Exhibit No.____ (PN-309)
FERC Docket No. R78-494

Testimony and Exhibits

of

Mr. B. H. Cherry

Before the Pennsylvania Public
Utilities Commission in
Docket No. I-79040308

TESTIMONY OF BERNARD H. CHERRY

Before the Pennsylvania Public Utility Commission

@ I79040308 et al.

My name is Bernard H. Cherry. I am employed by GPU Service Corporation serving as Vice President, Corporate Planning. My testimony is presented on behalf of Metropolitan Edison Company ("Met-Ed") and Pennsylvania Electric Company ("Penelec"), both of which are subsidiaries of General Public Utilities Corporation ("GPU").

I have been employed by GPU subsidiaries for 10 years, first as a senior nuclear engineer with the Jersey Central Power & Light Company ("Jersey Central"), and finally to my current position in August of 1977. I hold a Bachelor of Science Degree in Chemistry and Mathematics from the University of Illinois, a Master of Science Degree in Nuclear Engineering from the University of Illinois, and have done post graduate study in Nuclear Science and Engineering at Columbia University. In addition, I have participated in courses in Energy Supply, and Decision Analysis at the Massachusetts Institute of Technology.

In addition to my work at GPU, I am actively engaged in a number of activities related to energy supply planning and load forecasting. I have served as Chairman of an Energy Modeling Forum (EMF) group focusing on the forecasting of energy demand. EMF is an activity funded by the Electric Power Research

Institute and administered by Stanford University. I am a member of the North American Society for Corporate Planning, and I also serve on the divisional committee of the EPRI Energy and Environment Division, the Edison Electric Institute Nuclear Power Advisory Committee, and the American Nuclear Society Executive Committee on the Fuel Cycle.

I have been responsible for the management of the GPUSC Corporate Planning Division since it was formed in August, 1977. The division was set up in recognition of the need for improvement in the overall management and coordination of the several facets of company planning activities.

My testimony provides some data to assist the Commission in furthering its understanding of the benefits GPU's customers have received, and may expect to receive, from our nuclear operations. By way of the exhibits and the text of this testimony, I will show that GPU's nuclear TMI-1 and Oyster Creek facilities have already yielded customer cost savings that range up to $700 million.

Before directing my attention to the specific customer economic studies, a brief discussion of the generation planning process is in order. In the design of a generation plan, a multitude of sometimes non-comparable considerations must be studied and evaluated, and finally a judgment rendered on a specific course of action. We begin with an energy and load forecast for 20 years that defines expected demand for electric power by our

customers. It is then necessary to design a system expansion plan to assure that the required capacity is available in a reliable, cost-effective, and environmentally acceptable manner.

The resulting plan is a mix of baseload, intermediate or cycling, and peaking capacity units, bulk transmission and local distribution networks, all geographically configured in a manner to assure system stability and reliability of the power supply. This is done in a decision environment that recognizes emerging regulations on the technology, the maturation of that technology, and in recent years the considerable uncertainties regarding fuel prices.

Approximately 30 years ago GPU embarked on a program designed to achieve the benefits of economics of scale in generating facilities by installing units sized to the total GPU System load, rather than the loads of the individual members of the System. Moreover, in order to realize the economies of transporting electric energy by wire rather than coal by railroad, the GPU System built an extensive transmission system and the first two units at its Shawville station near the coal fields in Western Pennsylvania. As the System load grew, two additional units were installed at Shawville and another at Seward, also located near the Pennsylvania coal fields.

While it was feasible for the GPU companies to build a significant part of their generating capacity at or near mine-mouth, conditions of reliability also made it necessary to build generating capacity in the eastern portions of the service area and during this same time frame coal-fired generating units were installed at the Portland Station (on the Delaware River) and at the Sayreville Station in New Jersey.

The GPU System also did some pioneering work on the development of extra high voltage transmission and in the promotion of tenancy-incommon ownership by non-affiliated utilities of large mine-mouth coal-fired generating stations which led to the Keystone and then subsequently the Conemaugh and Homer City Stations near Johnstown. The GPU System is a participant in these three stations. Additionally, the GPU companies constructed the Saxton Nuclear Experimental generating station to gain first hand experience with the construction, operation and maintenance of a nuclear generating facility. Through the Atomic Energy Act of 1954, the Federal Government had, of course, actively encouraged the development of nuclear generation of electric energy.

The decision environment in the mid 1960's, when commitments were being made for TMI-1 and Oyster Creek, was considerably different from that of today. This was an era when the price of fuel oil was approximately 40 cents per million BTU's, as compared with today's price of $3.00 per million BTU's.

This was a time when facilities were being constructed without the regulations of the Clean Air Act of 1970, and there was a strong national commitment to expand our nuclear generating capacity.

Thus, by the mid-1960's, GPU had substantial existing wholly-owned western coal-fired generating capacity (Shawville, Seward, Warren) and was committed to several western Pennsylvania coal facilities then under construction -- Keystone service 1967/68), Conemaugh (in service 1970/71), and Homer City Units 1 and 2 (in service 1969). Given these commitments, and recognizing that our system was spread from the Atlantic Ocean through the States of New Jersey and Pennsylvania to Lake Erie, our future planning focused on the need for additional baseload capacity in the East. Our forecasts indicated that our theoretical load center was in eastern Pennsylvania or western New Jersey; hence, for system stability and reliability reasons, our attention was directed toward such locations as Oyster Creek (near Toms River, NJ) and Three Mile Island (near Middletown, PA).

As we were already committed at that time to satisfy a large fraction of our requirements from coal, in the interest of diversification of sources of energy, we were also considering oil or nuclear baseload capacity. Our economic studies, even in the mid-1960's -- before OPEC -- demonstrated the superiority of nuclear.

Having defined the decision process that led to relatively eastern locations of bulk power nuclear units (TMI-1 and 2 and Oyster Creek), I will now turn directly to a retrospective economic discussion of the savings that, in fact, did accrue to our customers from the construction and operation of these units. To provide structure to this analysis, I will discuss the comparison of TMI-1 with a hypothetical oil plant located at Three Mile Island, and the comparison of our Oyster Creek facility with a hypothetical oil plant located near Toms River. In that connection, I might note that the environmental regulations adopted in New Jersey beginning in the late 1960's necessitated the conversion of the Sayreville and Gilbert coal-fired units in New Jersey to oil-burning and that other utilities in Pennsylvania installed new oil-burning units in the same time period.

These comparisons are contained in Exhibits L-1 and L-2 to this testimony. It is notable that in the four years since its in-service date, our TMI-1 facility has yielded customer savings on the order of three hundred million dollars ($300 million) as compared with an oil-fired unit at the same site. It is equally pertinent to observe that in its nine years of service, our Oyster Creek facility has benefited our customers on the order of four hundred million dollars ($400 million) of cost savings as compared with an oil-fired unit at the same site.

For completeness of this presentation, I provide the coal vs. nuclear comparison in these same Exhibits. These tables demonstrate the composite benefits of these two units (as compared with coal-fired units at the same sites) to be on the order of $300 million since their in-service dates. The present value of the lifetime benefits of such nuclear units (as compared with coal units) is expected to be on the order of $1.4 billion.

In summary, retrospective customer economic assessments indicate that the alternatives to the TMI-1 and Oyster Creek facilities would have cost our customers as much as seven hundred million dollars ($700 million) more during the four years of operation of TMI-1 and the nine years of operation of Oyster Creek. These savings, by way of the regulatory process, accrue directly to our customers as lower charges than those which would have been necessary if the Oyster Creek or TMI-1 units had been fossil-fired. In other words, our customers have received all the economic benefits of the Oyster Creek and TMI-1 installations. Moreover the performance of these units has been well above the national average and our customers have received all the benefits of that superior performance. We endorse that philosophy.

The prospective benefits of the GPU commitment to nuclear energy are underlined by the information contained in Exhibit 1-3 to this testimony. This exhibit demonstrates that the rate

of escalation on a cents-per million BTU basis of oil and coal has been significantly greater than nuclear. This table suggests that the savings to our customers from these two nuclear units, over the coming decades, will continue to be very substantial.

GPU System Estimated Revenue Requirements

TMI-1 and Fossil Alternatives

| | Millions $ | | |
|---|---|---|---|
| | Nuclear TMI-1 | Oil - TMI | Coal - TMI |
| 1974-1978 | | | |
| Fuel, O&M[1,3] | $ 114 | $ 601 | $ 353 |
| Fixed Charges[2,3] | 338 | 210 | 193 |
| Estimated Total Revenue Requirements[3] | $ 452 | $ 811 | $ 546 |
| Lifetime Revenue Requirements | | | |
| Fuel, O&M[1,4] | $ 501 | $2,764 | $1,486 |
| Fixed Charges[2,4] | 1,102 | 595 | 534 |
| Total Present Value Revenue Requirements[4] | $1,603 | $3,359 | $2,020 |

[1]Fuel burned, payroll, other O&M

[2]Plant depreciation, income taxes, operating income, other taxes including gross receipts, nuclear decommissioning

[3]Not present valued

[4]Present valued to 1979 at 10.5%

## Data and Assumptions

### TMI-1 and Fossil Alternatives

In-service date, all plant types 9/74

| Type | Nuclear | Coal | Oil |
|---|---|---|---|
| Location | TMI | TMI | TMI |
| Capital Cost, including AFC 1974 $/KW | 518 | 300 | 264 |
| Fuel and O&M, Mills/KWH | | | |
| 1974 | 4.3 | 13.6 | 22.7 |
| 1975 | 5.2 | 13.7 | 23.9 |
| 1976 | 6.2 | 12.3 | 26.3 |
| 1977 | 4.1 | 12.3 | 28.2 |
| 1978 | 4.9 | 14.3 | 27.5 |

| | |
|---|---|
| Post-1978 Fuel and O&M Escalation Rate | 7% |
| Average 1974-1978 TMI Capacity Factor | 78% (Actual) |
| Average 1974-1978 Coal and Oil Capacity Factor | 65% |
| Post-1978 Capacity Factor, all types | 65%* |
| Nuclear Decommissioning, 1978 $ | $39.6 Million |
| Discount Rate | 10.5% |
| Rate of Return, Composite | 10.5% |
| Gross Receipts Tax, Composite (% of pre-Tax Revenue) | 7% |

Income Tax Rates, Composite State and Federal Weighted for Ownership Allocation

| | |
|---|---|
| 1974-1976 | 52.12% |
| 1977-1978 | 52.55% |
| 1979 on | 50.73% |

*Future estimate based on an average of national and GPU nuclear experience.

# GPU System Estimated Revenue Requirements

## Oyster Creek and Fossil Alternatives

Millions $

| | Oyster Creek Nuclear | Oyster Creek Oil Plant | Western Coal (Keystone) | Eastern Coal (Portland) | Eastern Coal (Oyster Creek) |
|---|---|---|---|---|---|
| **1970-1978** | | | | | |
| Fuel, O&M[1,3] | $ 150 | $ 576 | $ 270 | $ 358 | $ 399 |
| Fixed Charges[2,3] | 211 | 175 | 179 | 158 | 163 |
| Estimated Total Revenue Requirements[3] | $ 361 | $ 751 | $ 449 | $ 516 | $ 562 |
| **Lifetime Revenue Requirements** | | | | | |
| Fuel, O&M[1,4] | $ 404 | $2,246 | $1,135 | $1,400 | $1,519 |
| Fixed Charges[2,4] | 568 | 518 | 464 | 429 | 443 |
| Total Present Value Revenue Requirements[4] | $ 972 | $2,764 | $1,599 | $1,829 | $1,962 |

[1] Fuel burned, payroll, other O&M

[2] Plant depreciation, income taxes, operating income, other taxes including gross receipts, nuclear decommissioning

[3] Not present valued

[4] Present valued to 1979 at 10.5%

## Data and Assumptions

## Oyster Creek and Fossil Alternatives

In-service date, all plant types 12/69

| Type<br>Location | Nuclear | Coal<br>Keystone | Coal<br>Portland | Coal<br>Oyster Creek | Oil<br>Oyster Creek |
|---|---|---|---|---|---|
| Capital Cost, Including AFC, 1969 $/KW | 168 | 148* | 118 | 118 | 104 |
| Fuel and O&M, Mills/KWH | | | | | |
| 1970 | 3.2 | 3.7 | 6.7 | 6.7 | 7.4 |
| 1971 | 2.5 | 4.7 | 6.3 | 6.9 | 8.1 |
| 1972 | 2.6 | 4.8 | 6.8 | 7.2 | 8.7 |
| 1973 | 3.4 | 5.3 | 7.0 | 7.8 | 9.0 |
| 1974 | 5.1 | 8.4 | 12.3 | 14.1 | 22.7 |
| 1975 | 5.9 | 8.6 | 15.9 | 18.6 | 23.9 |
| 1976 | 4.6 | 9.5 | 13.9 | 16.3 | 26.3 |
| 1977 | 7.3 | 12.4 | 14.1 | 16.8 | 28.2 |
| 1978 | 7.6 | 13.9 | 16.9 | 18.3 | 27.5 |

| | |
|---|---|
| Post-1978 Fuel and O&M Escalation Rate | 7% |
| Average 1970-1978 Oyster Creek Capacity Factor | 67% (Actual) |
| Average 1970-1978 Coal and Oil Capacity Factor | 65% |
| Post-1978 Capacity Factor, all types | 65%** |
| Nuclear Decommissioning, 1975 $ | $26.8 Million |
| Discount Rate | 10.5% |
| Composite Rate of Return | 10.5% |
| Gross Receipts Tax (% of pre-Tax Revenue) | 14% |
| Income Tax Rates, Composite State and Federal | |

| | Pa. Plant | N.J. Plant |
|---|---|---|
| 1970-1971 | 50.08% | 48% |
| 1972 | 49.99% | 48% |
| 1973 | 49.91% | 48% |
| 1974-1976 | 49.65% | 48% |
| 1977-1978 | 49.82% | 48% |
| 1979 on | 47.89% | 46% |

*Includes incremental transmission construction cost of $30/KW

**Future estimate based on an average of national and GPU nuclear experience