDENT PEAK AND THE OVERALL ENERGY USE?

A. In order to provide generation to meet the overall load duration curve experienced by the Company, the Company can choose from among a number of investment options. At the two ends of the spectrum of choices available to the Company are peak plants and base plants. A peaking plant is widely recognized as one with the lowest reasonable fixed or capital investment costs but with correspondingly higher energy costs. On the other hand, base plants have relatively large fixed or capital costs, but have lower

operating costs. If the only consideration of the Company was to meet its coincident peak, the economic choice would be to install only peaking plants. Investment in generation facilities above the cost of purchasing or installing a peaking plant is economical only if that investment is undertaken to oobtain lower overall operating or fuel costs. As such, the only economically sound way to treat investment costs undertaken by the Company over and above the cost of peaking units is to treat them on an energy-related basis.

Q. HOW HAS THE COMPANY TREATED THE INVESTMENT IN THE LIMERICK FACILITY IN THIS COST OF SERVICE STUDY?

A. The Company treats the investment in Limerick as it treats all investment in production plant; that is, it allocates it on the basis of four coincident peak hours of use.

Q. DO YOU BELIEVE THIS TREATMENT IS REASONABLE?

A. No I do not. The investment undertaken by the Company in Limerick is first of all substantially above the investment that would have to be undertaken in order simply to provide a KW of capacity. According to figures developed in an earlier part of this proceeding, a reasonable estimate of the cost of bringing a peaking unit on line in 1985 was approximately $267 per KW (Office of Consumer Advocate, testimony of witness Komanoff, page 43). Assuming for purposes of calculation that that investment could be carried with a fixed charge recovery factor of 20%, that would produce yearly costs of a peaking unit of approximately $53 per KW per year. According to figures supplied by the Company in their prefiled statement of reasons, PECO Exhibit No. 3, the yearly cost associated with the Limerick plant is $872 per KW per year. If each KW

of capacity associated with Limerick were to generate electricity for only four hours per year, the cost per KW would be approximately $218 per KWH. (That cost would recover only the fixed costs associated with generation--the fuel and operation and maintenance costs would still have to be added.) It is highly unlikely that any customer would purchase electricity at $218 per KWH. Moreover, it is obvious that the Company has a number of options to produce KWHs much more cheaply if the purpose of the investment is only to provide electricity at the peak hours. The investment in the Limerick unit, to the extent that it is economic, is undertaken in order to provide lowered cost of generation throughout the year. The cost per KW from Limerick, less a credit of $53 for peaking capacity, can produce a KWH at roughly 9.35¢ per KWH if the generation is used year-round.

Q. WHAT CONCLUSIONS FOR COST ALLOCATION DO YOU DRAW FROM THE ABOVE ANALYSIS?

A. Again, to the extent the Limerick investment was economic, it will provide service and benefits to users throughout the year. Since the benefits will be delivered across the year, the only reasonable way to allocate the costs of the plant is to allocate them on an energy basis. It should be noted that in PECO EXHIBIT 3, the Company estimates $207.5 million in energy cost savings anticipated to result from the operation of Limerick I. These savings, which are a direct result of the capital investment undertaken to bring Limerick on line, are flowed through the fuel adjustment clause on a per KWH basis. This simply reinforces the notion that the bulk of the investment in the Limerick nuclear generation station was undertaken to provide year-round service, and should be allocated on that basis.

Q. HAVE YOU CALCULATED THE EFFECT THAT CHANGING THE ALLOCATION SOLELY OF THE LIMERICK PLANT WOULD HAVE ON THE COMPANY CLASSES AND IN PARTICULAR THE RESIDENTIAL R CLASS?

A. That recalculation is shown in Exhibit 1. This exhibit shows how the roughly $920 million associated with bringing Limerick on line would be reallocated if the allocation factor were changed from the present coincident peak to an overall energy basis. The allocation factors were taken from the Company cost of service study. The results show that the greatest differential swing would occur for the residential R tariff where a change in the allocation of Limerick would reduce cost responsibility by roughly $39 million. Compared to the revenue change shown on page 6A of PECO Exhibit WFS-1, making this change would produce roughly a 14.5% reduction in the overall residential rate R revenue responsibility. Additionally, the $38 million reduction would mean a per customer savings of approximately $35 per year.

Thus, at the present time, the misallocation of the investment undertaken in Limerick I results in an overcharging of the average residential customer by approximately $35 per year. As was pointed out in an earlier section of the testimony, this overallocation of costs has to be looked at not only in terms of its effect on the proper assignment of cost responsibility, but also in terms of its effect on people of varying levels of income.

Q. HAVE YOU RECALCULATED AN ALLOCATION FACTOR FOR PRODUCTION FACILITIES WHICH REPRESENTS THE DIMENSIONS OF BOTH PEAK AND ENERGY USAGE IN ALLOCATING THESE COSTS?

A. That calculation is shown also in Exhibit 1 on the line labeled Average and Excess. This factor is developed by allocating production

costs on each class' average demand responsibility and each class' share of the portion of the peak demand minus the average demand where the class share is based upon the class' coincident peak demand. As such, it considers both the overall energy use of the class and the coincident peak use of the class in determining the total class responsibility. The relevant weights given to the average demand and the coincident peak demand depend in turn upon the difference between the coincident peak of the Company and the average demand of the Company. I should add that this factor is not a perfect allocation factor but represents a definite improvement over the present coincident peak method used by the Company. Data and time limitations prevented the calculation of a more precise allocation factor that could be utilized in the determination of production plant responsibility.

Q. TURNING TO THE TREATMENT OF DISTRIBUTION PLANT, WOULD YOU BRIEFLY RECOUNT THE COMPANY TREATMENT OF THAT PLANT AND STATE YOUR RESERVATIONS FOR THAT TREATMENT?

A. The Company treats distribution plant by first classifying the plant from Account 360 through 369 into a demand and customer component. For each of the accounts, or subaccounts, the Company uses the predominant sized piece of equipment to establish the portion that should be classified and allocated on a customer basis. No precise definition of "predominant" is given. Once the customer portion is established, the costs are allocated to classes on the basis of numbers of customers weighted to reflect some voltage considerations. The demand costs, or the costs in the account or subaccount not already collected through the determination of the dominant equipment cost and all costs below that level, are collected on the basis of customer demands. It is important

to note here that the customer demand factors developed consider the demands of all customers, even those who can be served with equipment at or below the predominantly-sized equipment. This is important to note because from it flows a major consequence of the present Company treatment of distribution plant, namely that the cost of the plant is overcollected from low-use customers.

Q. HAVE YOU REVIEWED THE COMPANY DETERMINATION OF THE PREDOMINANT-SIZED EQUIPMENT?

A. To the extent that that is possible from the information made available by the Company, I have made that review. However, it should be noted that no precise definition of predominant-sized equipment is given. Thus, in the work papers provided by the Company in IR-OCA-7-8, it is possible to follow the arithmetic calculations of the Company. However, the two critical determinations, the size and cost of the predominant equipment and the amount of equipment in the subaccount which is of a size greater than the predominant equipment have to be taken as given. No independent work papers showing the development of those two critical figures have been provided. Thus, from its inception the predominant method is essentially subjective. A different determination of the equipment judged to be predominant would produce radically different results. In Account 365, the subportion of that account having to do with aerial primary lines produces in the Company's analysis a classification of only 18.791% of the costs as demand-related. If another conductor size, one smaller than the 4/0 aluminum conductor used by the Company in the study, were to be substituted as the predominant equipment, two factors in the Company's classification study would change: the amount of conductor at a size greater than the predominat size would

increase the amount presently shown, and the cost per foot of conductor would decrease. Both of these factors would tend to produce a greater classification of the plant as demand-related.

Q. WOULD YOU PLEASE EXPLAIN HOW THE COMPANY USE OF THE PREDOMINANT METHOD RESULTS IN AN OVERALLOCATION OF COSTS TO LOW-USE RESIDENTIAL CUSTOMERS?

A. This overallocation flows from the Company classification of a sizable piece of distribution equipment as being the customer-related equipment. Despite the fact that the Company has provided no precise definition of "predominant," it is obvious from the work papers provided by the Company that the piece of equipment they utilized to make the customer classification was at or above the average cost of equipment in the account and subaccounts. This result can be easily seen from looking at the portion of the investment determined to be demand-related. For the major accounts of Overhead Lines--Primary and Secondary, Underground Lines--Primary and Secondary, and Transformers, the Company classifies considerably more than half of the costs in the account as customer-related. In the case of some of the secondary overhead lines, the classification of customer-related is in excess of 99%. Thus the portion of equipment classified as customer is the installed equipment capable of serving average or below-average loads.

In other words, average or below-average users pay for the equipment necessary to serve them through the customer portion of the costs. In addition, the Company develops demand allocation factors to allocate the cost of equipment above the customer-related portion which include the demands of all customers. Thus, the below-average-use customers not only pay for more than the kind of equipment necessary to serve them through the customer charge, they are also required to pay for a portion of the

equipment above the customer-related through the demand-related charges. A more complete development of this critique of a split classification of distribution plant is developed in an article published by me in Public Utilities Fortnightly and attached as Appendix A to this testimony.

Q. HAVE YOU CALCULATED THE OVERALLOCATION OF COSTS TO THE LOW-USE RESIDENTIAL CUSTOMERS THAT RESULTS FROM THE COMPANY'S CLASSIFICATION SCHEME?

A. That overallocation of costs is shown in Exhibit 2. That exhibit compares the customer cost per residential rate R customer as developed from the Company's cost of service study with a recalculated customer cost performed by me based on information provided by the Company to IR-OCA-7-5. Before explaining the results of that exhibit, I should point out that an alternative way of calculating the overallocation of costs that results from the Company's distribution plant classification would be to reclassify the plant on a consistent demand basis, and rerun the cost of service study using that classification. The consistent demand allocation should apply for accounts from 360 to 368.

In addition, my recommendation would be, lacking a more detailed analysis of the investment and services accounts, that 50% of the accounts should be classified as customer-related and 50% as demand-related. The reason for this split is that in the absence of a more complete analysis of the costs, the 50/50 split acts to minimize the potential harm from making either a more exaggerated demand or customer classification.

Turning to Exhibit 2, that shows that in the Company's cost of service study, the costs per residential rate R customer per year are $207.30. In comparison, I have calculated from the information provided by the

Company that the proper customer charge per month should be approximately $4 per customer, which would produce yearly customer costs of $48. Thus, as a result of the improper classification of distribution plant costs, the average residential customer is overcharged $159 per year. (As I stated earlier, this figure of $159 is most likely a slight overstatement of the cost allocation redistribution that would occur if the distribution plant were reclassified as suggested and the entire cost of service study rerun.) Again, referring to my earlier testimony, it is important that this misallocation of costs be considered not only in terms of its effect on the cost allocation and rate design of the Company, but also in terms of its effect on the real income of the customers of Philadelphia Electric.

Q. TURNING TO THE FINAL AREA OF CONCERN WITH THE COST ALLOCATION STUDY, WOULD YOU PLEASE EXPLAIN THE RESERVATIONS YOU HAVE WITH THE COMPANY-PROPOSED METHOD FOR THE TREATMENT OF ACCOUNT 454--RENT FROM ELECTRIC PROPERTY?

A. The present Company treatment is shown on page 7A of WFS-1. That shows that at present the rent from electric property is allocated or distributed to the customer classes on the basis of A1, the production plant allocation factor. That allocation would be proper only if the equipment being rented were production or high voltage transmission plant. If the equipment being rented is distribution level plant, the allocation of the revenue should be based upon an allocation factor reflecting as accurately as possible the kind of distribution plant being rented. In other words, if the equipment being rented is the Company poles, then the allocation of the revenue from that rental should be based upon the allocation of the cost of the poles to the customer

class. The primary problem with allocating revenues obtained from renting distribution plant on the basis of their production level factor is that it allocates a considerable portion of the revenues to the commercial and industrial high tension customer class which has no cost responsibility for distribution plant. In other words, a class that has none of the cost responsibility for the distribution plant owned by the Company would receive roughly 41.5% of all of the revenue obtained by renting that distribution plant.

Clearly this is an improper assignment of the revenue from the distribution plant rental. At the time of preparing this testimony, discovery made on the Company as to the precise breakdown of the equipment rented had not been obtained. As a result, it is impossible to make a recommendation as to exactly how the allocation of the revenues from equipment rental should be made. Nevertheless, a general recommendation, that the allocation of the revenue be based upon the shared cost responsibility for the equipmemt rented can be made. To the extent that the equipment rented is distribution equipment, the allocation of revenues back to customrer classes should reflect that fact

IV. THE EVALUATION AND CONSIDERATION OF INCOME

Q. HOW DO YOU PROPOSE INTRODUCING THE CONSIDERATION OF INCOME AND THE RELATIONSHIP OF INCOME AND USAGE INTO THE DELIBERATIONS ON COST ALLOCATION AND RATE DESIGN IN THIS PROCEEDING?

A. My proposal is to evaluate the available information having to do with the income of the residential customers of Philadelphia Electric, and the relationship of usage and income among those customers. To the extent that useful information is available on those topics, my testimony is that such information be adopted as an additional evaluation or consideration of policies that are, first of all, based upon sound economic and cost allocation principles.

My testimony should not be taken to preclude specific consideration of the income and relative ability to pay of residential customers over and above cost consideration principles; however, those considerations are not raised at this time. In effect, my testimony is that the available information on the income of residential customers and the information available on the relationship of income to usage should be used in a way which is consistent with economic and costing principles, in order to design rates as sensitive as possible to the needs of low-income customers.

Q. WHAT INFORMATION HAVE YOU REVIEWED CONCERNING THE INCOME OF THE RESIDENTIAL CUSTOMERS AND THE RELATIONSHIP BETWEEN INCOME AND USAGE?

A. I have relied upon the updated census information having to do with the income of customers of Philadelphia Electric developed by George Grier, another witness for CEPA et al in this proceeding. In addition, I have reviewed the studies available to the Company, either developed by

them or at their direction, having to do with the relationship between income and usage. At the time of preparing this testimony, there were outstanding questions having to do with their analysis of income and usage, and as a consequence that information was not available for use in this testimony. However, the information developed from the 1980 census data and subsequently updated having to do with the incomes of residential customers of Philadelphia Electric is useful.

Q. WOULD YOU BRIEFLY DISCUSS THE INFORMATION AND THE TYPE OF RESULTS YOU OBTAINED FROM THIS ANALYSIS?

A. That information is presented in Exhibit 3. That exhibit shows the average income of various household sizes for residential customers below 150% of poverty, and those with incomes at or above 150% of poverty. As expected, the income of those below 150% of poverty is by definition below the income of those above 150% of poverty. The magnitude of the difference, however, is striking. The average income of all households below 150% of poverty is $7,826 per year. By comparison, the average income of households above 150% of poverty is $37,524 per year. Thus, the average income of those above 150% of poverty is nearly five times greater than of all households below 150% of poverty.

Q. WHAT POLICY CONCLUSIONS CAN YOU DRAW FROM THIS TYPE OF DATA?

A. While it is impossible, without more precise information about the relationship that exists between income and usage, to "fine tune" rate design proposals, given the information available from the census data it is possible to conclude that questionable policies which result in the overcharging of residential customers, while they may be acceptable to residential customers on average, have a much more profound effect on

people below poverty status. Specifically, in this case I have identified a number of areas where the residential class is overcharged, and which are discussed in a subsequent part of the testimony. That overcharging costs families above 150% of the poverty level approximately 0.5% of their income on average. For those below 150% of poverty, the effect of the same overcharging is to take 2.5% of their income on average.

The point is not that .5% is affordable or tolerable, but that the 2.5% has a much more serious effect on people's income. My testimony is that this additional consideration, the effect of improper allocation practices on people below 150% of poverty, should be added to the reasons developed in a previous section of the testimony for changing those practices at this time.

	TOTAL COMPANY	COMMERCIAL AND INDUSTRIAL HT	PRIM	RESIDENTIAL SECONDARY	R-H	R
A1	5.391.886	2,235,585 41.462%	500.698 9.286%	764.118 14.172%	211,311 3.919%	1,489,776 27.630%
C1	3.455.651	1,520.630 44.004%	280.706 8.123%	432.405 12.513%	200.234 5.794%	808.715 23.403%
AVERAGE&EXCESS		2.323.432 43.091%	460.507 8.541%	706.801 13.109%	276.116 5.121%	1,343.696 24.921%
DIFFERENTIAL		2.542%	-1.163%	-1.659%	1.875%	-4.227%

		STREET LIGHTING			OTHER		
	OP	SLP	SLS	OTHER	UTILITIES		INTER
A1	140	249	38	9	80.440		11.714
	0.003%	0.005%	0.001%	.000%	1.492%		0.217%
C1	48.395	11.938	7.541	1.965	52.933		7.589
	1.418%	0.345%	0.218%	0.057%	1.523%		0.218%
AVERAGE&EXCESS	49.046	12.027	7.555	1.968	81.719		11.736
	0.910%	0.223%	0.140%	0.037%	1.516%		0.218%
DIFFERENTIAL	1.415%	0.341%	0.218%	0.057%	0.037%		0.001%

		SEPTA	AMTRAK
	A1	41.559	56.249
		0.771%	1.043%
	C1	31.533	50.636
		0.913%	1.465%
AVERAGE&EXCESS		46.457	70.835
		0.862%	1.314%
DIFFERENTIAL		0.142%	0.428%

RESIDENTIAL CUSTOMER CHARGE

RATE BASE

ACCT. 369	$41,022,500.00
ACCT. 370	$51,769,000.00
TOTAL	$92,791,590.00
LEVEL ANNUAL CHARGE(16.7%)	$15,496,180.50

EXPENSES

METER O&M	
ACCT. 586	$2,750,000.00
ACCT. 597	$905,000.00
SUBTOTAL	$3,655,000.00
CUSTOMER ACCT.	
ACCT. 902	$10,205,000.00
ACCT. 903	$24,558,000.00
SUBTOTAL	$34,763,000.00
TOTAL EXPENSES	$38,418,000.00
TOTAL CUSTOMER COSTS	$53,914,180.50
NUMBER OF CUSTOMERS	1120500
COST PER CUSTOMER PER YEAR	$48.12
COST PER WFS-1	$207.30

INCOME LEVEL BY POVERTY GROUP AND HOUSEHOLD SIZE

HOUSEHOLD SIZE	BELOW 150%	ABOVE 150%
1	$4,641	$22,011
2	$7,497	$34,886
3	$8,216	$40,395
4	$10,555	$44,322
5	$12,047	$47,470
6	$14,154	$49,881
7	$15,061	$52,808
8	$18,602	$55,516
TOTAL	$7,925	$37,534

APPENDIX A

The Customer Charge and Problems Of Double Allocation of Costs

By GEORGE J. STERZINGER

AFTER several years of the "great rate debate" attention finally seems to be turning towards a forgotten part of rate design: the customer charge. Utilities, forced by the Public Utility Regulatory Policies Act to justify or do away with declining energy charges, have begun arguing for cost classification and subsequent rate design with increasingly large customer charges. Recently proposed customer charges seem to be consistently in the $6 to $9 range, accompanied by embedded cost-of-service studies supporting even greater charges.

Consumer and environmental groups concerned about rate design reform (rather than using the customer charge as a place to dump costs, as the utilities do) have seen it as a place to shave costs. Concerned primarily with getting a kilowatt-hour or usage charge to reflect incremental or marginal costs more accurately, these groups have attempted to resolve the problem of the resulting excess revenue by proposing that the customer charge be lowered enough to "lose" the surplus. Negative customer charges or lump sum monthly payments from the utility to consumers have been proposed by more imaginative analysts.[1]

Analyses of the proper customer charge have often yielded contradictory results depending upon whether incremental or embedded costs were used. Incremental analyses often, but not always, support low customer charges, while embedded cost analyses often, but not always, support high customer charges.

The importance of incremental price signals and the need to strike a balance between revenue constraints and proper price signals have produced wide agreement that the customer charge is the least "informative" of all parts of a rate design and should be the last place a utility is allowed to collect revenues if incremental costs are found to be useful in designing rates.

Unfortunately, the debate on the proper definition and use of incremental costs remains unresolved, while traditional practices of embedded cost allocation seem to support very high customer charges. Regulators, forced with making a decision, have found some cost basis to be

This article is a critique of the currently most widely used methodology for classifying a portion of electric utility distribution plant as a customer cost. The author argues that this classification, combined with an allocation of the "above minimum" portion on a demand basis, leads to an overallocation of costs to low-use residential customers of the electric system.

George J. Sterzinger is an economist with the New England Regional Energy Project where he specializes in electric utility rate design testimony. In 1979 he became director of the project. The NEREP provides economic, legal, and technical assistance to low-income groups on regulatory utility issues and other energy policy matters. **Mr. Sterzinger** received a BA degree in economics from St. Joseph College, Rensselaer, Indiana, and has completed all requirements but the dissertation for a PhD degree in economics at Purdue University.

[1] "Customer Charges and the Public Utility Regulatory Policies Act," by Edward F. Renshaw and Perry Renshaw, 104 PUBLIC UTILITIES FORTNIGHTLY 17, August 30, 1979, found high customer charges contrary to the intention of PURPA.

customer charge based on embedded cost-of-service studies.

Since incremental analyses cannot by themselves support a low customer charge, the embedded cost analyses which support high customer charges must also be closely investigated to determine if they meet current objectives of rate design. An examination of these methodologies reveals the following characteristics:

— Almost all of them rely for their justification on the determination of the cost of a minimum distribution system, and the classification of this system as a customer cost.

— Once the classification has been made, it is an inescapable conclusion of the allocated cost-of-service study that calculated customer costs will be substantial.

— However, an examination of the rationale for the classification and the implications of that classification lead equally inescapably to the conclusion that minimum use residential customers will be overcharged by such cost allocation practices.

— The only reasonable remedy for the problem of overcharging is to classify the entire distribution system on a consistent basis, which would be a demand basis.

— Once this is done, traditional cost-of-service studies no longer provide support for high customer charges.

A national survey of utility practices in classification of distribution system costs determine that the great majority used some form of minimum system to classify costs in the relevant Federal Energy Regulatory Commission accounts. (The survey was conducted by Carolina Power and Light Company, Raleigh, North Carolina.) The survey summarized the results of company practices to determine how much, on average, each distribution plant account was classified as demand. The results by FERC account were as follows:

— Account 364 — Poles and fixtures were separated into primary and secondary; the primary portion was split 50-50 between customer and demand costs, the secondary portion was classified 56.5 per cent customer and 43.5 per cent demand.

— Account 365 — Conductors and devices were also separated into primary and secondary; the primary portion was classified 44.3 per cent customer and 55.7 per cent demand, and the secondary portion was classified 46.4 per cent customer and 53.6 per cent demand.

— Account 368 — Line transformers were classified 34 per cent customer and 66 per cent demand.

— Account 369 — Services were classified 70.8 per cent customer and 29.2 per cent demand.

The difficulties with these methodologies only begin with the minimum distribution system. The concept is widely varying interpretations. No single method exists for calculating the cost of this system; nevertheless, a fairly standard approach is to reconstruct the existing distribution system using some type of minimum equipment. Minimum equipment could be of the type employed by the company, currently purchased by the company, currently used in the industry, or currently required by safety code. The cost of this equipment can be either booked or in current prices. Obviously, with this large a menu of definitions to choose from, a utility analyst can calculate costs for these systems over a wide range.

It should be mentioned here that one other method sometimes used to calculate the cost of a minimum system is the "zero-intercept" method whereby regression equations relating cost to various sizes of equipment are derived, and then solved for the cost of zero-sized or "zero-intercept" equipment. The strongest objections to this methodology arise from the limitations on data, the unreliability of the derived equations, and some fundamental problems that arise from making the statistical inference about the cost of the zero-sized equipment.

A typical utility in the sample discussed earlier, faced with the problem of classifying costs in Account 365 —overhead lines, for example, would determine the cost of the minimum equipment needed to replace all existing lines, calculate that cost as a fraction of the total costs of equipment in the account, and use that fraction to classify customer costs. Thus, a utility with 1,000 miles of overhead lines and two types of line costing $1 per foot and $2 per foot would calculate a minimum system cost of roughly $5.28 million ($1 × 5,280 feet per mile × 1,000 miles). This $5.28 million can, of course, be varied if different types of minimum lines are used, or if for other reasons the cost of $1 per foot is changed.

Beyond problems arising from the indeterminate nature of the minimum system, the appropriateness of classifying these costs as customer costs has been long debated. Strictly speaking, customer costs should be limited to those costs which can be shown to vary exclusively with number of customers. Distribution system costs, both as built and hypothetical minimum system, obviously depend to a great extent on geographical considerations — type of terrain and customer density. Several analysts have argued that the nature of cost causation — in this case at least in part due to geography — does not allow the costs to be neatly fit into either demand or customer cost categories; that the costs are simply unallocable. Recent statistical analyses support this notion.[2]

An additional and more severe problem with this methodology arises from the consequences of classifying distribution system costs into both customer and demand portions. Simply put, this practice leads

[2] "The Economics of Electric Distribution System Costs and Investments," by David J. Lessels, 106 PUBLIC UTILITIES FORTNIGHTLY 37, December 4, 1980, found no statistical justification for the classification of distribution costs as customer related.

collection of these costs from low-use residential customers and a misallocation of costs among customer classes.

To see why this is so, one need only step back for a moment to consider what it is that a cost allocation study attempts to do, and what happens when distribution system costs are split into customer and demand portions and then allocated to individual classes.

An allocation study assigns costs to customers on the basis of usage characteristics; fairness requires that allocated costs follow, as closely as possible, the actual costs of serving customers. Splitting the distribution system into a minimum usage and an above minimum usage portion, and allocating the minimum portion on a customer basis, and the above minimum on a usage basis results in low-use residential customers paying for more of the system than is required to serve them. By splitting the distribution system into two parts, low-use residential consumers are charged twice: once, on a customer basis, for a portion of the system sized to meet their demands; and again on a demand basis for a portion of the system sized to serve demand beyond what would be needed to serve them. The only practical way satisfactorily to assure that low-use customers are charged only once for distribution equipment is to allocate the distribution system costs on a single consistent basis. Of the two considered, customer and demand, it is obvious that only demand can be used to classify and allocate distribution costs on a satisfactory basis.

In order to explain more fully why this method constitutes double charging of low-use customers, we can look more closely at the handling of FERC Accounts 364 and 365 which represent the cost of overhead lines and poles. To illustrate this, suppose the company had only 1,000 miles of overhead lines and 10,000 poles; and in addition it used two types of line — one costing $1 per foot, for 500 miles of overhead, the other costing $2 per foot, for the remainder; and two sizes of pole — 5,000 costing $30 per pole and 5,000 costing $60 per pole. Total cost of this system would be:

a) Line: 500 miles at $1 per foot	$2,640,000	
b) Line: 500 miles at $2 per foot	5,280,000	
Subtotal		$7,920,000
c) Poles: 5,000 poles at $30 per pole	$ 150,000	
d) Poles: 5,000 poles at $60 per pole	300,000	
Subtotal		$ 450,000
Total		$8,370,000

A minimum system in this case would be determined by calculating the cost of the 1,000 miles of overheads if only the minimum-sized line was used, plus the cost of the 10,000 poles if only the minimum-sized pole was used.

a) Line: 1,000 miles at $1 per foot	$5,280,000	
b) Poles: 10,000 poles at $30 per pole	300,000	
Total		$5,580,000

Therefore, the cost of the above minimum (or capacity) system would be the remainder, or $2,780,000.

The minimum system calculated in this fashion could, and actually does, serve a considerable level of usage.

The minimum system is allocated on a customer basis — all customers are charged for an equal share of it. The remainder of the system, the more expensive facilities required to meet loads beyond those handled by minimum-sized equipment, is allocated on some demand basis; noncoincident peak demand is often used. In the calculation of the noncoincident peak demand allocation factors, usage at all levels of the residential and general service customer classes is used to determine allocation factors.

If, for example, the minimum overhead lines, conductors, and poles could supply a demand of two kilowatts per residential customer, that amount of usage would be paid for in the customer charge. In the determination of demand allocation factors, however, each residential customer's demand is calculated and added to determine the portion of the above minimum system costs to be allocated to the residential class and to each customer through the appropriate rates. So a residential customer who has a demand of two kilowatts will have paid for all the distribution costs associated with his load through the customer charge, but will also have his two-kilowatt usage go into the demand allocation factor to allocate distribution costs associated with above minimum usage.

One way to solve the double allocation problem would be to determine, for each piece of minimum equipment, the demand level it would be capable of serving, and then adjusting the demand allocation factors used to allocate the costs of all equipment of that type in order to assure that minimum use customers and the residential class were not charged twice. In many cases this would mean calculating several allocation factors for each FERC distribution account, since more than one type of equipment is used in the account. Even after overcoming all the problems of this approach one is still confronted with the dubious value of charging for equipment on an up-front basis rather than through a per kilowatt-hour charge at a time when conservation is recognized as an important goal of energy policy.

The direct way to assure that problems of overcollection are not built into the methodology used to determine class costs of service is to classify all distribution costs as demand costs. If this methodology is used in embedded cost studies, the studies will produce more equitable estimates of the cost of serving low-use residential customers.

K-860152
2-20-86

Before the

Pennsylvania Public Utility Commission

Docket No. R-850152

PHILADELPHIA ELECTRIC COMPANY

Corrected Testimony

of

JAMES A. ROSS

On behalf of

Occidental Chemical Corporation

February, 1986
Project 4066

Drazen-Brubaker & Associates, Inc.
St. Louis, Missouri 63141-0110

PHILADELPHIA ELECTRIC COMPANY
Docket No. R-850152

Errata Sheet re Testimony of James A. Ross

Page No.	Line No.	Comments
Summary of Testimony of James A. Ross		
1	23	RECOMMENDATIONS: [should be] RECOMMENDATIONS?
2	2	by a non-utility [should be] by non-utility
2	13	occassioned [should be] occasioned
2	24	follows so [should be] follows, so
2	25	power has [should be] power have
4	16	Occidential [should be] Occidental
4	21	power . [should be] power.
5	3	appropriate [should be] appropriately
5	7	( ), [should be] ( )

PHILADELPHIA ELECTRIC COMPANY
Docket No. R-850152

Errata Sheet re Testimony of James A. Ross

Page No.	Line No.	Comments
Testimony of James A. Ross		
3	3	cogeneration and [should be] cogeneration.
3	4	power production resources. For [should be] For
4	6	characteristics [should be] characteristic
4	25	generating resources [should be] generating resource
5	10	First, the cogeneration [should be] First, cogeneration
9	4	schedules [should be] schedule
9	21	(Tr. 1629-1632), [should be] (Tr. 1629-1632)
16	7	bill purposes, [should be] billing purposes,
16	24	the 25 MW reserve. [should be] the reserve.
21	17	(compared [should be] (compare
22	19	a 85% [should be] an 85%
24	4	for [should be] from
28	23	associated supplying [should be] associated with supplying
30	15	Thus the [should be] Thus, the
31	15	plus a [should be] <u>plus a</u>
31	16	mark-up. [should be] <u>mark-up</u>.
32	2	supplied. [should be] supplied, plus a mark-up.

PHILADELPHIA ELECTRIC COMPANY
Docket No. R-850152

Errata Sheet re Testimony of James A. Ross

Page No.	Line No.	Comments
Exhibit of James A. Ross		
Schedule 6	7	(15/30) x 5.73) [should be] (15/30) x 5.37)
6	7	$ 14,325.00 [should be] $ 13,425.00
6	12	$142,975.50 [should be] $142,075.50
7		Liability. 4 lines down, "negilgent" [should be] negligent
8	1 of 2	Parallel Operation. 5 lines down, occasioned outages [should be] occasioned by outages
8	2 of 2	Liability. 4 lines down, "negilgent" [should be] negligent
9	2 of 2	Liability. 4 lines down, "negilgent" [should be] negligent
10	2 of 2	Liability. 4 lines down, "negilgent" [should be] negligent

Before the

Pennsylvania Public Utility Commission

Docket No. R-850152

PHILADELPHIA ELECTRIC COMPANY

Summary of Testimony of James A. Ross

Q PLEASE SUMMARIZE YOUR TESTIMONY.

A The testimony which I present addresses the appropriate prices and provisions for providing supplementary power, back-up power and maintenance power to PECO customers. In my testimony, I discuss the basic principles and practices which should be employed in the determination of rates to be paid by PECO for these types of service. Furthermore, the testimony presents specific tariff schedules detailing the appropriate prices and provisions for providing these types of service. I have discussed both the appropriate service provisions and the appropriate rates for each of these types of service.

Conclusions and Recommendations

Q WHAT ARE YOUR CONCLUSIONS AND RECOMMENDATIONS?

A My conclusions and recommendations regarding service provisions are as follows:

1. PECO customers whose electric requirements may be provided by non-utility generation facilities including cogeneration and small power production facilities (collectively referred to as "cogeneration") have a potential need for supplementary power, back-up power and maintenance power. PECO should provide these types of service on a nondiscriminatory basis which reflects the cost of providing each type of service.

2. The tariff language setting forth the provisions under which these types of service are provided should clearly reflect the intent of the provisions. Based upon my understanding of Mr. Sundermier's testimony, I agree with PECO's policies regarding written permission for parallel operation and customer cost responsibility for additional distribution facilities. In order to clarify these policies in the tariff language, I recommend that the parallel operation provision be as follows:

> The customer shall not begin initial operation of any other source of supply in parallel with the Company's service until written permission is given by the Company for such parallel operation. Written permission is not required for re-establishing parallel operation occasioned by outages subsequent to the initial parallel operation. The Company shall have the right to inspect the customers installation in accordance with Tariff Rule 9.3.

With regard to additional distribution facility cost responsibility, I recommend the following:

> Investment in additions or changes to Company distribution facilities required to provide this service, that is over and above the investment that is normally incurred to provide service to such a customer assuming the customer were to obtain its full requirements from the Company in accordance with the rules and regulations, will be paid by customer.

3. I urge this Commission to modify the availability provisions associated with the supply of supplementary power, back-up power and maintenance power to read as follows, so that all customers receiving cogenerated power have access to these services:

Availability.

To any customer whose electrical requirements or any part thereof are regularly provided by facilities other than those of the Company, including qualified small power production or cogeneration facilities (qualifying facilities).

4. The Commission should eliminate the "Control of Supply Provision" as set forth in the Auxiliary Service Rider (and Scott Exhibit No. 1) and adopt the Excess Supply provision shown in Schedule 8 of Exhibit JAR-1 ( ). The provision presented in Schedule 8 addresses the PECO concern pertaining to electrical power consumption in excess of contract amount without requiring devices to physically limit the sale of power.

5. Maintenance power should be made available on a firm basis. Although the currently-effective Auxiliary Service Rider does not provide for firm maintenance power, the revised version of the Rider as shown in Scott Exhibit No. 1 (Revised Rider) clearly indicates a willingness on the part of PECO to provide maintenance power on a firm basis. Further, consistent with the Revised Rider, I recommend that the 1,000 kW minimum capacity requirement and the limitation on the duration and frequency of maintenance power be eliminated.

6. I recommend that the Commission review the Liability Provision in the Auxiliary Service Rider to determine whether it is discriminatory and imposes excessive risks on cogenerators. If similar liability requirements are not imposed on others operating in parallel with PECO, the current provision should be deleted and replaced by an even-handed provision. Such a provision could read as follows:

> Each party shall reimburse or hold harmless the other for all losses to the other party or third parties; for all damage to the facilities of the other party; or for all liabilities to third parties as a result of such parties negligent operation or use of electrical facilities used in connection with the provisions of this service.

Q. WOULD YOU PLEASE SUMMARIZE YOUR TESTIMONY WITH REGARD TO THE APPROPRIATE RATES THAT SHOULD BE PAID FOR SUPPLEMENTARY, BACK-UP AND MAINTENANCE POWER?

A. To summarize:

1. I agree with PECO's position that the normal service rate and applicable riders is an appropriate basis for pricing supplementary power. However, it is not appropriate to bill supplementary power in combination with back-up power as required by the Auxiliary Service Rider (and the Revised Rider). This combination billing practice should be prohibited.

2. The application of the "normal service rate and applicable riders" for back-up power as prescribed by the PECO Auxiliary Service Rider (and Revised Rider) is inappropriate and ignores the capacity supplied by cogeneration facilities. The effect of the back-up power provision in both the effective Auxiliary Service Rider and the Revised Rider is to assess excessive charges for back-up power and to potentially discourage cogeneration development.

3. Analyses to demonstrate that the PECO Auxiliary Service Rider reflects the probability that back-up service will or will not contribute to the need for and the use of utility capacity as required by the FERC have not been performed by PECO (see Occidental Chemical Exhibit No. 1 and Company testimony Tr. 1679). Further, as demonstrated by Schedule 3 of Exhibit JAR-1 ( ), there is an inherent simultaneous outage assumption in both the Auxiliary Service Rider and the Revised Rider--an assumption which is inconsistent with the FERC and PUC rules.

4. Back-up power charges under the PECO Riders can vary significantly for customers purchasing the same amount of power. Schedule 4 of Exhibit JAR-1 ( ) illustrates that the difference in charges could be over 85%.

5. Back-up power rate based upon the daily proration (of the otherwise applicable) firm rate is reasonable, provides protection to the other PECO ratepayers and should be adopted as the basis for pricing back-up service when taken by a cogenerator. The appropriate rate should contain a minimum payment provision which, if based on PECO's full requested revenue level, is the monthly rate

of $3.35 per kW times the contract capacity for back-up power. Schedule 5 of Exhibit JAR-1 ( ), shows the development of the $3.35 per kW charge. (If the approved rate level is less than requested, this charge should be appropriately reduced to reflect the approved rate level.)

6. Scheduled Maintenance Power should be provided during the off-peak nonsummer months and should be priced at the (otherwise applicable) daily prorated firm rate that incorporates a 0.50 Scheduling Provision Factor to reflect the cost to provide this off-peak type service. Schedule 6 of Exhibit JAR-1 ( ) illustrates the calculation of the scheduled maintenance power payment under the appropriate rate for Scheduled Maintenance Power. This schedule also illustrates the method of proration that would apply to both scheduled maintenance power and back-up power under my proposal.

7. I recommend that PECO be required to provide interruptible back-up and maintenance service on an "as-available" basis, in order to recognize the varying service needs of cogenerators and to encourage the development of qualifying facilities. The appropriate rate for this type of service is the Company's hourly PJM billing rate plus a 10% adder.

8. I recommend that the Commission implement the specific rate schedules presented in Schedules 7, 8, 9 and 10 of Exhibit JAR-1 ( ), which incorporate my recommendations regarding the appropriate prices and provisions for providing service on both a firm and interruptible basis.

Testimony to supplement that which is provided in this direct testimony may be necessary upon receipt of information which has been requested from PECO.

Before the

Pennsylvania Public Utility Commission

Docket No. R-850152

PHILADELPHIA ELECTRIC COMPANY

Testimony of James A. Ross

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A James A. Ross, 605 Old Ballas Road, St. Louis, Missouri.

Q WHAT IS YOUR OCCUPATION?

A I am a consultant in the field of public utility regulation with the firm of Drazen-Brubaker & Associates, Inc., utility rate and economic consultants.

Q WOULD YOU PLEASE DESCRIBE YOUR EDUCATION AND EXPERIENCE?

A This is set forth in Appendix A to this testimony.

Q ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?

A I am testifying on behalf of the Occidental Chemical Corporation.

Q WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A The purpose of my testimony is to address the various aspects of the Philadelphia Electric Company (PECO) tariff pertaining to the

supply of supplementary power, back-up power and maintenance power to PECO customers. My testimony also sets forth the basic principles and practices which should be employed in the determination of rates to be paid by PECO customers for supplementary power, back-up power and maintenance power. I shall discuss some of the more fundamental, theoretical and practical considerations attendant to the determination of the appropriate prices and provisions for these types of service. Furthermore, the testimony presents specific tariff schedules detailing the appropriate prices and provisions for providing these types of service.

Failure to specifically address an aspect of the PECO rates, rules and regulations pertaining to these types of service should not be construed as an endorsement of that aspect.

Supplementary, Back-up, and Maintenance Power

Q WHAT TYPES OF SERVICE DOES A PARTIAL REQUIREMENTS CUSTOMER NEED FROM THE UTILITY?

A Utility customers whose electric requirements may be provided by non-utility generation including cogeneration and small power production facilities (collectively referred to hereafter as "cogeneration") have a potential need for at least three types of service from the utility. The FERC regulations (18 CFR, Part 292) identify these services as supplementary power, back-up power, and maintenance power.

Q WHAT IS SUPPLEMENTARY POWER?

A Supplementary power is power supplied by the utility to the customer in addition to that which is supplied by cogeneration. For example, a customer with a total requirement of 60,000 kW may satisfy 40,000 kW with cogeneration and purchase the remaining 20,000 kW from the utility as supplementary power. Supplementary power is typically used consistently throughout the year.

Q WOULD THE CHARACTERISTICS OF A SUPPLEMENTARY POWER CUSTOMER BE SIMILAR TO THE CHARACTERISTICS OF A REGULAR TOTAL REQUIREMENTS CUSTOMER?

A Yes. Both customers require a continuous firm supply of power. Further, the load imposed upon the utility system for both of these customers is a function of the electrical consumption requirements of the customer.

Q WHAT IS MAINTENANCE POWER?

A Maintenance power is power supplied by the utility to replace the generation from cogeneration facilities when those facilities are scheduled out of service for maintenance. This type of power would normally be provided on a pre-arranged schedule basis to allow equipment to be taken out of service for routine inspections and preventive maintenance.

Two important characteristics of maintenance power are that the service is only required for short durations (typically not

more than a month) and the time at which load is imposed on the utility system is controllable. This means that supply of maintenance power can be arranged at a time when the utility has idle capacity available. As will be discussed later, this is an important cost-causative characteristic which should be reflected in the rate paid for this power.

Q WHAT IS BACK-UP POWER?

A Back-up power is power that is supplied by the utility to replace generation ordinarily provided by cogeneration equipment during periods of unscheduled outage.

Unlike supplementary power, the need for back-up power is a function of random equipment outages associated with generation facilities (and the time required to return the equipment to service). Further, back-up power differs from maintenance power in that back-up power cannot be scheduled.

Q IS THE NEED FOR BACK-UP POWER UNIQUE TO COGENERATION?

A Absolutely not. Utility generation equipment sustains forced and partial outages as a routine course of operation. Such outages require that the utility maintain sufficient reserves in order to accommodate these regular occurrences. The supply of back-up power to a cogenerator requires the use of reserves in the same manner as the reserves back-up a utility generating resource during an unscheduled outage. The utility outage and the

cogeneration outage both occur randomly and are directly related to the performance of generating equipment.

Q HOW DO THESE TYPES OF SERVICE DIFFER FROM REGULAR UTILITY SERVICE?

A Usually, a customer requiring electricity purchases all of his or her requirements from the utility ("total requirements customer"). The service required by a customer receiving power from cogeneration may differ from regular utility service in several ways.

First, cogeneration might not provide all of a customer's electrical power requirements ("partial requirements customer"). This customer, therefore, requires supplementary power from the utility on a continual basis.

Second, there will be periods when the cogenerating equipment has to be taken out of service for maintenance. Unless the partial requirements customer reduces his use of electricity, the utility will be called upon to provide maintenance power. In this case, the utility will be supplying all, or part, of the load on an intermittent basis for a period which normally has been previously scheduled with the utility.

Finally, all generating equipment is subject to being taken out of service due to equipment failures. Such failures occur on a random basis and occasion the need for back-up power to be provided by the utility.

Q HAS THE FERC AND THE PENNSYLVANIA PUBLIC UTILITY COMMISSION (PUC)

ESTABLISHED SPECIFIC CRITERIA FOR DEVELOPING RATES FOR BACK-UP AND MAINTENANCE POWER?

A Yes. In addition to stating that back-up and maintenance power rates shall be nondiscriminatory and provided upon request, the FERC rules in Section 292.305(c) also state:

> (c) Rates for sales of backup and maintenance power. The rate for sales of backup power or maintenance power:
>
> (1) shall not be based upon an assumption (unless supported by factual data) that forced outages or other reductions in electric output by all qualifying facilities on an electric utility's system will occur simultaneously, or during the system peak, or both; and
>
> (2) shall take into account the extent to which scheduled outages of the qualifying facilities can be usefully coordinated with scheduled outages of the utility's facilities.

The PUC rules state in Section 59.35(c) and (d) that:

> (c) A utility's rate for sales of back-up power to qualifying facilities shall not be based upon an assumption that forced outages or other reductions in electric output by all qualifying facilities on an electric utility's system will occur simultaneously or during the system peak, or both, unless supported by factual data.
>
> (d) A utility's rate for sales of maintenance power to qualifying facilities shall include all energy costs and a demand or capacity charge not in excess of a charge required to recover the appropriate transmission plant and full distribution plant costs. When the scheduled outages of a qualifying facility cannot be scheduled during other than utility peak periods, the demand or capacity charge shall be the full charge stated in the utility's filed tariff under which the qualifying facility receives such service.

Service Provisions

Q HAVE YOU REVIEWED PECO'S AUXILIARY SERVICE RIDER?

A Yes, I have. The Auxiliary Service Rider, effective September 25, 1984, is presented in Schedule 1 of Exhibit JAR-1 ( ). In addition to the September 25, 1984 Auxiliary Service Rider, I have reviewed the revised version of this Rider (Revised Rider) filed with this Commission on December 27, 1985. The Revised Rider was entered into the record in this proceeding as Scott Exhibit No. 1 and is presented in Schedule 2 of Exhibit JAR-1 ( ).

Q HAVE YOU ALSO REVIEWED THE TESTIMONY OF PECO WITNESS WILLIAM SUNDERMIER?

A Yes, I have. Although Mr. Sundermier has provided testimony in this proceeding clarifying certain of PECO's policies addressed in both the Auxiliary Service Rider and the Revised Rider, the actual language implementing such policies is ambiguous in both riders.

Q SHOULD THE TARIFF LANGUAGE CLEARLY REFLECT THE STATED PECO POLICIES?

A Yes, it should. PECO has stated that the tariff contains the only written statement of PECO's policy regarding the supply of supplementary, back-up or maintenance power (Tr. 1690-91). Thus, unambiguous tariff language is essential to customer understanding of these PECO policies.

Q WHAT ARE YOUR RECOMMENDATIONS WITH REGARD TO CLARIFYING THE TARIFF LANGUAGE?

A On cross-examination, Mr. Sundermier explained PECO's policies regarding written permission for parallel operation and customer cost responsibility for additional distribution facilities. Based on my understanding of his testimony, I concur with the stated PECO policies. However, the tariff language does not clearly reflect the Company intent as explained by Mr. Sundermier. I therefore recommend that the tariff language related to parallel operation be as follows:

> The Customer shall not begin initial operation of any other source of supply in parallel with the Company's service until written permission is given by the Company for such parallel operation. Written permission is not required for re-establishing parallel operation occasioned by outages subsequent to the initial parallel operation. The Company shall have the right to inspect the Customer's installation in accordance with Tariff Rule 9.3.

With regard to additional distribution facility cost responsibility, the following language is recommended:

> Investments in additions or changes to Company distribution facilities required to provide this service, that is over and above the investment normally incurred to provide service to such a customer assuming the customer were to obtain its full requirements from the Company in accordance with the Rules and Regulations, will be paid by customer.

Mr. Sundermier's testimony (Tr. 1670-1671) indicates that this language more clearly sets forth PECO's policy regarding distribution facilities.

Q HAVE YOU INCLUDED IN YOUR PROPOSED RATE SCHEDULES THE RECOMMENDED LANGUAGE REGARDING PARALLEL OPERATION AND DISTRIBUTION FACILITY COST?

A Yes, I have. I have also included in my proposed rate schedule language which more clearly states the PECO policy, expressed by Mr. Sundermier during the hearing (Tr. 1628-29), that supplementary power, back-up power, and maintenance power is available to all cogenerators regardless of qualifying status under PURPA. (As with the other policies discussed above, PECO's policy on the availability of this service is not embodied in any other written document available to prospective cogenerators.)

Q ARE THERE CERTAIN PECO POLICIES SET FORTH IN THE AUXILIARY SERVICE RIDER WHICH, IF ALLOWED TO CONTINUE, CAN DISCOURAGE THE DEVELOPMENT OF QUALIFYING FACILITIES?

A Yes, there are. Foremost among such policies is PECO's stated refusal to supply supplementary power, back-up power or maintenance power to a customer receiving power from an on-site cogeneration facility not owned by that customer.

Such a policy can be especially onerous to a PECO customer, such as the hospital discussed by Mr. Sundermier (Tr. 1629-1632) that is attempting to minimize operating costs so that it can continue to provide a service and maintain employment in the state of Pennsylvania. Moreover, once the cogeneration unit is operating, from a PECO cost, operations or rate standpoint, there is no

difference between supplying a customer that owns generation facilities and a customer that does not own such facilities. Unless PECO is informed of the different ownership, it could not distinguish between the two facilities from a service perspective.

Q WHAT DO YOU RECOMMEND?

A I urge the Commission to prohibit this practice by adopting the following language regarding the availability of supplementary, back-up and maintenance power:

> Availability.
> To any customer whose electrical requirements or any part thereof are regularly provided by facilities other than those of the Company, including qualified small power production or cogeneration facilities (qualifying facilities).

Q DOES THE AUXILIARY SERVICE RIDER HAVE A CONTROL OF SUPPLY PROVISION?

A Yes, it does. The tariff language is as follows:

> In case the number of kilowatts contracted for is less than customer's maximum demand as estimated by the Company, the Company may require the customer to limit his demand to the load in kilowatts contracted for by means of a circuit breaker or fuses, of types provided by the Company, to be furnished, installed, connected and maintained by the customer at his expense. The fuse size or the setting of the circuit breaker and its adjustment shall be under the sole control of the Company.

Q DO THE OTHER SERVICE RATE SCHEDULES OF PECO CONTAIN A CONTROL OF SUPPLY PROVISION AS SET FORTH IN THE AUXILIARY SERVICE RIDER?

A According to Company testimony, they do not. This provision is

difference between supplying a customer that owns generation facilities and a customer that does not own such facilities. Unless PECO is informed of the different ownership, it could not distinguish between the two facilities from a service perspective.

Q WHAT DO YOU RECOMMEND?

A I urge the Commission to prohibit this practice by adopting the following language regarding the availability of supplementary, back-up and maintenance power:

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Q DO THE OTHER SERVICE RATE SCHEDULES OF PECO CONTAIN A CONTROL OF SUPPLY PROVISION AS SET FORTH IN THE AUXILIARY SERVICE RIDER?

A According to Company testimony, they do not. This provision is

unique to the service provided to cogenerators.

Q GIVEN THE AMOUNT OF POWER AVAILABLE TO PECO, IS IT LOGICAL THAT PECO SHOULD NEED OR DESIRE TO LIMIT SALES?

A No, it is not. Nevertheless, PECO has included such a provision in the Auxiliary Service Rider. This provision permits PECO, at its discretion, physically to limit the amount of power a supplementary power customer can purchase whereas a total requirements customer has no such limitation. Such a provision is discriminatory, may discourage cogeneration and should be eliminated.

Q WHAT IS AN APPROPRIATE WAY TO HANDLE POWER CONSUMPTION IN EXCESS OF CONTRACT AMOUNTS?

A An appropriate way to handle this situation is through an adjustment of the contract amount as described by Mr. Sundermier (Tr. 1633).

The back-up power rate which I have proposed contains such a provision for adjusting the contract in the case of electrical power consumption in excess of contract amounts.

Q CAN A CUSTOMER PURCHASE MAINTENANCE POWER ON A FIRM BASIS UNDER THE PROVISION OF THE EFFECTIVE AUXILIARY SERVICE RIDER?

A No. Maintenance power is only available on a non-firm basis. The rider clearly states that maintenance power will be subject to interruption at the sole discretion of the Company.

Q ARE THE MAINTENANCE POWER PROVISIONS OF THE EFFECTIVE AUXILIARY SERVICE RIDER CONSISTENT WITH THE FERC REGULATIONS?

A No, they are not. The FERC and PUC regulations require that maintenance power be available on a firm basis.

Q HAVE YOU ANY INDICATION THAT PECO IS WILLING TO PROVIDE MAINTENANCE POWER ON A FIRM BASIS?

A Yes, the Revised Rider indicates such a willingness. Schedule 2 of Exhibit JAR-1 ( ) presents the revised version of the Auxiliary Service Rider filed by PECO on December 27, 1985 with this Commission. The Firm Supply provision shown in Schedule 2 clearly indicates that PECO is proposing to provide maintenance power on a firm basis.

Further, the Revised Rider eliminates the 1,000 kW minimum capacity requirement and the limitations on the duration and frequency of maintenance power presently in effect.

Q DO YOU CONCUR THAT MAINTENANCE POWER SHOULD BE PROVIDED ON A FIRM BASIS AND WITHOUT THE LIMITATIONS SPECIFIED IN THE PRESENT AUXILIARY SERVICE RIDER?

A Yes, I do. My recommendations set forth in this testimony address the appropriate provisions of both firm and interruptible maintenance power.

Q HAVE YOU REVIEWED THE LIABILITY SECTION OF THE AUXILIARY SERVICE

RIDER?

A Yes, I have. The current liability provision reads as follows:

> LIABILITY. The Customer shall reimburse or hold harmless the Company for all losses to Company, Customer or third parties; for all damage to Company or Customer facilities; or for all liabilities to third parties as a result of Customer's operation or use of non-Company owned generating facilities under the provisions of this rider.

The Revised Rider filed on December 27, 1985 (Scott Exh. 1) reads somewhat differently:

> LIABILITY. The Customer shall hold the Company harmless from all losses and damages to the Customer. The Customer shall reimburse the Company or third parties for all losses and damages to the Company or third parties resulting from the Customer's operation or use of non-Company owned generating facilities under the provisions of this rider.

While the precise language differs in some respects between the two riders, several features seem to be common to both. First, there is no reference in either to liability on the part of the Company. Second, there is no expressed statement in either that indicates that the Customer's liability is limited to instances in which it is at fault.

Q DO YOU HAVE ANY COMMENTS ON THE LIABILITY PROVISION?

A I believe that the liability sections should be subject to the same general standards that guide the Commission in reviewing other terms and conditions set forth in the Auxiliary Service Rider. As I have previously mentioned, this includes the requirement that the tariff be non-discriminatory.

Q ARE THE FULL REQUIREMENTS RETAIL CUSTOMERS SUBJECTED TO THE SAME LIABILITY PROVISIONS?

A According to Mr. Sundermier, no. (Tr. 1647)

Q IS THE LIABILITY PROVISION CONSISTENT WITH THE LIABILITY PROVISIONS IN PECO INTERCHANGE AGREEMENTS WITH OTHER UTILITY SYSTEMS OPERATING IN PARALLEL WITH THE PECO SYSTEM?

A Based on the Company's response to Occidental's data request, the answer is no. Occidental asked the Company to furnish copies of all interchange agreements (IR-CHEM 44). These agreements govern transactions between PECO and companies which operate generation equipment in parallel with PECO. PECO can sell power to or purchase power from these entities. Similar arrangements for parallel operation and purchase and sale of power are common between utilities and cogenerators. I have reviewed each of these interchange agreements furnished by PECO. The liability provisions in these agreements are quite different from those contained in the rider. For instance, such agreements provide for liability by <u>both</u> the Company and the other parties to the Agreement.

Q WHAT IS YOUR RECOMMENDATION WITH REGARD TO THE INCLUSION OF A LIABILITY PROVISION IN THE PECO TARIFF?

A I recommend that the Commission review the liability provision in the rider to determine whether it imposes discriminatory or excessive risks on cogenerators. If similar liability requirements are

not imposed on others who operate in parallel with PECO, the current provisions should be deleted and replaced by an even-handed provision. Such a provision could read as follows:

> Each party shall reimburse or hold harmless the other for all losses to the other party or third parties; for all damage to the facilities of the other party; or for all liabilities to third parties as a result of such party's negligent operation or use of electrical facilities used in connection with the provisions of this service.

Rates for Service

Q DO YOU AGREE WITH THE PECO POSITION THAT THE NORMAL SERVICE RATE AND APPLICABLE RIDERS IS AN APPROPRIATE BASIS FOR PRICING SUPPLEMENTARY AND BACK-UP POWER?

A To supplementary power, yes, but not to back-up power. Supplementary power should be billed in accordance with the PECO service schedule and applicable riders for which the service would otherwise be available to a customer not receiving a portion of its electrical requirements from cogeneration, because supplementary power is used to meet requirements in addition to those that can be supplied from cogeneration facilities. Thus, usage by supplementary power customers is akin to normal firm rate service.

For reasons discussed later, back-up power customers can be expected to impose different costs on the system than full requirements customers. Thus, rates for back-up service should not be identical to the rates applicable to full requirements customers.

Finally, it is not appropriate to bill supplementary power in combination with back-up power as required by the PECO Auxiliary Service Rider (and the Revised Rider). These types of service are distinct and have totally different load and cost characteristics. Thus, as I will discuss later, the PECO provision that requires the combining of back-up service with supplementary service for billing purposes, is inappropriate.

Q YOU STATED EARLIER IN YOUR TESTIMONY THAT BACK-UP POWER IS BASED UPON THE PRINCIPLE THAT THE UTILITY IS PROVIDING RESERVE CAPACITY, IS THIS "RESERVE" PRINCIPLE CONSISTENT WITH HOW A UTILITY PROVIDES SERVICE TO ITS REGULAR FIRM CUSTOMERS?

A Yes, it is. For example, a utility with 3,000 MW of firm load and a 25% reserve margin requirement would install 3,750 MW of capacity. Mr. Sundermier stated that this is precisely how PECO provides to service its firm customers (Tr. 1640). Thus, a nongenerating firm customer with a load of 100 kW would pay the utility for 125 kW of capacity (100 kW associated with the load and 25 KW associated with the reserve).

Similarly, a 100 kW customer supplied by a cogeneration facility of 100 kW should only pay the utility for the reserve capacity, because the cogeneration facility is providing the 100 kW of capacity to serve the customer's load. The utility is merely responsible for the reserve. However, both are entitled to call upon this reserve whenever needed.

Q IS THE LEVEL OF RESERVE A FUNCTION OF GENERATING RESOURCE RELIABILITY?

A Yes, it is. This means that cogeneration with reliability greater than utility-controlled resources may require reserves lower than the utility average. In fact, the PJM Pool specifically recognizes the relationship between resource reliability and reserve requirement. A PJM member having more reliable capacity has a smaller Pool obligation, all other things being equal. In the long-run, the level of necessary reserve for cogeneration can be determined by the observed performance of the cogeneration facilities.

Q DO BACK-UP SERVICE AND MAINTENANCE SERVICE IMPOSE THE SAME COSTS ON THE UTILITY?

A No, they do not. Back-up service and maintenance service are two distinct types of service which differ from regular utility service and from one another. It is important that the rates reflect this cost differential. Further, in the interest of encouraging qualifying facility (QF) development, these services should be provided in the most flexible manner possible.

The rates for back-up service should reflect the probability that back-up power will or will not contribute to the need for and the use of utility capacity. Maintenance service rates (for maintenance scheduled with the utility) should reflect the off-peak nature of this service.

Q HOW IS BACK-UP SERVICE PRICED WITH THE THE PECO AUXILIARY SERVICE RIDER?

A The PECO Auxiliary Service Rider requires a customer (including customers who are qualifying facilities) to pay for back-up service under the provisions of the "normal service rate and applicable riders."

However, the FERC requirements are that:

> A qualifying facility is entitled to purchase back-up or standby power at a nondiscriminatory rate which reflects the probability that the qualifying facility will or will not contribute to the need for and the use of utility capacity. (Section-by-section analysis of Section 292.305).

Thus, an important question is whether the "normal service rate" is appropriate, given the characteristics of back-up service.

Q HAVE YOU REVIEWED THE ANALYSES PECO PERFORMED TO DEMONSTRATE THAT THE AUXILIARY SERVICE RIDER REFLECTS THE PROBABILITY THAT BACK-UP SERVICE WILL OR WILL NOT CONTRIBUTE TO THE NEED FOR AND THE USE OF UTILITY CAPACITY?

A No, I have not made such a review because PECO did not perform any analyses. PECO has stated, in response to data requests and in testimony, that such analyses were not performed. Occidental Chemical Exhibit No. 1 is a copy of the PECO response to data requests inquiring about such analyses. Further, Mr. Sundermier testified that PECO did not develop separate load characteristics data for the services provided under the Auxiliary Service Rider

(Tr. 1679).

Thus, it is clear that the Auxiliary Service Rider is not based upon an analysis which supports that the rate for back-up service is consistent with the FERC and PUC rules and regulations.

Q IN GENERAL, HOW ARE THE MONTHLY BACK-UP SERVICE CHARGES COMPUTED UNDER PECO'S AUXILIARY SERVICE RIDER?

A The Rider states that the monthly billing for back-up power will be under the provisions of the normal service rate and applicable riders for full requirement customers.

For example, a 10,000 kW demand measured customer taking service on the currently-effective Rate HT would pay approximately $61,090 in monthly charges if the facility was forced out of service and required back-up power for 10 hours in a given summer month (10,000 x 10 x .0739 + 10,000 x 5.37 = $61,090). The same customer would pay approximately $42,960 a month during the period of October through May if he did not use any additional back-up power due to the ratchet provision of Rate HT (10,000 x .8 x 5.37 = 42,960).

Q IS THE SERVICE RIDER CONCEPT, AS IMPLEMENTED BY PECO'S AUXILIARY SERVICE RIDER, APPROPRIATE FOR DETERMINING BACK-UP SERVICE CHARGES?

A No, it is not. The rates applied to back-up power customers under the Auxiliary Service Rider (and the Revised Rider) are developed

using the characteristics of customers who are predominantly full requirement customers of PECO. There is a fundamental difference in the cost characteristics of a back-up customer and the cost characteristics of the majority of the customers who form the basis for the normal service rates.

For full requirement customers, PECO must install the capacity to supply the customer load plus the reserve capacity needed to assure that the load is reliably served. On the other hand, the cogeneration facility is supplying the load carrying capacity of a back-up power customer and PECO is only responsible for the reserve capacity. To apply the "normal service rate and applicable riders" as prescribed by the PECO Auxiliary Service Riders is to ignore the capacity supplied by the cogeneration facility.

The effect of the back-up power provisions in both PECO Riders is to assess excessive charges for back-up power and to potentially discourage cogeneration development.

Q UNDER WHAT CONDITIONS COULD THE COST CHARACTERISTICS OF BACK-UP POWER CUSTOMERS CORRESPOND TO THE COST CHARACTERISTICS OF FULL REQUIREMENTS CUSTOMERS ON THE PECO SYSTEM?

A This could occur if the electric output of all generating equipment supplying partial requirement customers sustained outages simultaneous with PECO peaks. This assumption, unless supported by factual data, is clearly prohibited by both the FERC rules and the Pennsylvania Public Utility Commission rules implementing

PURPA.

Q PLEASE ILLUSTRATE THE SIMULTANEOUS OUTAGE ASSUMPTION FOR COGENERATORS INHERENT IN THE PECO AUXILIARY SERVICE RIDER.

A This inherent simultaneous outage assumption in both the Auxiliary Service Rider and the Revised Rider is illustrated in Schedule 3 of Exhibit JAR-1 ( ). The three customers shown in Schedule 3 are assumed to be full requirement customers with cost responsibility of 10% as shown on Line 9.

Schedule 3 shows these same customers assuming they have installed cogeneration facilities and are purchasing back-up power (with equipment outages occurring on a random basis), Lines 10 through 16. The cost responsibility under the random outage scenario is about 2% (Line 17).

Obviously, a rate designed to recover the cost of full requirement customers is not appropriate for cogenerators because of the difference in the cost to provide service (compare Line 9 to Line 17). The application of a normal service rate to back-up power inherently ignores the cogeneration capacity and thus assumes simultaneous outages on the cogeneration facilities at time of peak. This is illustrated on Schedule 3, where the back-up power customer cost responsibility (10%) is identical to that of the full requirements customers (10%) (Lines 18 through 24).

Q ASIDE FROM THE INAPPROPRIATENESS OF THE RATES, CAN THE

AUXILIARY SERVICE RIDER RESULT IN SIGNIFICANTLY DIFFERENT BACK-UP POWER CHARGES TO CUSTOMERS REQUIRING THE SAME AMOUNT OF BACK-UP POWER?

A Yes, it can. In effect, a customer requiring both supplementary and back-up power can be penalized vis-a-vis a customer taking the same amount of back-up power on a stand-alone basis.

Q WOULD YOU PLEASE ILLUSTRATE HOW THIS CAN OCCUR?

A Schedule 4 of Exhibit JAR-1 ( ) illustrates the difference in back-up power charges that can result from the Auxiliary Service Rider billing provisions. In the example, one customer purchases only back-up power. Another customer purchases the identical amount of back-up power in conjunction with supplementary power. As shown in Schedule 4, the customer purchasing back-up power on a stand-alone basis pays $80,304 (Line 13). By contrast, the customer (who normally purchase $354,734 of monthly supplementary power as shown on Line 10) pays $148,686 for the same back-up power merely because supplementary power is also taken. This represents over an 85% difference in charges for the identical service. This illustration clearly shows that the Auxiliary Service Rider produces inappropriate and unreasonable charges for back-up power.

Alternate Rate Proposal for Back-Up Service and Maintenance Service

Q IN YOUR OPINION, WHAT SHOULD BE THE BASIS FOR BACK-UP SERVICE AND

MAINTENANCE SERVICE CHARGES?

A Fundamentally, cost of service should be the basis for determining the rates for back-up service and maintenance service. Although factors, such as simplicity and ease of administration may also be appropriately considered, the fundamental starting point and guideline should be that of the cost of providing service.

Q HAVE YOU DEVELOPED A PROPOSED BACK-UP SERVICE RATE THAT RECOGNIZES THE RELATIONSHIP BETWEEN COST AND COGENERATION UNIT RELIABILITY?

A Yes, I have.

Q PLEASE BRIEFLY DESCRIBE YOUR PROPOSAL.

A Under my proposed for back-up service, a customer would be obligated to pay PECO a minimum monthly payment directly related to the cost of PECO-owned production and transmission plant. When back-up service is actually taken by a cogenerator, the charges paid to PECO would be based on a proration of the service rate which would otherwise be applicable.

Q HOW DOES YOUR PROPOSAL REFLECT DIFFERENT RESERVE COSTS FOR DIFFERENT NON-UTILITY GENERATING UNIT RELIABILITIES.

A Whenever a customer takes back-up service, the monthly demand charge (of the otherwise applicable firm rate) would be applied on a prorated basis. The more back-up service required by a customer, the higher the back-up service payment. This would reflect

the higher probability that the back-up power will be taken coincident with the PECO system peaks.

Another important feature is that, while other ratepayers are protected from subsidizing a back-up power customer, this customer would never pay more than the rate this Commission has deemed appropriate for a regular firm customer of PECO. This is a much more reasonable rate for back-up service than the PECO Auxiliary Service Rider, which does not even attempt to reflect the unique characteristics of back-up service (and can also charge vastly different amounts for the same service).

Q WHAT ARE YOU PROPOSING AS THE APPROPRIATE RATE FOR ESTABLISHING THE MINIMUM BACK-UP SERVICE PAYMENT?

A A monthly rate of $3.35 per kilowatt based on PECO's full requested revenue level. (If the approved rate level is less than requested, this charge should be appropriately reduced to reflect the approved rate level.)

Q HOW WAS THE $3.35 PER KILOWATT DEMAND CHARGE DEVELOPED?

A Schedule 5 of Exhibit JAR-1 ( ) shows the development of the $3.35 per kilowatt demand charge. This charge represents the monthly cost associated with the reserve component of PECO's production and transmission plant. Column 1 of Schedule 5 shows the total plant in-service investment (Line 3), the total accumulated depreciation (Line 6), and the net plant associated with

production and transmission plant (Line 7). Column 2 shows the annual cost (based on Company-sponsored Exhibits in this docket) associated with the requested return on plant, depreciation expense, and income taxes. Line 11 shows that the total annual cost of these elements is approximately $1,435 million. Column 3 shows that the per-unit cost associated with production and transmission plant on a $/kW of total installed capability basis. Line 13 of Schedule 5 shows the annual reserve cost for production and transmission at a 22% planning reserve margin. Line 17 shows the development of the monthly minimum cost of $3.35/kW.

Q UNDER YOUR PROPOSAL, WHAT WOULD BE THE MINIMUM MONTHLY PAYMENT FOR A CUSTOMER WHO CONTRACTS FOR 10,000 KILOWATTS OF BACK-UP SERVICE?

A A customer who contracts for 10,000 kW of back-up service would be obligated to make a minimum monthly payment of $33,500 per month (10,000 x 3.35 = 33,500). Of course, when the back-up power is actually taken, the total payment would be a function of the amount of back-up service taken. But in no event, would the payment made by a customer in any month be less than the $33,500 figure. Furthermore, a customer would be obligated to enter into a contract with PECO for back-up service covering not less than 12 calendar months. This would result in a minimum annual payment of $402,000. Note that this is approximately $100,000 more than the 40% minimum contract demand payment requirement of Rate HT (9.44 x 10,000 x .4 x 8 = 302,080).

Q WOULD THE $33,500 FIGURE IN YOUR PREVIOUS EXAMPLE BE IN ADDITION TO THE CHARGES COMPUTED FOR BACK-UP SERVICE ACTUALLY TAKEN DURING A MONTH?

A No. The $33,500 represents a minimum monthly payment and is not an additional charge. For example, in a month when the charge for actual service taken was $20,000, a customer would pay $33,500. However, in a month when the actual charges were $46,000, the customer would pay $46,000.

Q IN YOUR OPINION, SHOULD THE UTILITY BE COMPENSATED DIFFERENTLY FOR BACK-UP POWER DELIVERED IN EXCESS OF THE BACK-UP CONTRACT CAPACITY?

A Yes. I recommend that the utility be compensated for the excess power at the service rate set forth in the back-up power contract without proration for that month. In other words, the excess power delivered by the utility would be priced at the full monthly firm rate for the initial month. Furthermore, the Back-Up Contract Capacity should be increased to the "delivered" amount for the ensuing 12 months.

Q SHOULD THE CUSTOMER BE ALLOWED TO REDUCE THE REVISED BACK-UP CONTRACT CAPACITY AT THE END OF THE 12-MONTH PERIOD?

A Yes. However, I believe this is best left to negotiation.

Q DO YOU HAVE AN ALTERNATE PROPOSAL REGARDING MAINTENANCE SERVICE?

A Yes, I do.

Q HOW DOES YOUR ALTERNATE PROPOSAL FOR MAINTENANCE SERVICE DIFFER FROM THAT OF PECO'S?

A With regard to the effective Auxiliary Service Rider, my proposal differs as follows:

1. Scheduled Maintenance Power under my proposal would be on a firm basis whereas the PECO rider only provides maintenance power on an unscheduled basis.

2. Under my proposal, Maintenance Power would be available to all customers whereas PECO's rider excludes customers with loads less than 1,000 kW.

3. The scheduling notification period under my proposal is not less than 12 calendar months, whereas the PECO rider has a notification period of at least 30 days.

4. My proposal requires the customer to notify the Company when maintenance power is no longer required whereas the PECO rider suggests that the customer can return to service without notifying the Company.

With regard to the revised rider filed on December 27, 1985, my maintenance power proposal differs in two major respects. The first area pertains to the scheduling of maintenance power. My proposal requires the customer to provide not less than 12 months written notification that maintenance power is required of the Company (PECO's notification period is 30 days). Further, maintenance power under my proposal is restricted to the off-peak period of October through May, whereas the PECO revised rider has no such restriction. The PECO revised rider requires approval from the Company for scheduled maintenance to be performed. My

proposal, with its extended notification and restricted period available for maintenance, allows the customer to select the period during which maintenance is to be performed.

The other major difference is that my proposal provides a rate which reflects the off-peak nature of maintenance service, whereas the PECO revised rider does not reflect the cost-causative nature of maintenance service and would charge an inappropriately high rate for this service.

Q BRIEFLY DESCRIBE YOUR PROPOSAL REGARDING SCHEDULED MAINTENANCE SERVICE?

A Scheduled Maintenance Service would be provided to a customer who provides PECO with not less than 12 months advance written notice that scheduled maintenance is to be performed. Further, the period during which scheduled maintenance can be performed is restricted to the off-peak period of October through May. These two factors would assure PECO that maintenance service would not contribute to system peak requirements.

As with both the effective Auxiliary Service Rider and the Revised Rider (Tr. 1662-64), my proposal is also based upon a proration of the otherwise applicable firm rate. However, my proposal for scheduled maintenance takes into account the reduced system cost associated with supplying scheduled maintenance power.

Q HOW DOES PECO ALLOCATE PRODUCTION AND TRANSMISSION PLANT AND

RELATED EXPENSES TO CLASSES OF SERVICE?

A PECO allocates these costs on the basis of the average contribution of each class to hourly system peaks in each of the four summer months (June through September). As stated in Mr. Sundermier's direct prefiled testimony on Page 6 at Line 19:

> Production and transmission plant must be designed to meet the maximum demand requirements imposed on the system by the customers; therefore, it is appropriate that these costs should be allocated on the basis of contribution to those peak demands.

Q UNDER THE COMPANY'S ALLOCATION METHOD, HOW MUCH PRODUCTION AND TRANSMISSION PLANT AND RELATED EXPENSES SHOULD BE ALLOCATED TO CUSTOMERS RECEIVING SERVICE UNDER YOUR SCHEDULED MAINTENANCE PROPOSAL?

A My scheduled maintenance proposal is designed to assure PECO that additional production and transmission plant and related expenses will not be imposed upon the PECO system. Thus, to be consistent with the PECO allocation method, the scheduled maintenance service customers should not be allocated any production and transmission plant or related expenses.

Q HOW HAVE YOU REFLECTED THE REDUCED COSTS WHICH WOULD BE IMPOSED ON PECO BY CUSTOMERS RECEIVING SERVICE UNDER YOUR SCHEDULED MAINTENANCE POWER PROPOSAL?

A This cost reduction is reflected by way of a Scheduling Provision Factor of 0.05 which would be applied to the normal billing demand.

Q HOW WOULD THE BILLING DEMAND FOR SCHEDULED MAINTENANCE BE COMPUTED UNDER YOUR PROPOSAL?

A The customer scheduling his maintenance power requirements with PECO under the provisions of my scheduled maintenance service would have his normal billing demand reduced by 50%. This scheduling provision factor reflects the off-peak type of service that is being provided and the corresponding costs.

Q WHAT WOULD BE THE BILLING DEMAND FOR A CUSTOMER WHO SCHEDULED 10,000 KILOWATTS OF MAINTENANCE POWER UNDER YOUR PROPOSAL?

A Schedule 6 of Exhibit JAR-1 ( ) illustrates the calculation of the billing demand and the resulting scheduled maintenance power payment under my proposal. Line 6 shows that the billing demand would be the product of the 10,000 kW and the 0.50 scheduling provision factor. Thus, the billing demand for a customer who schedules 10,000 kW of demand would be 5,000 kW.

Q DOES THE PRORATION METHOD SET FORTH IN SCHEDULE 6 OF EXHIBIT JAR-1 ( ) REFLECT THE METHOD OF PRORATION THAT WOULD APPLY TO BOTH SCHEDULED MAINTENANCE POWER AND BACK-UP POWER UNDER YOUR PROPOSAL?

A Yes, it would. The ratio of the days of power use to the days in the month would be applied to the capacity charge calculation and the hours' use blocking in the energy charge.

Q HAVE YOU PREPARED SPECIFIC RATE SCHEDULES FOR SUPPLEMENTARY POWER,

BACK-UP POWER AND MAINTENANCE POWER WHICH IMPLEMENTS YOUR RECOMMENDATIONS?

A Yes, I have. Schedule 7 of Exhibit JAR-1 ( ) is a rate schedule which incorporate my recommendations regarding supplementary power. Schedules 8 and 9 incorporate my recommendations with regard to back-up power and maintenance power, respectively.

Q IN ORDER TO RECOGNIZE THE VARYING SERVICE NEEDS AND TO ENCOURAGE THE DEVELOPMENT OF QUALIFYING FACILITIES, SHOULD BACK-UP AND MAINTENANCE SERVICE ALSO BE PROVIDED AND PRICED ON AN "AS-AVAILABLE" BASIS?

A Yes, it should. Under an "as-available" method, the customer would not pay for any monthly capacity charges. However, at the time the customer desires service, he would pay a rate based upon the additional energy charges incurred by the utility, plus a mark-up.

Although the customer would not be obligated to pay capacity payments, the utility would not be obligated to ensure that the capacity would be available at all times.

Q WHAT IS THE APPROPRIATE RATE FOR "AS-AVAILABLE" BACK-UP AND MAINTENANCE SERVICE?

A The appropriate rate for this type of service is the Company's hourly PJM billing rate plus a 10% adder. Thus, PECO would have complete control with regard to supplying the service and also

would be assured of receiving full compensation for all costs associated with power supplied, plus a mark-up.

Q IS PECO A PARTY TO AGREEMENTS THAT PROVIDE FOR TRANSACTIONS SIMILAR TO YOUR "AS-AVAILABLE" BACK-UP AND MAINTENANCE POWER PROPOSAL?

A Yes, it is. PECO is a party to a number of agreements where energy is scheduled to another party when the other party cannot supply the energy with its own resources. Further, the agreements call for the costing of such energy supplied based upon the cost of generating the energy plus an adder which ranges from $1.40 per megawatthour to $2.60 per megawatthour. Based upon the projected PJM hourly billing rates, the 10% adder that I have recommended should be more than adequate when compared to these transactions.

Q HAVE YOU PREPARED A SPECIFIC RATE SCHEDULE FOR AS-AVAILABLE POWER?

A Yes, I have. Schedule 10 of Exhibit JAR-1 ( ) is a rate schedule which would implement the as-available back-up and maintenance service proposal. Note that the $24 per kW figure appearing in the Penalty For Failure to Curtail section shown in Schedule 10 is based on PECO's full requested revenue level. Thus, if the approved rate level is less than requested, this charge should be appropriately reduced.

Q DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A Yes, it does. However, supplemental testimony may be necessary upon receipt of information which has been requested from PECO.

Qualifications of James A. Ross

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A James A. Ross, 605 Old Ballas Road, St. Louis, Missouri.

Q PLEASE STATE YOUR OCCUPATION.

A I am a consultant in the field of public utility regulation with the firm of Drazen-Brubaker & Associates, Inc., utility rate and economic consultants.

Q PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.

A I am a graduate of the University of Missouri, with the degrees of Bachelor of Science in Electrical Engineering and Master of Science in Engineering Management.

After graduation in 1971, I was employed by Union Electric Company, a utility which provides service to Metropolitan St. Louis, Missouri, and surrounding areas. While assigned to the Power Operation Function, I was responsible for system operation-related engineering evaluations which included long-range and intermediate planning studies, various economic studies and computer simulation of system operations. I was later assigned to the Corporate Planning Function with responsibilities in capacity planning coordination activities and special studies. Subsequent to my ten-year employment with Union Electric Company, I joined the firm of Drazen-Brubaker & Associates, Inc.

Q DURING YOUR EMPLOYMENT WITH UNION ELECTRIC COMPANY, DID YOU PARTICIPATE IN ANY CAPACITY PLANNING EVALUATIONS?

A Yes, I was responsible for assisting in all facets of Union Electric's ten-year capacity addition studies. My responsibilities included computer simulation of system operations, development of capacity addition strategies and engineering economic evaluation of alternatives. Additionally, I was assigned to the System Studies Group of the Compressed Air Energy Storage research project sponsored by the Department of Energy and the Electric Power Research Institute. My responsibilities included participation in the overall capacity planning evaluation of compressed air energy storage as a viable capacity alternative and authoring portions of the Project's report on utility system planning.

Also, while assigned to the Corporate Planning Function, I was assigned to a Union Electric oversight committee regarding a power plant siting study being performed by an outside consultant.

Q WHAT REGULATORY COMMISSIONS HAVE YOU TESTIFIED BEFORE?

A I have testified on electric rates and related matters before the regulatory commissions of Alabama, Colorado, Idaho, Louisiana, Massachusetts, Michigan, New York, South Carolina, Texas, Utah and Wyoming.

R-850152
2-20-86

Before the

Pennsylvania Public Utility Commission

Docket No. R-850152

PHILADELPHIA ELECTRIC COMPANY

Supplemental Testimony of

JAMES A. ROSS

On Behalf of

Occidental Chemical Corporation

February, 1986
Project 4066

Drazen-Brubaker & Associates, Inc.
St. Louis, Missouri 63141-0110

Before the

Pennsylvania Public Utility Commission

Docket No. R-850152

PHILADELPHIA ELECTRIC COMPANY

Supplemental Testimony of James A. Ross

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A James A. Ross, 605 Old Ballas Road, St. Louis, Missouri.

Q HAVE YOU PREVIOUSLY FILED TESTIMONY IN THIS DOCKET?

A Yes, I have.

Q WHAT IS THE PURPOSE OF YOUR SUPPLEMENTAL TESTIMONY?

A The testimony addresses certain rate provisions incorporated in my proposed Scheduled Maintenance Power and As Available Power rates as presented in my prefiled direct testimony. This supplemental testimony is based on information which could not be included in the direct testimony due to the fact that the information was received from Philadelphia Electric Company (PECO) during the time the direct testimony was being finalized.

Q HAS THE COMPANY PROVIDED A SEPARATION OF THE ENERGY-RELATED AND THE DEMAND-RELATED COSTS INCLUDED IN THE ENERGY CHARGES OF THE

PECO PROPOSED RATE HT?

A Yes, it has. In addition to the $9.44 per kilowatt capacity charge, the HT monthly energy charges recover nonenergy-related costs in the following manner:

Rate HT	Price	Nonenergy Cost in $/kWh	Nonenergy Cost in $/kW
1st Block	$0.0964/kWh	$0.07036/kWh	$10.55/kW
2nd Block	$0.0668/kWh	$0.04076/kWh	$ 6.11/kW
3rd Block	$0.0375/kWh	$0.01146/kWh	$ 1.69/kW

The above table demonstrates that over 65% of the nonenergy-related costs are recovered through the Rate HT energy charges. This is an important factor in the design of a rate to recover the appropriate capacity or demand charges for Scheduled Maintenance Power, since customers taking Maintenance Power will pay the standard rate energy charges and thus pay demand costs in excess of the stated demand charge.

Q WHAT DO THE PENNSYLVANIA PUBLIC UTILITY COMMISSION RULES SAY ABOUT CAPACITY OR DEMAND CHARGES APPLICABLE TO MAINTENANCE POWER WHICH IS SCHEDULED WITH THE UTILITY DURING NONPEAK PERIODS?

A The Commission rules state:

> "A utility's rate for sales of maintenance power to qualifying facilities shall include all energy costs and a demand or capacity charge not in excess of a charge required to recover the appropriate transmission plant and full distribution plant costs."

Q UNDER THE PECO COST-OF-SERVICE ALLOCATION METHOD, WHAT IS THE

APPROPRIATE TRANSMISSION PLANT COST THAT SHOULD BE ALLOCATED TO CUSTOMERS TAKING SERVICE ON YOUR SCHEDULED MAINTENANCE POWER RATE?

A Consistent with the Company's four summer peak (June through September) transmission plant allocation method, Scheduled Maintenance customers under my proposed rate should not be allocated any transmission plant cost.

Q ACCORDING TO THE PECO COST-OF-SERVICE STUDY, WHAT PERCENTAGE OF THE TOTAL DEMAND-RELATED COSTS RECOVERED IN PROPOSED RATE HT IS RELATED TO DISTRIBUTION COST?

A Distribution cost associated with Rate HT is about 2.5% of the total demand-related cost recovered in that rate, or about $8.30/kW annually.

Q HOW MUCH DEMAND-RELATED COSTS ARE RECOVERED IN A SINGLE MONTH UNDER YOUR PROPOSED SCHEDULED MAINTENANCE POWER RATE?

A Even with the 0.50 scheduling provision, a single month of maintenance service under my proposal recovers about $16.50/kW of demand-related costs. This represents about two-times the Rate HT annual distribution cost recovery.

Q IS IT YOUR RECOMMENDATION THAT THE 0.50 SCHEDULING PROVISION FACTOR BE MODIFIED AT THIS TIME?

A No. However, the current cost data would suggest a reduction in the level of this factor. The point I wish to make is that the 0.50 factor is more than adequate to recover the costs. At the

proposed level, the factor assures that the other ratepayers of PECO will not subsidize customers taking Scheduled Maintenance Power under my proposed rate schedule. However, as PECO gains more experience in providing Scheduled Maintenance Power, a more rigorous analysis should be performed to more precisely determine the appropriate level for the scheduling provision factor.

Q PERTAINING TO THE AS AVAILABLE POWER RATE THAT YOU ARE PROPOSING, HAS PECO PROVIDED UPDATED PROJECTIONS OF THEIR INCREMENTAL ENERGY COST?

A Yes, an updated projection for the years 1985 through 1994 has been provided. Although these updated energy costs are somewhat lower than the original projections provided by PECO, the 10% adder associated with the As Available Power Rate produces an adder still in excess of the $2.60/MWh adder specified in various interconnection agreements to which PECO is a part. The following table illustrates the annual updated projected energy costs provided by PECO:

Description		Annual ($/MWh) All Hours	On-Peak	Off-Peak
Actual	1984	$44.4	$55.3	$37.5
Projected	1985	37.8	45.3	30.3
	1986	34.9	42.1	27.7
	1987	36.0	43.6	28.4
	1988	38.0	46.3	29.7
	1989	42.4	51.4	33.4
	1990	44.2	53.8	34.6
	1991	47.8	57.4	38.3
	1992	53.4	63.9	42.9
	1993	62.2	74.9	49.5
	1994	69.7	83.6	55.9

Q WHAT CONCLUSIONS HAVE YOU DRAWN FROM THE ADDITIONAL INFORMATION PROVIDED BY PECO?

A The additional information provided by PECO confirms that the Scheduled Maintenance Power Rate and the As Available Power Rate will not result in other ratepayers subsidizing customers who take service under the provisions of these rates. Furthermore, this information suggests that certain of the pricing aspects may require modification (after PECO has experience operating under these rates), in order to assure that the backup and maintenance customers are not subsidizing other regular rate customers of PECO.

Q DOES THIS CONCLUDE YOUR SUPPLEMENTAL TESTIMONY?

A Yes, it does.

CERTIFICATE OF SERVICE

I hereby certify that I have this 14th day of February, 1986, served the foregoing document upon counsel for Philadelphia Electric Company, the Governor's Energy Council, and the Staff of the Pennsylvania Public Utility Commission by Federal Express Mail, and upon all other parties whose names appear on the attached service list by first class mail, postage prepaid.

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Attorney for
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Dated: February 14, 1986

Before the

Pennsylvania Public Utility Commission

Docket No. R-850152

PHILADELPHIA ELECTRIC COMPANY

Corrected Testimony

of

JAMES A. ROSS

On behalf of

Occidental Chemical Corporation

February, 1986
Project 4066

Drazen-Brubaker & Associates, Inc.
St. Louis, Missouri 63141-0110

Before the

Pennsylvania Public Utility Commission

Docket No. R-850152

PHILADELPHIA ELECTRIC COMPANY

Summary of Testimony of James A. Ross

Q PLEASE SUMMARIZE YOUR TESTIMONY.

A The testimony which I present addresses the appropriate prices and provisions for providing supplementary power, back-up power and maintenance power to PECO customers. In my testimony, I discuss the basic principles and practices which should be employed in the determination of rates to be paid by PECO for these types of service. Furthermore, the testimony presents specific tariff schedules detailing the appropriate prices and provisions for providing these types of service. I have discussed both the appropriate service provisions and the appropriate rates for each of these types of service.

Conclusions and Recommendations

Q WHAT ARE YOUR CONCLUSIONS AND RECOMMENDATIONS?

A My conclusions and recommendations regarding service provisions are as follows:

1. PECO customers whose electric requirements may be provided by non-utility generation facilities including cogeneration and small power production facilities (collectively referred to as "cogeneration") have a potential need for supplementary power, back-up power and maintenance power. PECO should provide these types of service on a nondiscriminatory basis which reflects the cost of providing each type of service.

2. The tariff language setting forth the provisions under which these types of service are provided should clearly reflect the intent of the provisions. Based upon my understanding of Mr. Sundermier's testimony, I agree with PECO's policies regarding written permission for parallel operation and customer cost responsibility for additional distribution facilities. In order to clarify these policies in the tariff language, I recommend that the parallel operation provision be as follows:

> The customer shall not begin initial operation of any other source of supply in parallel with the Company's service until written permission is given by the Company for such parallel operation. Written permission is not required for re-establishing parallel operation occasioned by outages subsequent to the initial parallel operation. The Company shall have the right to inspect the customers installation in accordance with Tariff Rule 9.3.

With regard to additional distribution facility cost responsibility, I recommend the following:

> Investment in additions or changes to Company distribution facilities required to provide this service, that is over and above the investment that is normally incurred to provide service to such a customer assuming the customer were to obtain its full requirements from the Company in accordance with the rules and regulations, will be paid by customer.

3. I urge this Commission to modify the availability provisions associated with the supply of supplementary power, back-up power and maintenance power to read as follows, so that all customers receiving cogenerated power have access to these services:

Availability.

To any customer whose electrical requirements or any part thereof are regularly provided by facilities other than those of the Company, including qualified small power production or cogeneration facilities (qualifying facilities).

4. The Commission should eliminate the "Control of Supply Provision" as set forth in the Auxiliary Service Rider (and Scott Exhibit No. 1) and adopt the Excess Supply provision shown in Schedule 8 of Exhibit JAR-1 ( ). The provision presented in Schedule 8 addresses the PECO concern pertaining to electrical power consumption in excess of contract amount without requiring devices to physically limit the sale of power.

5. Maintenance power should be made available on a firm basis. Although the currently-effective Auxiliary Service Rider does not provide for firm maintenance power, the revised version of the Rider as shown in Scott Exhibit No. 1 (Revised Rider) clearly indicates a willingness on the part of PECO to provide maintenance power on a firm basis. Further, consistent with the Revised Rider, I recommend that the 1,000 kW minimum capacity requirement and the limitation on the duration and frequency of maintenance power be eliminated.

6. I recommend that the Commission review the Liability Provision in the Auxiliary Service Rider to determine whether it is discriminatory and imposes excessive risks on cogenerators. If similar liability requirements are not imposed on others operating in parallel with PECO, the current provision should be deleted and replaced by an even-handed provision. Such a provision could read as follows:

> Each party shall reimburse or hold harmless the other for all losses to the other party or third parties; for all damage to the facilities of the other party; or for all liabilities to third parties as a result of such parties negligent operation or use of electrical facilities used in connection with the provisions of this service.

Q WOULD YOU PLEASE SUMMARIZE YOUR TESTIMONY WITH REGARD TO THE APPROPRIATE RATES THAT SHOULD BE PAID FOR SUPPLEMENTARY, BACK-UP AND MAINTENANCE POWER?

A To summarize:

1. I agree with PECO's position that the normal service rate and applicable riders is an appropriate basis for pricing supplementary power. However, it is not appropriate to bill supplementary power in combination with back-up power as required by the Auxiliary Service Rider (and the Revised Rider). This combination billing practice should be prohibited.

2. The application of the "normal service rate and applicable riders" for back-up power as prescribed by the PECO Auxiliary Service Rider (and Revised Rider) is inappropriate and ignores the capacity supplied by cogeneration facilities. The effect of the back-up power provision in both the effective Auxiliary Service Rider and the Revised Rider is to assess excessive charges for back-up power and to potentially discourage cogeneration development.

3. Analyses to demonstrate that the PECO Auxiliary Service Rider reflects the probability that back-up service will or will not contribute to the need for and the use of utility capacity as required by the FERC have not been performed by PECO (see Occidental Chemical Exhibit No. 1 and Company testimony Tr. 1679). Further, as demonstrated by Schedule 3 of Exhibit JAR-1 ( ), there is an inherent simultaneous outage assumption in both the Auxiliary Service Rider and the Revised Rider--an assumption which is inconsistent with the FERC and PUC rules.

4. Back-up power charges under the PECO Riders can vary significantly for customers purchasing the same amount of power. Schedule 4 of Exhibit JAR-1 ( ) illustrates that the difference in charges could be over 85%.

5. Back-up power rate based upon the daily proration (of the otherwise applicable) firm rate is reasonable, provides protection to the other PECO ratepayers and should be adopted as the basis for pricing back-up service when taken by a cogenerator. The appropriate rate should contain a minimum payment provision which, if based on PECO's full requested revenue level, is the monthly rate

of $3.35 per kW times the contract capacity for back-up power. Schedule 5 of Exhibit JAR-1 ( ), shows the development of the $3.35 per kW charge. (If the approved rate level is less than requested, this charge should be appropriately reduced to reflect the approved rate level.)

6. Scheduled Maintenance Power should be provided during the off-peak nonsummer months and should be priced at the (otherwise applicable) daily prorated firm rate that incorporates a 0.50 Scheduling Provision Factor to reflect the cost to provide this off-peak type service. Schedule 6 of Exhibit JAR-1 ( ) illustrates the calculation of the scheduled maintenance power payment under the appropriate rate for Scheduled Maintenance Power. This schedule also illustrates the method of proration that would apply to both scheduled maintenance power and back-up power under my proposal.

7. I recommend that PECO be required to provide interruptible back-up and maintenance service on an "as-available" basis, in order to recognize the varying service needs of cogenerators and to encourage the development of qualifying facilities. The appropriate rate for this type of service is the Company's hourly PJM billing rate plus a 10% adder.

8. I recommend that the Commission implement the specific rate schedules presented in Schedules 7, 8, 9 and 10 of Exhibit JAR-1 ( ), which incorporate my recommendations regarding the appropriate prices and provisions for providing service on both a firm and interruptible basis.

Testimony to supplement that which is provided in this direct testimony may be necessary upon receipt of information which has been requested from PECO.

Before the

Pennsylvania Public Utility Commission

Docket No. R-850152

PHILADELPHIA ELECTRIC COMPANY

Testimony of James A. Ross

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A James A. Ross, 605 Old Ballas Road, St. Louis, Missouri.

Q WHAT IS YOUR OCCUPATION?

A I am a consultant in the field of public utility regulation with the firm of Drazen-Brubaker & Associates, Inc., utility rate and economic consultants.

Q WOULD YOU PLEASE DESCRIBE YOUR EDUCATION AND EXPERIENCE?

A This is set forth in Appendix A to this testimony.

Q ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?

A I am testifying on behalf of the Occidental Chemical Corporation.

Q WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A The purpose of my testimony is to address the various aspects of the Philadelphia Electric Company (PECO) tariff pertaining to the

supply of supplementary power, back-up power and maintenance power to PECO customers. My testimony also sets forth the basic principles and practices which should be employed in the determination of rates to be paid by PECO customers for supplementary power, back-up power and maintenance power. I shall discuss some of the more fundamental, theoretical and practical considerations attendant to the determination of the appropriate prices and provisions for these types of service. Furthermore, the testimony presents specific tariff schedules detailing the appropriate prices and provisions for providing these types of service.

Failure to specifically address an aspect of the PECO rates, rules and regulations pertaining to these types of service should not be construed as an endorsement of that aspect.

Supplementary, Back-up, and Maintenance Power

Q WHAT TYPES OF SERVICE DOES A PARTIAL REQUIREMENTS CUSTOMER NEED FROM THE UTILITY?

A Utility customers whose electric requirements may be provided by non-utility generation including cogeneration and small power production facilities (collectively referred to hereafter as "cogeneration") have a potential need for at least three types of service from the utility. The FERC regulations (18 CFR, Part 292) identify these services as supplementary power, back-up power, and maintenance power.

Q WHAT IS SUPPLEMENTARY POWER?

A Supplementary power is power supplied by the utility to the customer in addition to that which is supplied by cogeneration. For example, a customer with a total requirement of 60,000 kW may satisfy 40,000 kW with cogeneration and purchase the remaining 20,000 kW from the utility as supplementary power. Supplementary power is typically used consistently throughout the year.

Q WOULD THE CHARACTERISTICS OF A SUPPLEMENTARY POWER CUSTOMER BE SIMILAR TO THE CHARACTERISTICS OF A REGULAR TOTAL REQUIREMENTS CUSTOMER?

A Yes. Both customers require a continuous firm supply of power. Further, the load imposed upon the utility system for both of these customers is a function of the electrical consumption requirements of the customer.

Q WHAT IS MAINTENANCE POWER?

A Maintenance power is power supplied by the utility to replace the generation from cogeneration facilities when those facilities are scheduled out of service for maintenance. This type of power would normally be provided on a pre-arranged schedule basis to allow equipment to be taken out of service for routine inspections and preventive maintenance.

Two important characteristics of maintenance power are that the service is only required for short durations (typically not

more than a month) and the time at which load is imposed on the utility system is controllable. This means that supply of maintenance power can be arranged at a time when the utility has idle capacity available. As will be discussed later, this is an important cost-causative characteristic which should be reflected in the rate paid for this power.

Q WHAT IS BACK-UP POWER?

A Back-up power is power that is supplied by the utility to replace generation ordinarily provided by cogeneration equipment during periods of unscheduled outage.

Unlike supplementary power, the need for back-up power is a function of random equipment outages associated with generation facilities (and the time required to return the equipment to service). Further, back-up power differs from maintenance power in that back-up power cannot be scheduled.

Q IS THE NEED FOR BACK-UP POWER UNIQUE TO COGENERATION?

A Absolutely not. Utility generation equipment sustains forced and partial outages as a routine course of operation. Such outages require that the utility maintain sufficient reserves in order to accommodate these regular occurrences. The supply of back-up power to a cogenerator requires the use of reserves in the same manner as the reserves back-up a utility generating resource during an unscheduled outage. The utility outage and the

cogeneration outage both occur randomly and are directly related to the performance of generating equipment.

Q HOW DO THESE TYPES OF SERVICE DIFFER FROM REGULAR UTILITY SERVICE?

A Usually, a customer requiring electricity purchases all of his or her requirements from the utility ("total requirements customer"). The service required by a customer receiving power from cogeneration may differ from regular utility service in several ways.

First, cogeneration might not provide all of a customer's electrical power requirements ("partial requirements customer"). This customer, therefore, requires supplementary power from the utility on a continual basis.

Second, there will be periods when the cogenerating equipment has to be taken out of service for maintenance. Unless the partial requirements customer reduces his use of electricity, the utility will be called upon to provide maintenance power. In this case, the utility will be supplying all, or part, of the load on an intermittent basis for a period which normally has been previously scheduled with the utility.

Finally, all generating equipment is subject to being taken out of service due to equipment failures. Such failures occur on a random basis and occasion the need for back-up power to be provided by the utility.

Q HAS THE FERC AND THE PENNSYLVANIA PUBLIC UTILITY COMMISSION (PUC)

ESTABLISHED SPECIFIC CRITERIA FOR DEVELOPING RATES FOR BACK-UP AND MAINTENANCE POWER?

A Yes. In addition to stating that back-up and maintenance power rates shall be nondiscriminatory and provided upon request, the FERC rules in Section 292.305(c) also state:

> (c) Rates for sales of backup and maintenance power. The rate for sales of backup power or maintenance power:
>
> (1) shall not be based upon an assumption (unless supported by factual data) that forced outages or other reductions in electric output by all qualifying facilities on an electric utility's system will occur simultaneously, or during the system peak, or both; and
>
> (2) shall take into account the extent to which scheduled outages of the qualifying facilities can be usefully coordinated with scheduled outages of the utility's facilities.

The PUC rules state in Section 59.35(c) and (d) that:

> (c) A utility's rate for sales of back-up power to qualifying facilities shall not be based upon an assumption that forced outages or other reductions in electric output by all qualifying facilities on an electric utility's system will occur simultaneously or during the system peak, or both, unless supported by factual data.
>
> (d) A utility's rate for sales of maintenance power to qualifying facilities shall include all energy costs and a demand or capacity charge not in excess of a charge required to recover the appropriate transmission plant and full distribution plant costs. When the scheduled outages of a qualifying facility cannot be scheduled during other than utility peak periods, the demand or capacity charge shall be the full charge stated in the utility's filed tariff under which the qualifying facility receives such service.

Service Provisions

Q HAVE YOU REVIEWED PECO'S AUXILIARY SERVICE RIDER?

A Yes, I have. The Auxiliary Service Rider, effective September 25, 1984, is presented in Schedule 1 of Exhibit JAR-1 ( ). In addition to the September 25, 1984 Auxiliary Service Rider, I have reviewed the revised version of this Rider (Revised Rider) filed with this Commission on December 27, 1985. The Revised Rider was entered into the record in this proceeding as Scott Exhibit No. 1 and is presented in Schedule 2 of Exhibit JAR-1 ( ).

Q HAVE YOU ALSO REVIEWED THE TESTIMONY OF PECO WITNESS WILLIAM SUNDERMIER?

A Yes, I have. Although Mr. Sundermier has provided testimony in this proceeding clarifying certain of PECO's policies addressed in both the Auxiliary Service Rider and the Revised Rider, the actual language implementing such policies is ambiguous in both riders.

Q SHOULD THE TARIFF LANGUAGE CLEARLY REFLECT THE STATED PECO POLICIES?

A Yes, it should. PECO has stated that the tariff contains the only written statement of PECO's policy regarding the supply of supplementary, back-up or maintenance power (Tr. 1690-91). Thus, unambiguous tariff language is essential to customer understanding of these PECO policies.

Q WHAT ARE YOUR RECOMMENDATIONS WITH REGARD TO CLARIFYING THE TARIFF LANGUAGE?

A On cross-examination, Mr. Sundermier explained PECO's policies regarding written permission for parallel operation and customer cost responsibility for additional distribution facilities. Based on my understanding of his testimony, I concur with the stated PECO policies. However, the tariff language does not clearly reflect the Company intent as explained by Mr. Sundermier. I therefore recommend that the tariff language related to parallel operation be as follows:

> The Customer shall not begin initial operation of any other source of supply in parallel with the Company's service until written permission is given by the Company for such parallel operation. Written permission is not required for re-establishing parallel operation occasioned by outages subsequent to the initial parallel operation. The Company shall have the right to inspect the Customer's installation in accordance with Tariff Rule 9.3.

With regard to additional distribution facility cost responsibility, the following language is recommended:

> Investments in additions or changes to Company distribution facilities required to provide this service, that is over and above the investment normally incurred to provide service to such a customer assuming the customer were to obtain its full requirements from the Company in accordance with the Rules and Regulations, will be paid by customer.

Mr. Sundermier's testimony (Tr. 1670-1671) indicates that this language more clearly sets forth PECO's policy regarding distribution facilities.

Q HAVE YOU INCLUDED IN YOUR PROPOSED RATE SCHEDULES THE RECOMMENDED LANGUAGE REGARDING PARALLEL OPERATION AND DISTRIBUTION FACILITY COST?

A Yes, I have. I have also included in my proposed rate schedule language which more clearly states the PECO policy, expressed by Mr. Sundermier during the hearing (Tr. 1628-29), that supplementary power, back-up power, and maintenance power is available to all cogenerators regardless of qualifying status under PURPA. (As with the other policies discussed above, PECO's policy on the availability of this service is not embodied in any other written document available to prospective cogenerators.)

Q ARE THERE CERTAIN PECO POLICIES SET FORTH IN THE AUXILIARY SERVICE RIDER WHICH, IF ALLOWED TO CONTINUE, CAN DISCOURAGE THE DEVELOPMENT OF QUALIFYING FACILITIES?

A Yes, there are. Foremost among such policies is PECO's stated refusal to supply supplementary power, back-up power or maintenance power to a customer receiving power from an on-site cogeneration facility not owned by that customer.

Such a policy can be especially onerous to a PECO customer, such as the hospital discussed by Mr. Sundermier (Tr. 1629-1632) that is attempting to minimize operating costs so that it can continue to provide a service and maintain employment in the state of Pennsylvania. Moreover, once the cogeneration unit is operating, from a PECO cost, operations or rate standpoint, there is no

difference between supplying a customer that owns generation facilities and a customer that does not own such facilities. Unless PECO is informed of the different ownership, it could not distinguish between the two facilities from a service perspective.

Q WHAT DO YOU RECOMMEND?

A I urge the Commission to prohibit this practice by adopting the following language regarding the availability of supplementary, back-up and maintenance power:

> Availability.
>
> To any customer whose electrical requirements or any part thereof are regularly provided by facilities other than those of the Company, including qualified small power production or cogeneration facilities (qualifying facilities).

Q DOES THE AUXILIARY SERVICE RIDER HAVE A CONTROL OF SUPPLY PROVISION?

A Yes, it does. The tariff language is as follows:

> In case the number of kilowatts contracted for is less than customer's maximum demand as estimated by the Company, the Company may require the customer to limit his demand to the load in kilowatts contracted for by means of a circuit breaker or fuses, of types provided by the Company, to be furnished, installed, connected and maintained by the customer at his expense. The fuse size or the setting of the circuit breaker and its adjustment shall be under the sole control of the Company.

Q DO THE OTHER SERVICE RATE SCHEDULES OF PECO CONTAIN A CONTROL OF SUPPLY PROVISION AS SET FORTH IN THE AUXILIARY SERVICE RIDER?

A According to Company testimony, they do not. This provision is

unique to the service provided to cogenerators.

Q GIVEN THE AMOUNT OF POWER AVAILABLE TO PECO, IS IT LOGICAL THAT PECO SHOULD NEED OR DESIRE TO LIMIT SALES?

A No, it is not. Nevertheless, PECO has included such a provision in the Auxiliary Service Rider. This provision permits PECO, at its discretion, physically to limit the amount of power a supplementary power customer can purchase whereas a total requirements customer has no such limitation. Such a provision is discriminatory, may discourage cogeneration and should be eliminated.

Q WHAT IS AN APPROPRIATE WAY TO HANDLE POWER CONSUMPTION IN EXCESS OF CONTRACT AMOUNTS?

A An appropriate way to handle this situation is through an adjustment of the contract amount as described by Mr. Sundermier (Tr. 1633).

The back-up power rate which I have proposed contains such a provision for adjusting the contract in the case of electrical power consumption in excess of contract amounts.

Q CAN A CUSTOMER PURCHASE MAINTENANCE POWER ON A FIRM BASIS UNDER THE PROVISION OF THE EFFECTIVE AUXILIARY SERVICE RIDER?

A No. Maintenance power is only available on a non-firm basis. The rider clearly states that maintenance power will be subject to interruption at the sole discretion of the Company.

Q ARE THE MAINTENANCE POWER PROVISIONS OF THE EFFECTIVE AUXILIARY SERVICE RIDER CONSISTENT WITH THE FERC REGULATIONS?

A No, they are not. The FERC and PUC regulations require that maintenance power be available on a firm basis.

Q HAVE YOU ANY INDICATION THAT PECO IS WILLING TO PROVIDE MAINTENANCE POWER ON A FIRM BASIS?

A Yes, the Revised Rider indicates such a willingness. Schedule 2 of Exhibit JAR-1 ( ) presents the revised version of the Auxiliary Service Rider filed by PECO on December 27, 1985 with this Commission. The Firm Supply provision shown in Schedule 2 clearly indicates that PECO is proposing to provide maintenance power on a firm basis.

Further, the Revised Rider eliminates the 1,000 kW minimum capacity requirement and the limitations on the duration and frequency of maintenance power presently in effect.

Q DO YOU CONCUR THAT MAINTENANCE POWER SHOULD BE PROVIDED ON A FIRM BASIS AND WITHOUT THE LIMITATIONS SPECIFIED IN THE PRESENT AUXILIARY SERVICE RIDER?

A Yes, I do. My recommendations set forth in this testimony address the appropriate provisions of both firm and interruptible maintenance power.

Q HAVE YOU REVIEWED THE LIABILITY SECTION OF THE AUXILIARY SERVICE

RIDER?

A Yes, I have. The current liability provision reads as follows:

> LIABILITY. The Customer shall reimburse or hold harmless the Company for all losses to Company, Customer or third parties; for all damage to Company or Customer facilities; or for all liabilities to third parties as a result of Customer's operation or use of non-Company owned generating facilities under the provisions of this rider.

The Revised Rider filed on December 27, 1985 (Scott Exh. 1) reads somewhat differently:

> LIABILITY. The Customer shall hold the Company harmless from all losses and damages to the Customer. The Customer shall reimburse the Company or third parties for all losses and damages to the Company or third parties resulting from the Customer's operation or use of non-Company owned generating facilities under the provisions of this rider.

While the precise language differs in some respects between the two riders, several features seem to be common to both. First, there is no reference in either to liability on the part of the Company. Second, there is no expressed statement in either that indicates that the Customer's liability is limited to instances in which it is at fault.

Q DO YOU HAVE ANY COMMENTS ON THE LIABILITY PROVISION?

A I believe that the liability sections should be subject to the same general standards that guide the Commission in reviewing other terms and conditions set forth in the Auxiliary Service Rider. As I have previously mentioned, this includes the requirement that the tariff be non-discriminatory.

Q ARE THE FULL REQUIREMENTS RETAIL CUSTOMERS SUBJECTED TO THE SAME LIABILITY PROVISIONS?

A According to Mr. Sundermier, no. (Tr. 1647)

Q IS THE LIABILITY PROVISION CONSISTENT WITH THE LIABILITY PROVISIONS IN PECO INTERCHANGE AGREEMENTS WITH OTHER UTILITY SYSTEMS OPERATING IN PARALLEL WITH THE PECO SYSTEM?

A Based on the Company's response to Occidental's data request, the answer is no. Occidental asked the Company to furnish copies of all interchange agreements (IR-CHEM 44). These agreements govern transactions between PECO and companies which operate generation equipment in parallel with PECO. PECO can sell power to or purchase power from these entities. Similar arrangements for parallel operation and purchase and sale of power are common between utilities and cogenerators. I have reviewed each of these interchange agreements furnished by PECO. The liability provisions in these agreements are quite different from those contained in the rider. For instance, such agreements provide for liability by both the Company and the other parties to the Agreement.

Q WHAT IS YOUR RECOMMENDATION WITH REGARD TO THE INCLUSION OF A LIABILITY PROVISION IN THE PECO TARIFF?

A I recommend that the Commission review the liability provision in the rider to determine whether it imposes discriminatory or excessive risks on cogenerators. If similar liability requirements are

not imposed on others who operate in parallel with PECO, the current provisions should be deleted and replaced by an even-handed provision. Such a provision could read as follows:

> Each party shall reimburse or hold harmless the other for all losses to the other party or third parties; for all damage to the facilities of the other party; or for all liabilities to third parties as a result of such party's negligent operation or use of electrical facilities used in connection with the provisions of this service.

Rates for Service

Q DO YOU AGREE WITH THE PECO POSITION THAT THE NORMAL SERVICE RATE AND APPLICABLE RIDERS IS AN APPROPRIATE BASIS FOR PRICING SUPPLEMENTARY AND BACK-UP POWER?

A To supplementary power, yes, but not to back-up power. Supplementary power should be billed in accordance with the PECO service schedule and applicable riders for which the service would otherwise be available to a customer not receiving a portion of its electrical requirements from cogeneration, because supplementary power is used to meet requirements in addition to those that can be supplied from cogeneration facilities. Thus, usage by supplementary power customers is akin to normal firm rate service.

For reasons discussed later, back-up power customers can be expected to impose different costs on the system than full requirements customers. Thus, rates for back-up service should not be identical to the rates applicable to full requirements customers.

Finally, it is not appropriate to bill supplementary power in combination with back-up power as required by the PECO Auxiliary Service Rider (and the Revised Rider). These types of service are distinct and have totally different load and cost characteristics. Thus, as I will discuss later, the PECO provision that requires the combining of back-up service with supplementary service for billing purposes, is inappropriate.

Q YOU STATED EARLIER IN YOUR TESTIMONY THAT BACK-UP POWER IS BASED UPON THE PRINCIPLE THAT THE UTILITY IS PROVIDING RESERVE CAPACITY, IS THIS "RESERVE" PRINCIPLE CONSISTENT WITH HOW A UTILITY PROVIDES SERVICE TO ITS REGULAR FIRM CUSTOMERS?

A Yes, it is. For example, a utility with 3,000 MW of firm load and a 25% reserve margin requirement would install 3,750 MW of capacity. Mr. Sundermier stated that this is precisely how PECO provides to service its firm customers (Tr. 1640). Thus, a nongenerating firm customer with a load of 100 kW would pay the utility for 125 kW of capacity (100 kW associated with the load and 25 KW associated with the reserve).

Similarly, a 100 kW customer supplied by a cogeneration facility of 100 kW should only pay the utility for the reserve capacity, because the cogeneration facility is providing the 100 kW of capacity to serve the customer's load. The utility is merely responsible for the reserve. However, both are entitled to call upon this reserve whenever needed.

Q IS THE LEVEL OF RESERVE A FUNCTION OF GENERATING RESOURCE RELIABILITY?

A Yes, it is. This means that cogeneration with reliability greater than utility-controlled resources may require reserves lower than the utility average. In fact, the PJM Pool specifically recognizes the relationship between resource reliability and reserve requirement. A PJM member having more reliable capacity has a smaller Pool obligation, all other things being equal. In the long-run, the level of necessary reserve for cogeneration can be determined by the observed performance of the cogeneration facilities.

Q DO BACK-UP SERVICE AND MAINTENANCE SERVICE IMPOSE THE SAME COSTS ON THE UTILITY?

A No, they do not. Back-up service and maintenance service are two distinct types of service which differ from regular utility service and from one another. It is important that the rates reflect this cost differential. Further, in the interest of encouraging qualifying facility (QF) development, these services should be provided in the most flexible manner possible.

The rates for back-up service should reflect the probability that back-up power will or will not contribute to the need for and the use of utility capacity. Maintenance service rates (for maintenance scheduled with the utility) should reflect the off-peak nature of this service.

Q HOW IS BACK-UP SERVICE PRICED WITH THE THE PECO AUXILIARY SERVICE RIDER?

A The PECO Auxiliary Service Rider requires a customer (including customers who are qualifying facilities) to pay for back-up service under the provisions of the "normal service rate and applicable riders."

However, the FERC requirements are that:

> A qualifying facility is entitled to purchase back-up or standby power at a nondiscriminatory rate which reflects the probability that the qualifying facility will or will not contribute to the need for and the use of utility capacity. (Section-by-section analysis of Section 292.305).

Thus, an important question is whether the "normal service rate" is appropriate, given the characteristics of back-up service.

Q HAVE YOU REVIEWED THE ANALYSES PECO PERFORMED TO DEMONSTRATE THAT THE AUXILIARY SERVICE RIDER REFLECTS THE PROBABILITY THAT BACK-UP SERVICE WILL OR WILL NOT CONTRIBUTE TO THE NEED FOR AND THE USE OF UTILITY CAPACITY?

A No, I have not made such a review because PECO did not perform any analyses. PECO has stated, in response to data requests and in testimony, that such analyses were not performed. Occidental Chemical Exhibit No. 1 is a copy of the PECO response to data requests inquiring about such analyses. Further, Mr. Sundermier testified that PECO did not develop separate load characteristics data for the services provided under the Auxiliary Service Rider

(Tr. 1679).

Thus, it is clear that the Auxiliary Service Rider is not based upon an analysis which supports that the rate for back-up service is consistent with the FERC and PUC rules and regulations.

Q IN GENERAL, HOW ARE THE MONTHLY BACK-UP SERVICE CHARGES COMPUTED UNDER PECO'S AUXILIARY SERVICE RIDER?

A The Rider states that the monthly billing for back-up power will be under the provisions of the normal service rate and applicable riders for full requirement customers.

For example, a 10,000 kW demand measured customer taking service on the currently-effective Rate HT would pay approximately $61,090 in monthly charges if the facility was forced out of service and required back-up power for 10 hours in a given summer month (10,000 x 10 x .0739 + 10,000 x 5.37 = $61,090). The same customer would pay approximately $42,960 a month during the period of October through May if he did not use any additional back-up power due to the ratchet provision of Rate HT (10,000 x .8 x 5.37 = 42,960).

Q IS THE SERVICE RIDER CONCEPT, AS IMPLEMENTED BY PECO'S AUXILIARY SERVICE RIDER, APPROPRIATE FOR DETERMINING BACK-UP SERVICE CHARGES?

A No, it is not. The rates applied to back-up power customers under the Auxiliary Service Rider (and the Revised Rider) are developed

using the characteristics of customers who are predominantly full requirement customers of PECO. There is a fundamental difference in the cost characteristics of a back-up customer and the cost characteristics of the majority of the customers who form the basis for the normal service rates.

For full requirement customers, PECO must install the capacity to supply the customer load plus the reserve capacity needed to assure that the load is reliably served. On the other hand, the cogeneration facility is supplying the load carrying capacity of a back-up power customer and PECO is only responsible for the reserve capacity. To apply the "normal service rate and applicable riders" as prescribed by the PECO Auxiliary Service Riders is to ignore the capacity supplied by the cogeneration facility.

The effect of the back-up power provisions in both PECO Riders is to assess excessive charges for back-up power and to potentially discourage cogeneration development.

Q UNDER WHAT CONDITIONS COULD THE COST CHARACTERISTICS OF BACK-UP POWER CUSTOMERS CORRESPOND TO THE COST CHARACTERISTICS OF FULL REQUIREMENTS CUSTOMERS ON THE PECO SYSTEM?

A This could occur if the electric output of all generating equipment supplying partial requirement customers sustained outages simultaneous with PECO peaks. This assumption, unless supported by factual data, is clearly prohibited by both the FERC rules and the Pennsylvania Public Utility Commission rules implementing

PURPA.

Q PLEASE ILLUSTRATE THE SIMULTANEOUS OUTAGE ASSUMPTION FOR COGENERATORS INHERENT IN THE PECO AUXILIARY SERVICE RIDER.

A This inherent simultaneous outage assumption in both the Auxiliary Service Rider and the Revised Rider is illustrated in Schedule 3 of Exhibit JAR-1 ( ). The three customers shown in Schedule 3 are assumed to be full requirement customers with cost responsibility of 10% as shown on Line 9.

Schedule 3 shows these same customers assuming they have installed cogeneration facilities and are purchasing back-up power (with equipment outages occurring on a random basis), Lines 10 through 16. The cost responsibility under the random outage scenario is about 2% (Line 17).

Obviously, a rate designed to recover the cost of full requirement customers is not appropriate for cogenerators because of the difference in the cost to provide service (compare Line 9 to Line 17). The application of a normal service rate to back-up power inherently ignores the cogeneration capacity and thus assumes simultaneous outages on the cogeneration facilities at time of peak. This is illustrated on Schedule 3, where the back-up power customer cost responsibility (10%) is identical to that of the full requirements customers (10%) (Lines 18 through 24).

Q ASIDE FROM THE INAPPROPRIATENESS OF THE RATES, CAN THE

AUXILIARY SERVICE RIDER RESULT IN SIGNIFICANTLY DIFFERENT BACK-UP POWER CHARGES TO CUSTOMERS REQUIRING THE SAME AMOUNT OF BACK-UP POWER?

A Yes, it can. In effect, a customer requiring both supplementary and back-up power can be penalized vis-a-vis a customer taking the same amount of back-up power on a stand-alone basis.

Q WOULD YOU PLEASE ILLUSTRATE HOW THIS CAN OCCUR?

A Schedule 4 of Exhibit JAR-1 ( ) illustrates the difference in back-up power charges that can result from the Auxiliary Service Rider billing provisions. In the example, one customer purchases only back-up power. Another customer purchases the identical amount of back-up power in conjunction with supplementary power. As shown in Schedule 4, the customer purchasing back-up power on a stand-alone basis pays $80,304 (Line 13). By contrast, the customer (who normally purchase $354,734 of monthly supplementary power as shown on Line 10) pays $148,686 for the same back-up power merely because supplementary power is also taken. This represents over an 85% difference in charges for the identical service. This illustration clearly shows that the Auxiliary Service Rider produces inappropriate and unreasonable charges for back-up power.

Alternate Rate Proposal for Back-Up Service and Maintenance Service

Q IN YOUR OPINION, WHAT SHOULD BE THE BASIS FOR BACK-UP SERVICE AND

MAINTENANCE SERVICE CHARGES?

A Fundamentally, cost of service should be the basis for determining the rates for back-up service and maintenance service. Although factors, such as simplicity and ease of administration may also be appropriately considered, the fundamental starting point and guideline should be that of the cost of providing service.

Q HAVE YOU DEVELOPED A PROPOSED BACK-UP SERVICE RATE THAT RECOGNIZES THE RELATIONSHIP BETWEEN COST AND COGENERATION UNIT RELIABILITY?

A Yes, I have.

Q PLEASE BRIEFLY DESCRIBE YOUR PROPOSAL.

A Under my proposed for back-up service, a customer would be obligated to pay PECO a minimum monthly payment directly related to the cost of PECO-owned production and transmission plant. When back-up service is actually taken by a cogenerator, the charges paid to PECO would be based on a proration of the service rate which would otherwise be applicable.

Q HOW DOES YOUR PROPOSAL REFLECT DIFFERENT RESERVE COSTS FOR DIFFERENT NON-UTILITY GENERATING UNIT RELIABILITIES.

A Whenever a customer takes back-up service, the monthly demand charge (of the otherwise applicable firm rate) would be applied on a prorated basis. The more back-up service required by a customer, the higher the back-up service payment. This would reflect

the higher probability that the back-up power will be taken coincident with the PECO system peaks.

Another important feature is that, while other ratepayers are protected from subsidizing a back-up power customer, this customer would never pay more than the rate this Commission has deemed appropriate for a regular firm customer of PECO. This is a much more reasonable rate for back-up service than the PECO Auxiliary Service Rider, which does not even attempt to reflect the unique characteristics of back-up service (and can also charge vastly different amounts for the same service).

Q WHAT ARE YOU PROPOSING AS THE APPROPRIATE RATE FOR ESTABLISHING THE MINIMUM BACK-UP SERVICE PAYMENT?

A A monthly rate of $3.35 per kilowatt based on PECO's full requested revenue level. (If the approved rate level is less than requested, this charge should be appropriately reduced to reflect the approved rate level.)

Q HOW WAS THE $3.35 PER KILOWATT DEMAND CHARGE DEVELOPED?

A Schedule 5 of Exhibit JAR-1 ( ) shows the development of the $3.35 per kilowatt demand charge. This charge represents the monthly cost associated with the reserve component of PECO's production and transmission plant. Column 1 of Schedule 5 shows the total plant in-service investment (Line 3), the total accumulated depreciation (Line 6), and the net plant associated with

production and transmission plant (Line 7). Column 2 shows the annual cost (based on Company-sponsored Exhibits in this docket) associated with the requested return on plant, depreciation expense, and income taxes. Line 11 shows that the total annual cost of these elements is approximately $1,435 million. Column 3 shows that the per-unit cost associated with production and transmission plant on a $/kW of total installed capability basis. Line 13 of Schedule 5 shows the annual reserve cost for production and transmission at a 22% planning reserve margin. Line 17 shows the development of the monthly minimum cost of $3.35/kW.

Q UNDER YOUR PROPOSAL, WHAT WOULD BE THE MINIMUM MONTHLY PAYMENT FOR A CUSTOMER WHO CONTRACTS FOR 10,000 KILOWATTS OF BACK-UP SERVICE?

A A customer who contracts for 10,000 kW of back-up service would be obligated to make a minimum monthly payment of $33,500 per month (10,000 x 3.35 = 33,500). Of course, when the back-up power is actually taken, the total payment would be a function of the amount of back-up service taken. But in no event, would the payment made by a customer in any month be less than the $33,500 figure. Furthermore, a customer would be obligated to enter into a contract with PECO for back-up service covering not less than 12 calendar months. This would result in a minimum annual payment of $402,000. Note that this is approximately $100,000 more than the 40% minimum contract demand payment requirement of Rate HT (9.44 x 10,000 x .4 x 8 = 302,080).

Q WOULD THE $33,500 FIGURE IN YOUR PREVIOUS EXAMPLE BE IN ADDITION TO THE CHARGES COMPUTED FOR BACK-UP SERVICE ACTUALLY TAKEN DURING A MONTH?

A No. The $33,500 represents a minimum monthly payment and is not an additional charge. For example, in a month when the charge for actual service taken was $20,000, a customer would pay $33,500. However, in a month when the actual charges were $46,000, the customer would pay $46,000.

Q IN YOUR OPINION, SHOULD THE UTILITY BE COMPENSATED DIFFERENTLY FOR BACK-UP POWER DELIVERED IN EXCESS OF THE BACK-UP CONTRACT CAPACITY?

A Yes. I recommend that the utility be compensated for the excess power at the service rate set forth in the back-up power contract without proration for that month. In other words, the excess power delivered by the utility would be priced at the full monthly firm rate for the initial month. Furthermore, the Back-Up Contract Capacity should be increased to the "delivered" amount for the ensuing 12 months.

Q SHOULD THE CUSTOMER BE ALLOWED TO REDUCE THE REVISED BACK-UP CONTRACT CAPACITY AT THE END OF THE 12-MONTH PERIOD?

A Yes. However, I believe this is best left to negotiation.

Q DO YOU HAVE AN ALTERNATE PROPOSAL REGARDING MAINTENANCE SERVICE?

A Yes, I do.

Q HOW DOES YOUR ALTERNATE PROPOSAL FOR MAINTENANCE SERVICE DIFFER FROM THAT OF PECO'S?

A With regard to the effective Auxiliary Service Rider, my proposal differs as follows:

1. Scheduled Maintenance Power under my proposal would be on a firm basis whereas the PECO rider only provides maintenance power on an unscheduled basis.

2. Under my proposal, Maintenance Power would be available to all customers whereas PECO's rider excludes customers with loads less than 1,000 kW.

3. The scheduling notification period under my proposal is not less than 12 calendar months, whereas the PECO rider has a notification period of at least 30 days.

4. My proposal requires the customer to notify the Company when maintenance power is no longer required whereas the PECO rider suggests that the customer can return to service without notifying the Company.

With regard to the revised rider filed on December 27, 1985, my maintenance power proposal differs in two major respects. The first area pertains to the scheduling of maintenance power. My proposal requires the customer to provide not less than 12 months written notification that maintenance power is required of the Company (PECO's notification period is 30 days). Further, maintenance power under my proposal is restricted to the off-peak period of October through May, whereas the PECO revised rider has no such restriction. The PECO revised rider requires approval from the Company for scheduled maintenance to be performed. My

proposal, with its extended notification and restricted period available for maintenance, allows the customer to select the period during which maintenance is to be performed.

The other major difference is that my proposal provides a rate which reflects the off-peak nature of maintenance service, whereas the PECO revised rider does not reflect the cost-causative nature of maintenance service and would charge an inappropriately high rate for this service.

Q BRIEFLY DESCRIBE YOUR PROPOSAL REGARDING SCHEDULED MAINTENANCE SERVICE?

A Scheduled Maintenance Service would be provided to a customer who provides PECO with not less than 12 months advance written notice that scheduled maintenance is to be performed. Further, the period during which scheduled maintenance can be performed is restricted to the off-peak period of October through May. These two factors would assure PECO that maintenance service would not contribute to system peak requirements.

As with both the effective Auxiliary Service Rider and the Revised Rider (Tr. 1662-64), my proposal is also based upon a proration of the otherwise applicable firm rate. However, my proposal for scheduled maintenance takes into account the reduced system cost associated with supplying scheduled maintenance power.

Q HOW DOES PECO ALLOCATE PRODUCTION AND TRANSMISSION PLANT AND

RELATED EXPENSES TO CLASSES OF SERVICE?

A PECO allocates these costs on the basis of the average contribution of each class to hourly system peaks in each of the four summer months (June through September). As stated in Mr. Sundermier's direct prefiled testimony on Page 6 at Line 19:

> Production and transmission plant must be designed to meet the maximum demand requirements imposed on the system by the customers; therefore, it is appropriate that these costs should be allocated on the basis of contribution to those peak demands.

Q UNDER THE COMPANY'S ALLOCATION METHOD, HOW MUCH PRODUCTION AND TRANSMISSION PLANT AND RELATED EXPENSES SHOULD BE ALLOCATED TO CUSTOMERS RECEIVING SERVICE UNDER YOUR SCHEDULED MAINTENANCE PROPOSAL?

A My scheduled maintenance proposal is designed to assure PECO that additional production and transmission plant and related expenses will not be imposed upon the PECO system. Thus, to be consistent with the PECO allocation method, the scheduled maintenance service customers should not be allocated any production and transmission plant or related expenses.

Q HOW HAVE YOU REFLECTED THE REDUCED COSTS WHICH WOULD BE IMPOSED ON PECO BY CUSTOMERS RECEIVING SERVICE UNDER YOUR SCHEDULED MAINTENANCE POWER PROPOSAL?

A This cost reduction is reflected by way of a Scheduling Provision Factor of 0.05 which would be applied to the normal billing demand.

Q HOW WOULD THE BILLING DEMAND FOR SCHEDULED MAINTENANCE BE COMPUTED UNDER YOUR PROPOSAL?

A The customer scheduling his maintenance power requirements with PECO under the provisions of my scheduled maintenance service would have his normal billing demand reduced by 50%. This scheduling provision factor reflects the off-peak type of service that is being provided and the corresponding costs.

Q WHAT WOULD BE THE BILLING DEMAND FOR A CUSTOMER WHO SCHEDULED 10,000 KILOWATTS OF MAINTENANCE POWER UNDER YOUR PROPOSAL?

A Schedule 6 of Exhibit JAR-1 ( ) illustrates the calculation of the billing demand and the resulting scheduled maintenance power payment under my proposal. Line 6 shows that the billing demand would be the product of the 10,000 kW and the 0.50 scheduling provision factor. Thus, the billing demand for a customer who schedules 10,000 kW of demand would be 5,000 kW.

Q DOES THE PRORATION METHOD SET FORTH IN SCHEDULE 6 OF EXHIBIT JAR-1 ( ) REFLECT THE METHOD OF PRORATION THAT WOULD APPLY TO BOTH SCHEDULED MAINTENANCE POWER AND BACK-UP POWER UNDER YOUR PROPOSAL?

A Yes, it would. The ratio of the days of power use to the days in the month would be applied to the capacity charge calculation and the hours' use blocking in the energy charge.

Q HAVE YOU PREPARED SPECIFIC RATE SCHEDULES FOR SUPPLEMENTARY POWER,

BACK-UP POWER AND MAINTENANCE POWER WHICH IMPLEMENTS YOUR RECOMMENDATIONS?

A Yes, I have. Schedule 7 of Exhibit JAR-1 ( ) is a rate schedule which incorporate my recommendations regarding supplementary power. Schedules 8 and 9 incorporate my recommendations with regard to back-up power and maintenance power, respectively.

Q IN ORDER TO RECOGNIZE THE VARYING SERVICE NEEDS AND TO ENCOURAGE THE DEVELOPMENT OF QUALIFYING FACILITIES, SHOULD BACK-UP AND MAINTENANCE SERVICE ALSO BE PROVIDED AND PRICED ON AN "AS-AVAILABLE" BASIS?

A Yes, it should. Under an "as-available" method, the customer would not pay for any monthly capacity charges. However, at the time the customer desires service, he would pay a rate based upon the additional energy charges incurred by the utility, plus a mark-up.

Although the customer would not be obligated to pay capacity payments, the utility would not be obligated to ensure that the capacity would be available at all times.

Q WHAT IS THE APPROPRIATE RATE FOR "AS-AVAILABLE" BACK-UP AND MAINTENANCE SERVICE?

A The appropriate rate for this type of service is the Company's hourly PJM billing rate plus a 10% adder. Thus, PECO would have complete control with regard to supplying the service and also

would be assured of receiving full compensation for all costs associated with power supplied, plus a mark-up.

Q IS PECO A PARTY TO AGREEMENTS THAT PROVIDE FOR TRANSACTIONS SIMILAR TO YOUR "AS-AVAILABLE" BACK-UP AND MAINTENANCE POWER PROPOSAL?

A Yes, it is. PECO is a party to a number of agreements where energy is scheduled to another party when the other party cannot supply the energy with its own resources. Further, the agreements call for the costing of such energy supplied based upon the cost of generating the energy plus an adder which ranges from $1.40 per megawatthour to $2.60 per megawatthour. Based upon the projected PJM hourly billing rates, the 10% adder that I have recommended should be more than adequate when compared to these transactions.

Q HAVE YOU PREPARED A SPECIFIC RATE SCHEDULE FOR AS-AVAILABLE POWER?

A Yes, I have. Schedule 10 of Exhibit JAR-1 ( ) is a rate schedule which would implement the as-available back-up and maintenance service proposal. Note that the $24 per kW figure appearing in the Penalty For Failure to Curtail section shown in Schedule 10 is based on PECO's full requested revenue level. Thus, if the approved rate level is less than requested, this charge should be appropriately reduced.

Q DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A Yes, it does. However, supplemental testimony may be necessary upon receipt of information which has been requested from PECO.

Qualifications of James A. Ross

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A James A. Ross, 605 Old Ballas Road, St. Louis, Missouri.

Q PLEASE STATE YOUR OCCUPATION.

A I am a consultant in the field of public utility regulation with the firm of Drazen-Brubaker & Associates, Inc., utility rate and economic consultants.

Q PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.

A I am a graduate of the University of Missouri, with the degrees of Bachelor of Science in Electrical Engineering and Master of Science in Engineering Management.

After graduation in 1971, I was employed by Union Electric Company, a utility which provides service to Metropolitan St. Louis, Missouri, and surrounding areas. While assigned to the Power Operation Function, I was responsible for system operation-related engineering evaluations which included long-range and intermediate planning studies, various economic studies and computer simulation of system operations. I was later assigned to the Corporate Planning Function with responsibilities in capacity planning coordination activities and special studies. Subsequent to my ten-year employment with Union Electric Company, I joined the firm of Drazen-Brubaker & Associates, Inc.

Q DURING YOUR EMPLOYMENT WITH UNION ELECTRIC COMPANY, DID YOU PARTICIPATE IN ANY CAPACITY PLANNING EVALUATIONS?

A Yes, I was responsible for assisting in all facets of Union Electric's ten-year capacity addition studies. My responsibilities included computer simulation of system operations, development of capacity addition strategies and engineering economic evaluation of alternatives. Additionally, I was assigned to the System Studies Group of the Compressed Air Energy Storage research project sponsored by the Department of Energy and the Electric Power Research Institute. My responsibilities included participation in the overall capacity planning evaluation of compressed air energy storage as a viable capacity alternative and authoring portions of the Project's report on utility system planning.

Also, while assigned to the Corporate Planning Function, I was assigned to a Union Electric oversight committee regarding a power plant siting study being performed by an outside consultant.

Q WHAT REGULATORY COMMISSIONS HAVE YOU TESTIFIED BEFORE?

A I have testified on electric rates and related matters before the regulatory commissions of Alabama, Colorado, Idaho, Louisiana, Massachusetts, Michigan, New York, South Carolina, Texas, Utah and Wyoming.