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PUBLIC UTILITY COMMISSION

LAW'S OFFICE
Public Utility Commission

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Pennsylvania Public Utility Commission, et al. :
versus Philadelphia Electric Company. :
Investigation into a requested $660 million :Docket No.
annual rate increase. :R-850152
:
Further Hearing :
:

- -x

Pages 3185 through 3449

Hearing Room 2
North Office Building
Harrisburg, Pennsylvania

Thursday, February 13, 1986

Met, pursuant to adjournment, at 9:35 a.m.

BEFORE:

JOSEPH MATUSCHAK, Administrative Law Judge

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DOCKETED
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C O N T E N T S

WITNESSES	DIRECT	CROSS	REDIRECT	RECROSS
John W. Wilson				
By Mr. Clark	3223		--	
By Mr. MacGregor		3227		--
By Mr. Popowsky		3263		
Arie P. Schinnar				
By Mr. Rainey	3268		3423	
By Mr. Calvert		3283		3434
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By Mr. Wersan		3403		
By Mr. Widoff		3406		
By Mr. Clark		3413		
By Mr. Kleppinger		3420		

E X H I B I T S

NUMBER	FOR IDENTIFICATION	IN EVIDENCE
Governor's Energy Council Statements		
GEC-1A and LB (Wilson)	3224	3226
City of Philadelphia Statements		
1 (Schinnar)	3269	3282
City of Philadelphia Exhibits		
2 (Starloc Model Specifications)	3282	3282
Philadelphia Electric Company Exhibits		
22 (Wharton PMW Report No. 8618)	3294	3403
23 (IR-PECO-CITY-6 Set VI)	3299	3403
24 (IR-PECO-CITY-6 Set VI)	3299	3403

E X H I B I T S (Continued)

NUMBER		FOR IDENTIFICATION	IN EVIDENCE
	Philadelphia Electric Company Exhibits		
25	(1981 Dollar Deliveries...)	3357	3403
26	(IR-PECP-CITY 6 Set VI)	3364	3403
27	(IR-PECO-CITY 2 Set II)	3384	3403
28	(Portion of PP&L Electric Tariff)	3387	3403
29	(Portion of computer printout)	3391	3403
30	(IR-PECO-CITY 2 Set 2)	3402	3403

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P R O C E E D I N G S

ADMINISTRATIVE LAW JUDGE JOSEPH MATUSCHAK: This is the time and place fixed for further hearing in the matter of Pennsylvania Public Utility Commission versus the Philadelphia Electric Company at Docket No. R-850152.

We understand the parties here present have oral argument on a motion in limine of Philadelphia Electric Company to strike certain testimony of the Office of Consumer Advocate. Mr. MacGregor?

MR. MacGREGOR: Yes, Your Honor.

Before we proceed to the motion, I have one preliminary matter concerning scheduling that I would like to get out of the way, if I could.

We have hearings scheduled next week for the 18th, 19th, 20th and 21st to cross-examine various rate structure testimony filed by parties other than the company in this proceeding.

I have been in contact with the various parties who are presenting witnesses next week and have inquired generally about the amount of cross-examination they expect to have.

It appears that we can complete the cross-examination of those witnesses in three days. And with the availability of the various witnesses, I have set up a schedule of hearings for the 19th, 20th and 21st. That would allow us to cancel the 18th.

Let me state for the record what those witnesses are, and if that is acceptable to Your Honor, I can send out a letter by express mail to all the parties tonight informing them of the schedule.

The 18th, as I said, would be cancelled. On the 19th, we would take Mr. King, Mr. Figley, Mr. Larson, Mr. Bloom and Mr. Pollock.

Then on Thursday, the 20th, we would take Mr. Ross, Mr. Grier, Mr. Sterzinger, Mr. Rudden and Mr. Vuchic.

Then on Friday, we would take Mr. Feldman, Mr. Wirtshafter, and Mr. Oliver. It may be necessary that we will have to extend the days to some extent to cover those, depending on the amount of the cross, but I thought it would be better to have three long days rather than four short ones.

JUDGE MATUSCHAK: I agree with you. If they have to be long days, I'd rather have the first two days extended rather than the last day.

Does that meet the consensus of counsel in this case? I know Mr. Ryan indicated he would have Mr. Larson on the 19th.

MR. MacGREGOR: And we have scheduled him in accordance with that request, Your Honor.

JUDGE MATUSCHAK: If that meets with the approval of counsel, we will cancel the hearing scheduled for February 18th, and convene at 10:00 in Philadelphia on February 19th,

and then continue with the 20th and 21st.

MR. MacGREGOR: Thank you, Your Honor.

Your Honor, with respect to the company's motion, on January 22, 1986, the company filed a motion to strike those portions of the testimony of OCA witnesses Hanauer and O'Brien addressing the issue of the alleged imprudence of General Electric in the testing and design of the Mark II containment structure on the ground that the relitigation of this issue in this proceeding is barred by the doctrine of collateral estoppel.

As set forth in our motion, Pennsylvania case law clearly establishes that collateral estoppel does apply in public utility rate proceedings in Pennsylvania where the underlying facts at issue are historic and not subject to change.

General Electric's testing of the Mark II containment and the discovery of the Mark II containment problem all occurred in the 1960's and 1970's and are clearly historic facts and events, and the OCA does not dispute this point in their answer.

In addition, it is the company's view that all the other requisite elements of collateral estoppel are present. The issue of GE imprudence was fully litigated by the OCA in the 1983 PP&L rate case, and the issue was decided against the Consumer Advocate.

We believe they are therefore barred from relitigating that issue in this proceeding. The Company believes that this case is the same as Philadelphia Electric Company versus Pennsylvania Public Utility Commission, 433 Atlantic 2nd, where the Commonwealth Court held that Philadelphia Electric Company was barred from relitigating issues related to the prudence of its management in the construction of the Salem 1 nuclear plant.

If PECo is barred from relitigating the prudence issues related to Salem 1, then the OCA should be barred from relitigating imprudence issues previously decided against it as well, in this instance the question of whether General Electric was prudent in its design of the Mark II containment.

Now, the OCA's answer raises five points in opposition to the company's motion: first, as I understand, that the OCA was not a party to both proceedings; or was a party in a different capacity in the two proceedings;

Second, the issue is not the same in this case because of changes in the legal context or the applicable law;

Third, the issue was not fully litigated in the PP&L case;

The fourth point, relating to the allocation of the burden of proof;

And the fifth point being that the company's motion was not timely filed.

I would like to briefly respond to each of these, and hopefully demonstrate that they provide no basis for rejecting the company's motion.

In reviewing the OCA's answer, it appears that their principal argument is that the party against whom collateral estoppel is asserted in this proceeding, the Consumer Advocate, is not the same in the two cases because in the PP&L rate case, the OCA was representing PP&L ratepayers while in this case the OCA was representing PECo ratepayers. Therefore, collateral estoppel does not apply.

Three points in response to this, Your Honor:

First, regardless of who the OCA is representing, it is clear that it is the OCA who is the party in this case case and was the party in the PP&L case.

And if you look at the OCA's enabling legislation in 71 Purdon's statutes, it states that, "Any action brought by the Consumer Advocate before a court or an agency of this Commonwealth shall be brought in the name of the Consumer Advocate." The Consumer Advocate is the named party in the complaint in this case. They are the named party in the PP&L case.

Regardless of who they are representing, it is clear that they were a party to the PP&L case and they are a party

to this case.

Secondly, Your Honor, the Consumer Advocate's answer cites no case law, and there is no case law to my knowledge holding that a Pennsylvania state agency can avoid application of collateral estoppel simply because it represents members of the public.

The government always appears as a representative of a party in any proceeding, but this does not mean that collateral estoppel does not apply.

On the contrary, the case law is clear that collateral estoppel does apply to Pennsylvania government and its agencies.

I would provide Your Honor with the following citations in support of that proposition:

Volume 50, Corpus Juris Secondum, Section 818;

Volume 20 of the Pennsylvania Law Encyclopedia, Section 326.

JUDGE MATUSCHAK: What's the first page or section in Volume 50?

MR. MacGREGOR: Volume 20.

JUDGE MATUSCHAK: The first one, you say Volume 50?

MR. MacGREGOR: Yes, sir.

JUDGE MATUSCHAK: What was the section?

MR. MacGREGOR: 50 C.J.S. Section 818.

And the second citation is Volume 20 of the

Pennsylvania Law Encyclopedia, Section 326;

Section 18.05 of Davis' Text on Administrative Law.

I would cite two Pennsylvania cases, the first being Shadis versus Beal, Secretary of the Department of Public Welfare, 520 Federal Supplement 858, Eastern District, Pennsylvania, 1981, affirmed by the Third Circuit, 685, Federal Section, 824.

The other case is Consumer Party versus Tucker, Secretary of the Commonwealth of Pennsylvania, 364 Federal Supplement 594, Eastern District, Pennsylvania, 1973.

Each of these authorities holds that collateral estoppel can apply against a government agency. The OCA is a state agency. It is no more and no less than that.

And since collateral estoppel clearly applies to state agencies, it must also clearly apply to the OCA, and there is no basis for a different result simply because the OCA appears in a representative capacity.

The OCA relies heavily in its answer on Section 28(5) of the Restatement of Judgments which states that collateral estoppel may not apply where there is a clear and convincing need for a new determination of the issue because of the potential adverse impact of the determination on the public interest or interest of persons not themselves party in the initial action.

Your Honor, three points in response to that

reference: to my knowledge, this section has never been specifically adopted, and the OCA cites no Pennsylvania case law adopting it.

I would also note that on its face, it is a very narrow exception, only applying where there is "a clear and convincing need for an exception." And I would further reference page 289 of the Restatement, which are the notes following Section 28, which states that such situations -- that is those covered in Subsection 5 -- are and should be infrequent.

The company believes there is no clear and convincing need in this case to relitigate an issue when the exact issue was litigated and decided adversely to the OCA in another proceeding.

In addition, Your Honor, I think it is important to consider the consequences of adopting the OCA's position on this point.

First, if it is adopted, it would appear to me that collateral estoppel would never apply against the Office of Consumer Advocate.

The group of ratepayers that it represents obviously would change over time, and will always be different from case to case, even in a case involving the same utility.

The group of ratepayers is always changing. It is never going to be the same, and I think if you adopt the

OCA's position on this point, you will essentially be saying that collateral estoppel cannot apply against the OCA. I don't think that is in accordance with law or policy.

The same is true, as I said before, of any government agency. If government is to be viewed as representing the public, the public is always changing. The citizens of Pennsylvania are always changing.

And if you adopt this theory, there would simply be no collateral estoppel against the government, and that is simply not in accordance with the case law.

We simply don't think that there is any reason in the law or public policy as to why the OCA should be given special or preferred treatment.

The OCA is a party to this case like anybody else, and there is no reason they should be above or beyond the law simply because they represent ratepayers rather than shareholders.

Now, the OCA repeatedly asserts in its answer that we are trying to somehow take away rights from PECo ratepayers, and that is simply not true, Your Honor.

We are not trying to bar PECo ratepayers from litigating any issue in this case. We are trying to stop the Consumer Advocate, who was a party to both of these cases, from relitigating an issue it lost in a previous proceeding.

The next argument by the OCA is that collateral estoppel should not apply in this case because the legal context has changed.

Again, to my understanding, the rule is that collateral estoppel will not apply where there had been a clear change in the law on the relevant issues.

And it is clear in my view that there has been no change in the law. The OCA cites the adoption of Section 515 in 1308(f) to the Public Utility Code which requires utilities to provide an explanation of cost increases in major plant additions.

This obviously does not change the law of what constitutes imprudence and whether General Electric was imprudent. It simply requires the utilities to provide an explanation of cost increases.

The rule of law as to what constitutes imprudence by a party has not changed, to my knowledge, and I don't believe the OCA cites anything to indicate that it has.

The OCA also cites the Commission's recent ECR-8 order on the issue of whether a utility may be held vicariously liable for the actions of its contractor.

Again, this is not the issue we are trying to bar relitigation of, Your Honor. Vicarious liability is not part of our motion.

We are simply trying to bar relitigation of the issue

of whether General Electric was imprudent in the testing and design of the Mark II containment, and this has nothing to do with the question of vicarious liability.

In any event, there has been no change in the law. The Met-Ed cases which the OCA cites in its briefs were decided prior to the PP&L case, and they were argued extensively by the Consumer Advocate in its brief to the Commission in the PP&L case, so that there really has been no change in the law, in my view.

The OCA also appears to argue that the issue was not fully litigated in the PP&L case. I think I don't need to respond in any great detail on that.

I think if you will review the testimony attached as Appendix C to our motion, you will see that the issue was extensively presented and discussed by the OCA's witness.

I would note that on page 22 of its answer, the OCA quotes six lines of testimony from Mr. Bridenbaugh's testimony in the PP&L case.

I don't want there to be any implication that that constitutes Mr. Bridenbaugh's entire discussion of this issue. His discussion of the Mark II containment issue went on for several pages, and those were included as Attachment C to our appendix.

Now, the OCA also appears to argue that collateral estoppel can only apply against the party who has the burden

of proof in a proceeding. Again, they don't cite any cases to support this view.

PP&L had the burden of proof in its rate case. PECo has the burden of proof in this case, but the issue we are talking about is whether General Electric was imprudent or not. And the Commission found that General Electric was not imprudent in the PP&L case, and I can't see any basis for relitigating that issue now simply because the OCA didn't have the burden of proof in either case.

Finally, Your Honor, the OCA asserts that our motion was not timely filed. I would strongly disagree with that characterization.

The company is not required to file a motion to strike until a witness takes the stand and his testimony is offered into evidence.

In the number of cases I have been involved in over the past several years, the normal time I see a motion to strike filed is when I put my witness on the stand and offer his testimony, and I go to move it into evidence, and somebody moves to strike it.

We filed our motion to strike substantially before the time Mr. Hanauer and Mr. O'Brien were cross-examined, so I believe we filed it earlier than we were required to under any Commission rules or regulations.

In summary, Your Honor, I think our motion clearly

establishes that all the requisites under Pennsylvania law for collateral estoppel are present in this case, and we don't believe that the OCA should be provided with any special exception or preferred treatment, and that collateral estoppel should apply to them just as it applies to Philadelphia Electric Company or any other party in a public utility proceeding. Thank you.

JUDGE MATUSCHAK: Mr. MacGregor, what is the position of the company as to whether PECo customers would be estopped from raising the issue of GE imprudence in the design of the Mark II?

MR. MacGREGOR: They would not be barred, Your Honor.

JUDGE MATUSCHAK: They would not be barred.

Isn't the Consumer Advocate's representation here as a party, in that representation, isn't the real party in interest here PECo customers rather than Consumer Advocate?

MR. MacGREGOR: I disagree with that, Your Honor. The statute gives the OCA automatic standing to participate as a party in rate proceedings.

The statute states that they are to appear as the representative of ratepayers. That doesn't change the fact that they are the party in interest, and they are certainly not the only representative of PECo ratepayers.

They only represent generally a portion of the PECo ratepayers. And the fact that they happen to be representing

ratepayers as opposed to shareholders or anybody else, there is nothing in the law I can find that indicates that that should give them some different treatment under collateral estoppel.

Any government agency represents the public or represents the people. And I don't think that fact alone should be enough to hold that collateral estoppel doesn't apply.

JUDGE MATUSCHAK: What in effect you are telling us is that if PECo customers utilize the services of the Consumer Advocate as provided by the Legislature to represent such consumers, that if they engage the services of the Consumer Advocate at no expense, they are barred, but if they go out and hire their own attorney, their own experts at their own expense, they are not barred; is that your position?

MR. MacGREGOR: Your Honor, it is my position that the OCA is a party to this case and should be treated like any other party.

There are many other groups that represent PECo ratepayers other than the Consumer Advocate: Community Legal Services; the Consumer's Education and Protective Association who are participating in this proceeding.

Many other PECo ratepayer groups have filed complaints in this case and have proceeded. Now, the Legislature has

chosen to provide one way for ratepayers' interests to be heard, through a state agency. The Consumer Advocate is a state agency with the responsibility of presenting ratepayers' interests in utility rate proceedings.

They are not PECo ratepayers. The complaint they file says, "The Consumer Advocate." PECo ratepayers have never consented to have OCA be their sole representative in any proceeding, and in fact they are never the sole representative of ratepayers in a rate case.

They are just one party like any other party in the case. And many parties represent ratepayers. I don't see that that is a basis for not applying collateral estoppel.

The City of Philadelphia participates in this case as a representative of the citizens of Philadelphia. That doesn't seem to me to mean that collateral estoppel doesn't apply because the citizens change all the time.

The same with any other party. Mr. Kleppinger represents a group of industrial customers that are formed into a group.

I don't think that he can avoid application of collateral estoppel by changing the members of his group from case to case.

The complaint is filed as his group of customers. There has to be a party in every proceeding. I think for the OCA to walk in here and say, "We're not the Consumer Advocate,

we're PECo ratepayers," is first of all, not true, and overstates their role and function in this proceeding.

JUDGE MATUSCHAK: Does the word "advocate" in itself indicate that the Consumer Advocate is acting in a representative capacity as a high-powered attorney to represent the consumers involved in this particular case?

MR. MacGREGOR: Your Honor, I don't deny that the OCA appears in this case as a party to represent the interests of ratepayers.

JUDGE MATUSCHAK: In some jurisdictions, they refer to what would be the Consumer Advocate here as People's Counsels or Public Counsel.

Doesn't that infer that he is acting in the nature of -- although he is technically a party -- he is acting in a representative capacity as counsel for the particular interests that are involved in that particular case? The Consumer Advocate has cited our order in Consumer Advocate against West Penn Power Company, C-823151, December 7, 1982.

We said, "The Consumer Advocate has been authorized by the Legislature to represent the consumers of public utilities in protecting their interests before this Commission. The Office of the Consumer Advocate was created with the full realization that the consumers, especially individual residential consumers, cannot adequately represent themselves in utility matters before this Commission, and that the

functions of the Commission can best be performed in an adverse proceeding by counsel at least as skilled as counsel for the public utility companies, and presents resources sufficient to conduct in-depth investigations and to enlist expert evidence."

And there we also said, "If on the other hand, West Penn would agree that consumers individually or as a group have standing but not through the representation of Consumer Advocate, then its objection would not be against standing as such, but only against effective standing, a position that would certainly be contrary to the intent and will of the Legislature."

Aren't you in effect stating that PECo customers in this case have standing, and they have a right to not be barred by collateral estoppel? If they engage counsel of their own choosing at their own expense, and experts at their own expense, they are not barred, but if they make use of the Office of Consumer Advocate at public expense, then they are barred. Does that sound right?

MR. MacGREGOR: Yes, Your Honor, I think that is the right result. I agree with everything you quoted before and stated.

There is nothing in our motion that goes against that. The OCA has to be treated as a state agency like any other state agency, and the case law holds that collateral estoppel

applies against state agencies.

The fact that the OCA represents ratepayers, in my view, shouldn't mean that they are allowed to go around in 25, 30 different public utility rate cases in this state and raise the same issue over and over and over and over and over again, simply because they happen to be representing a different group of ratepayers in that case.

Most issues, a number of issues, depend upon the particular circumstances and actions of a utility. We are not trying to bar relitigation of any actions taken by Philadelphia Electric Company with respect to solving the Mark II containment problem.

We are dealing here with a generic issue of whether General Electric Company prudently designed and tested the Mark II containment.

That issue is exactly the same in this case as it was in the PP&L case. And I can't see any public interest that is served by allowing the OCA to simply say, "We're representing ratepayers," to come in and relitigate an issue that they lost before.

JUDGE MATUSCHAK: Don't you agree that underlying all discussion of the collateral estoppel and res judicata is the principle of fundamental fairness, and due process sense is really what we're looking for?

MR. MacGREGOR: Yes, Your Honor.

JUDGE MATUSCHAK: Is that fundamentally fair to PECo ratepayers?

MR. MacGREGOR: Absolutely, Your Honor. We are not trying to deprive PECo --

JUDGE MATUSCHAK: To say that you are not barred if you go out and spend your own money, if your raise your own money for counsel and for any experts, it's all right if you do that, but if you make use of a service that has been provided by the Legislature at no cost, then you are barred? Does that sound fair?

MR. MacGREGOR: Yes, it does, Your Honor, because every state agency provides services to the public. The Consumer Advocate provides a service to the public. The Public Utility Commission provides a service to the public. The Department of Public Welfare -- every state agency provides certain services to the public.

JUDGE MATUSCHAK: That may be so, but in those cases, they represent the public as a given, the public as all the members of the public of the Commonwealth.

But in these rate cases, the Consumer Advocate does not represent PECo customers in a PP&L case. He doesn't represent Met-Ed customers in the PP&L case. He doesn't represent West Bend customers in the PP&L case. In each rate case, he is representing the customers of that particular utility, so it's a little different from a state agency

that represents all the public in a general sense, than a state agency which has been established by the Legislature to represent particular customers in a proceeding, in a rate proceeding on the grounds that usually the customers, especially residential customers, cannot adequately represent themselves in the adversary proceeding.

MR. MacGREGOR: I think if you adopt that result, Your Honor, what you're saying is that collateral estoppel doesn't apply to the Consumer Advocate.

And I don't think that's a fair result, I don't think it's a result that's in accordance with the law. The fact that they appear as a representative of ratepayers should not change the application of the law of collateral estoppel.

Philadelphia Electric Company represents its shareholders, and its --

JUDGE MATUSCHAK: Every policy has a purpose. And while the doctrine of collateral estoppel has a purpose to bring some finality to litigation, we question whether it should be so rigidly applied as to create an injustice or a failure to provide adequate representation for the PECo customers in this case.

MR. MacGREGOR: Your Honor, I would just note that we have a somewhat unusual circumstance here with the issue involved. Most issues in most circumstances are going to

involve the reasonableness of a particular claim by the company. A fair rate of return, claimed rate base, sales levels, expenses, structure of the rates are obviously going to be different issues for every utility, and obviously in those circumstances the issue would not be the same, and collateral estoppel would not apply.

We have a special issue here that is exactly the same in the two cases: How General Electric designed and tested the Mark II containment.

And I think you may be right. As a general proposition, under the approach we are taking here, the OCA is not going to be barred from one case to the next. It's difficult to think of another issue like this on which they would be barred.

They are free to argue PECo's rate structure in this case. They are free to argue revenues, expenses, rate base, return, all the other normal rate case issues, and any actions taken by Philadelphia Electric Company with respect to the construction of Limerick.

But on this one, special issue, which is different than most rate case issues because it involves completely historic facts of a third party, General Electric, who was the contractor or the designer of the Mark II containment for both the Susquehanna and Limerick plant, the issue is: were GE's actions in the 1960's in testing and designing the

Mark II containment prudent or not.

That issue doesn't change from rate case to rate case, from utility to utility. That is exactly the circumstance that led the Commonwealth Court to say that collateral estoppel can apply to these special issues that solely involve historic facts.

JUDGE MATUSCHAK: Don't we have two issues of public policy here? We have first the issue of public policy in regard to collateral estoppel, to realize some finality to decisions of the Commission of this case.

And on the other hand, isn't there also a public policy that any party should not be deprived of a fair adversary proceeding in which to present its case, and in this case I am referring to PECo.

You state, if you break down and consider PECo as another party, as a real party in interest in this case, then in effect what you're saying is the Consumer Advocate will not be bound in any event because customers as such change and so forth.

We will go along with you on that, that even though the customers are changed, the Consumer Advocate may be bound in a particular utility adversary proceeding.

But we don't go along, and we don't see that necessarily that because the Consumer Advocate represents customers in the PP&L case, for instance, that all consumers

throughout the Commonwealth of Pennsylvania should be barred by that representation of the Consumer Advocate, if they want to utilize a service that has been provided by the Legislature at great cost and public expense.

MR. MacGREGOR: Your Honor, I agree with you, and the law of collateral estoppel as developed and applied in this Commonwealth will assure, in 99 percent of the cases, that that result does not happen, because the issues are simply not going to be the same.

We have a special case here of an issue that is exactly the same. Ratepayers had a fair and full hearing on this issue through the Consumer Advocate in the PP&L case. I don't see how it's unfair --

JUDGE MATUSCHAK: Which ratepayers?

MR. MacGREGOR: PP&L ratepayers. What unfairness is there to PECo ratepayers in not allowing them to relitigate an identical issue that was decided by this Commission in 1983? If there was some difference that required an additional hearing, that would be one thing. We are dealing with historic facts related to General Electric in the 1960s that are absolutely identical in both cases. I don't think, in weighing the policy interest, there is any unfairness to anybody in barring relitigation of this issue.

JUDGE MATUSCHAK: But at the same time, you say that PECo ratepayers are not barred by collateral estoppel. They

could raise the issue if they wished.

MR. MacGREGOR: That is correct, Your Honor.

JUDGE MATUSCHAK: So, in effect, what you are saying is, if they want to raise the issue at their own expense -- and they may not have the resources of the company -- but they can raise that issue at their own expense, and hire experts at their own expense, they are not barred.

But if they want to take advantage of the Office of Consumer Advocate, which the Legislature has provided at considerable expense, that they are barred. It just doesn't sound right to us.

MR. MacGREGOR: Your Honor, I believe it's a fair result, because it only applies to this one issue. Every other issue in this case, to the best of my knowledge, is different, and the OCA is entitled to represent PECo ratepayers on every other issue in this case.

I don't think that stating that where the issue is exactly the same in a very rare case, where you have an identical issue in two different rate proceedings, that's exactly the same and it makes no difference whether it's Philadelphia Electric Company, PP&L, Duquesne Light or any other company -- the issue of what General Electric did or did not do in the design and the testing of the Mark II containment is exactly the same -- I don't think it's unfair in that circumstance for the Commission to only have to

litigate that issue once, rather than in every Mark II containment nuclear plant that comes into service in this case.

And there are more instances than just PP&L and PECo of utilities who use Mark II containment. If the OCA loses the issue here, they'll litigate it in the Penn Power case and they'll litigate it in the Duquesne case.

I think there has to be some limit on what can be done here. Where the issue is exactly the same, I don't see how there is any unfairness in not requiring this Commission to hear the same argument over and over and over again.

JUDGE MATUSCHAK: You say they could hear it if the PECo customers raise that issue themselves. If they litigate themselves, this Commission has to hear it.

MR. MacGREGOR: Yes, they do. Unfortunately, that is true, Your Honor, under the principles of collateral estoppel.

JUDGE MATUSCHAK: What you are saying, in effect, is that the PECo customers have a right to litigate the matter over again --

MR. MacGREGOR: Yes, Your Honor.

JUDGE MATUSCHAK: -- themselves, but they have no effective right to litigate, as we said, effective standing in the West Penn case. They have no effective right to litigate the matter because they may not have the resources that the Commonwealth has provided through the Consumer

Advocate.

MR. MacGREGOR: Your Honor, I think that assumes that the Office of Consumer Advocate is the only representative of PECo ratepayers.

The Commission Trial Staff represents the public interests in these proceedings, and PECo's ratepayers are represented by other groups as well, some groups well-funded and with well-qualified attorneys representing them who could raise this issue in this case.

JUDGE MATUSCHAK: Then we come to this question of whether your motion is timely. I think it can be pretty well agreed that in rate cases usually, in order to conserve resources of all the parties, that usually the parties litigating the case against the utility usually provide some division of the issues that will be represented by the various parties, so that each party doesn't have to provide testimony on all the issues, and there is some sharing of responsibility for concentrating on certain issues by certain parties.

Here, in effect, hasn't PECo waited until it is too late for any other party or PECo customers in their own capacity to come in and litigate this matter, and thereby deprive the PECo customers of litigating the matter in their own right or by the Staff or some other party taking up the burden and litigating the matter on behalf of -- say the

Governor's Council, for instance, or the Staff would come in -- well, the Staff, I guess, was in the PP&L case.

Suppose the Governor's Council or some other party that was not involved in the PP&L case came in and said, well, if the Consumer Advocate can't do it, if they're barred, we'll pick the issue up and we'll litigate it.

Now, they would not be barred if they were not a party to the PP&L case, is that right?

MR. MacGREGOR: That is correct, Your Honor.

JUDGE MATUSCHAK: Very well. We'll hear from Mr. Wersan.

MR. POPOWSKY: I will speak for the Consumer Advocate and try to be brief. We did file a 33-page response to the company's motion. I will try not to reiterate the arguments, but I will try to reply to certain of Mr. MacGregor's contentions, and also to answer some of the questions that you have raised, Your Honor.

I think that your reference to the West Penn case is the heart of the matter. If, as the company now says, they are not trying to bar PECo ratepayers from litigating the Mark II claim but they are only trying to prevent the Office of Consumer Advocate from litigating it on behalf of PECo ratepayers, then as you said in the West Penn case, PECo is challenging the effective ability of PECo ratepayers to defend themselves against this claim.

There is no dispute that the company, for the first time in this case -- that is, Philadelphia Electric Company--is asking Philadelphia Electric Company ratepayers to pay $136 million of direct costs plus AFUDC for the cost of correcting the Mark II containment design problems.

The Office of Consumer Advocate has undertaken an extensive, expensive investigation on behalf of PECo ratepayers. We secured the services of a gentleman whom we believe to be one of the top experts in the nation on nuclear safety issues, who has testified in this case that the genesis of the problem was in the imprudence of General Electric, that PECo ratepayers should not have to pay for that imprudence.

It is unrealistic and unfair to suggest that individual ratepayers, that CEPA or even PAIEUG, the industrials, should have to go to the expense and effort to put together this type of a case which is the type of case that the Office of Consumer Advocate was specifically created to present.

I am not aware of any other parties that have been able to put on the kind of expert, independent nuclear engineering and other testimonies similar to that which we have been able to put on in this case.

And as you said in the West Penn decision, "The resources of the Consumer Advocate are not unlimited, so the Legislature left it to the Consumer Advocate's discretion as

to the consumer interests in which he will become involved before this Commission."

The Consumer Advocate has determined to defend PECo ratepayers in this proceeding to the best of our ability, and we have decided to expend the resources on behalf of PECo ratepayers who have never before had an opportunity to defend themselves against this claim.

The company indicates that there is no unfairness in preventing PECo ratepayers from relitigating this issue, and they insist that the OCA should not be able to relitigate an issue that they lost on some other case in another part of the state.

But what if PP&L had lost the Mark II issue? The company, even though they of course were also represented by Morgan, Lewis & Bockius in the PP&L case, the company in this case, Philadelphia Electric Company, would undoubtedly have a right to make the same claim that it made in this case, that is they would have a right to present the Commission with their Mark II costs and present testimony that the costs of the Mark II containment problem were prudently incurred and that they did everything within their power to correct that problem prudently.

We believe it is unfair and in fact inconceivable that the General Assembly, by creating a single Office of Consumer Advocate to defend ratepayers, intended to create a double

standard where each utility has a due process constitutional right to litigate every claim on its own behalf -- in fact, litigate every claim on its own behalf at ratepayer expense, since ratepayers are paying their rate case expense anyway -- but then prohibit the Consumer Advocate, which was designated by the General Assembly to represent consumers from case to case.

We think that is a total perversion of the principle of creating a single Office of Consumer Advocate. And I think you are correct, Your Honor, in distinguishing the Consumer Advocate perhaps even from other state agencies.

While a state agency may represent the Commonwealth as a whole in various cases and therefore the principle of collateral estoppel may apply against that same state agency in different cases, the Consumer Advocate is quite different and is, in fact, I suppose you would call a hybrid.

We are a state agency, but in each case we sign on to represent the particular ratepayers involved in that case. We have no other standing in this case other than as the representative of PECo ratepayers.

We had no standing in the PP&L case other than as the representative of PP&L ratepayers. What the company is trying to do is to deny PECo ratepayers in effect effective representation in this case, because of what happened to PP&L ratepayers in a prior case.

I will not discuss the facts and law applicable to the PP&L case, unless you have any questions, other than to point out that in that case, the Administrative Law Judge at least believed that there was a serious question as to whether the prudence of imprudence of GE was even a proper issue before him at the time.

He did find, we agree, that there was no evidence of GE imprudence in that case. He did not find, he did not clearly find in any case, that everything that GE did and everything that was done as a result of GE's actions were prudent.

But in any case, PE ratepayers, Philadelphia Electric ratepayers certainly have never had an opportunity to question the prudence and efficiency of the design and construction of the Mark II containment at Limerick.

I would also agree with Your Honor that the question of whether to apply the doctrine of collateral estoppel in a particular case is not just an issue of administrative expediency. It's also an issue of fairness and due process to the parties involved.

We did cite examples from the Restatement of Judgments in which even where the parties and the issues are identical, that there are certain policy reasons, such as where one segment of the public is represented in one case and not in another, there are certain areas where relitigation, the need

for relitigation simply outweighs any benefits that occur from administrative expediency.

And here, the need for PECo ratepayers for the first time to defend themselves against a nearly $200 million rate base claim which our witness contends is imprudent, we think that the ability of PECo ratepayers to so defend themselves outweighs any administrative expediency from preventing relitigation.

Mr. MacGregor indicates that the OCA apparently believes that it is never bound by principles of collateral estoppel, and that we like the company should be bound, for example, as the company was in the Salem 1 imprudence case.

Your Honor, we have not attempted to relitigate the Salem 1 imprudence case. We were successful in winning a certain adjustment in that case.

We have not attempted to go back and expand on that or to say, oh, no, on second thought, there were more costs in Salem 1 that were imprudent that we weren't aware of at the time.

I think it is a completely different argument if the OCA, in a case with the same company and the same plant, were to attempt to say that collateral estoppel did not apply.

But here we're dealing with two different companies, two completely different sets of ratepayers, two different plants, and a major rate base claim which is being made for

the first time by the company, with expert testimony, paid for by the ratepayers in this case.

Basically, it is our feeling that, as Dr. Hanauer said in his testimony, the utilities in Ohio with the Zimmer plant, they have sued GE for the costs of the Mark II containment errors. In Philadelphia, the company has decided to sue the ratepayers.

We are defending the ratepayers. We don't believe these costs should be charged to ratepayers. And we think that as the statutorily authorized representative of the ratepayers, we have to have a right to present testimony to defend against that claim.

We at least have the right, we have to have the right to at least raise those issues against a claim that is being imposed on these ratepayers.

JUDGE MATUSCHAK: This matter is a matter of, we think, urgency and concern to all parties. We would prefer to render our decision in this case in a full discussion.

But so that the parties so desiring can initiate any review process that they wish to engage in, we will make an order in this case and subsequently at our earliest opportunity supplement our order with a memorandum opinion, discussing in detail our position in this matter.

In our opinion, the public policy relating to collateral estoppel must be balanced against the public

policy of providing an opportunity to all parties to adequately litigate their position.

We do not feel that the public policy of collateral estoppel should be so rigidly applied as to prevent the fundamental fairness and justice in this proceeding.

So, we will make the following order:

And now, February 13, 1986, the motion in limine of Philadelphia Electric Company to strike certain testimony relating to the General Electric's prudence or imprudence in the design and testing of Mark II containment is denied.

A further discussion of our ruling will be submitted in a memorandum ... opinion.

MS. CHESTNUT: Excuse me, Your Honor. I did not have an opportunity to make a statement before Your Honor issued his ruling.

JUDGE MATUSCHAK: I am sorry.

MS. CHESTNUT: There is simply one point that I would like to clarify for the record, and that is the role of Staff in these proceedings.

I don't know if Your Honor is going to address it in his memorandum or not, but I would like to say something on the record with respect to that.

JUDGE MATUSCHAK: Very well. You may state your position on the record.

MS. CHESTNUT: Your Honor, I think there is a little

confusion about what the public interest is that Staff is representing in cases. Our mandate, of course, is broader than that of the Consumer Advocate, and it is broader really than any of the other representatives in this proceeding.

When the statute says that the Staff is supposed to represent all matters in the public interest, that doesn't mean we represent the entire Commonwealth, or all the ratepayers in the Commonwealth in this proceeding.

It simply means that we don't represent one narrow segment of PECo's ratepayers in a proceeding such as this. We don't represent just the commercial ratepayers or just the residential ratepayers. Sometimes we look out for the interests of the company, as well.

That is what really Staff's role is in this kind of case. And as far as Staff is concerned, Your Honor, we consider ourselves bound by the principles of collateral estoppel to that extent, if it involves the same utility and we are representing the same position on behalf of the same interest.

But, for example, if we had presented testimony in PP&L -- which we did not; we didn't take a position -- then we would consider ourselves bound in a subsequent PP&L case.

But we don't consider ourselves bound in this proceeding, if we had wished to present testimony on the Mark II issue.

We consider that issue very important, and because the OCA has put in expert testimony on it, we did not.

JUDGE MATUSCHAK: We think that the Consumer Advocate is acting as the same capacity, and we think that it is acting in a representative capacity.

The real party in interest in this case are not PP&L customers. The real party in this case is not the Consumer Advocate. The real party in this case are the PECo customers who are represented by the Consumer Advocate.

We don't think that collateral estoppel should apply in this particular instance.

Very well, let's have a 10-minute recess.

(Recess.)

JUDGE MATUSCHAK: In what fashion do you wish to proceed?

MR. CLARK: Your Honor, now is the time for the Governor's Energy Council to present its witness in this proceeding, Dr. John W. Wilson.

JUDGE MATUSCHAK: Very well.

Whereupon,

JOHN W. WILSON

having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. CLARK:

Q. Dr. Wilson, would you please state your full name and address for the record?

A. My name is John W. Wilson. My address is 2600 Virginia Avenue, Northwest, Washington, D. C.

Q. Have you prepared two pieces of testimony for this proceeding, one piece entitled "GEC Statement No. 1A" of 49 pages of questions and answers with attached exhibits, and a second piece entitled "GEC Statement No. 1B" of 55 pages of questions and answers with attached exhibits?

A. Yes, I have.

MR. CLARK: Your Honor, I would like to have marked for identification at this time GEC Statements 1A and 1B.

JUDGE MATUSCHAK: So marked.

(Whereupon, the documents were marked as GEC Statements Nos. 1A and 1B for identification.)

BY MR. CLARK:

Q. Dr. Wilson, were these statements prepared by you or under your supervision?

A. Yes, they were.

Q. Do you today have any corrections, changes or modifications to these statements?

A. Yes, I do.

Q. Is one of those changes a series of changes to exhibits?

A. Yes.

MR. CLARK: I have, Your Honor, shared those changes with counsel, the reporter, and yourself.

JUDGE MATUSCHAK: Very well.

BY MR. CLARK:

Q. Would you please briefly explain what those changes are in those exhibits?

A. The primary changes concern computations with respect to the cost of purchased power depending upon the output level of nuclear power plants. There are some revisions here that reflect the lower purchased power cost from the PJM pool in the event that nuclear power operations are superior and higher costs of purchases from the PJM pool if nuclear power production is at an inferior level.

In the original computations that were made, there

was an average purchased power cost that was used; and on reconsidering that matter, we felt that it was appropriate to reflect the variation in purchased power cost depending upon nuclear output.

Q. Have all of the numbers in these exhibits changed or just some of them?

A. Oh, no. There are just a relatively few numbers that have changed, and they do not alter any of the ultimate conclusions.

Q. Dr. Wilson, are there any other corrections or changes in the testimony?

A. Yes.

Q. Could you tell us what those changes are, please?

A. Yes. There are also changes, I think, that are appended to that same group of documents that pertain to the financial indicators under the various phase-in approaches, and there were some changes that took place there with respect to the cash capital and cash construction indicators, and I think some minor changes pertaining to coverage as well in each of the years. These were simply corrections for some updated information that PECo had supplied at approximately the time of the filing, and I believe there were also some computational errors that were corrected of a minor nature.

Q. Those are changes to JW-17 in the package?

A. That's right. In addition to that, I have a couple of text changes. In GEC Statement 1B, page 49, line 21 should be stricken.

At GEC Statement 1B, page 50, the question that begins at line 18, the reference should be to Exhibit JW-16, not JW-15.

I think that's all the corrections I have at this time.

Q. With those corrections, Dr. Wilson, is the testimony that you are giving in this case true and correct to the best of your knowledge?

A. Yes, it is.

Q. If I were to ask you these questions today, would your answers be the same as in the testimony?

A. Yes, they would.

MR. CLARK: Your Honor, I would like to move into evidence GEC Statements 1A and 1B subject to any timely motions to strike, with the corrected exhibits as distributed to the parties.

JUDGE MATUSCHAK: Under those conditions, the motion is granted.

(Whereupon, the documents marked as GEC Statements Nos. 1A and 1B were received in evidence.)

MR. CLARK: Your Honor, Dr. Wilson is available for

cross-examination.

JUDGE MATUSCHAK: Mr. MacGregor?

MR. MacGREGOR: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. MacGREGOR:

Q. Good morning, Mr. Wilson.

A. Good morning.

Q. Mr. Wilson, I first have some questions relating to your Statement 1A. Am I correct that in your Statement 1A you propose that the Commission establish a target performance standard for all PECo nuclear units utilizing a 65 percent capacity factor?

A. For the units as a group, that is right.

Q. And under your proposal, energy costs included in the company's energy cost rate would be calculated using a 65 percent aggregate capacity factor for all nuclear units; is that correct?

A. That is correct.

Q. And as I understand it, at the end of each ECR year, actual performance of the units would be reviewed, and if the total average capacity factor for the nuclear units was plus or minus five percentage points of the 65 percent -- that is, within a range of 60 percent to 70 percent -- no adjustment would be made and there would be full reconciliation of the actual costs; is that correct?

A. The methodology for the reconciliation is really set forth in Statement 1C. Operationally, if the plants have a factor between 60 and 70 percent, there would be full reconciliation. If the plants had a factor below 60 or above 70, there would be a bearing of some of those costs by the company rather than by its ratepayers. But the precise methodology by which that would be taken care of is set forth in detail in 1C.

MR. CLARK: Your Honor, I might just explain that Statement 1C is a statement Dr. Wilson has prepared and filed as part of the ECR component of this case. It was filed last week, I believe, and Dr. Wilson will stand for cross-examination on 1C when that cross-examination is scheduled. Today he is here for Statements IA and 1B.

JUDGE MATUSCHAK: Very well.

BY MR. MacGREGOR:

Q. Now, I believe as you indicated, Mr. Wilson, if the aggregate capacity factor is less than 60 percent, as I understand your proposal, the shareholders would bear 100 percent of that loss; is that correct?

A. Of the additional fuel for the replacement fuel costs, yes, for operations below 60 percent, and they would obtain a half of the savings if the operations were above 70 percent.

Q. So if operations are above 70 percent, ratepayers

would receive half of the additional fuel savings and the shareholders would receive the other half; is that correct?

A. That is correct.

Q. And at least as I read your Statement 1A, you propose no limit on the maximum loss the company might incur due to operation of its nuclear units at capacity factors below 60 percent; is that correct?

A. That is correct.

Q. Would you agree with me, Mr. Wilson, that the Commission has directed the company to file in this case an energy cost rate incentive provision in which 20 percent of its total energy costs, both those related to nuclear and non-nuclear units, would not be subject to after-the-fact reconciliation in the ECR?

A. Yes, and I have explained the way in which my proposal would be integrated with that.

Q. And as I understand it, your proposed nuclear performance standard is in addition to the 80/20 ECR and not in place of it; is that correct?

A. That's correct.

Q. So under your plan, there would be two separate incentive provisions, one the 80/20 ECR and then the separate nuclear performance standard as well; is that correct?

A. The nuclear performance standard would be in addition to the general standard that is established for

operations of all of the company's generation and purchased power. So it is additional in that regard. It's not really something that I would call a separate standard, but something that would be integrated along with the 80/20 split.

Q. They would both be in effect at the same time, however?

A. Oh, yes.

Q. Mr. Wilson, would you agree with me that the Commission is currently conducting a generic rulemaking proceeding at Docket No. M-820324 to establish performance standards for nuclear and coal generating facilities for all electric utilities in Pennsylvania, if you know?

A. I'm not familiar with that docket.

Q. Are you aware as to whether the Commission has issued proposed regulations setting forth performance standards for nuclear and coal units of all electric utilities in Pennsylvania on April 20, 1985?

A. I don't believe I am familiar with that, no.

Q. Are you aware, Mr. Wilson, that in the ECR-8 order directing the company to file an 80/20 ECR on October 30, 1985, that the Commission stated in that order that when and if generic standards were adopted at this generic docket, they would also apply to Philadelphia Electric Company?

A. I am not aware of that, but I would presume that that would be the case.

Q If that is the case, Mr. Wilson, any nuclear performance standard which you are proposing here would only be a temporary measure until the Commission issues its generic rulemaking in final form?

MR. CLARK: Objection, Your Honor. I think counsel for the company is asking Dr. Wilson to make some legal predictions about the impact of the orders. I think that is beyond --

JUDGE MATUSCHAK: Not necessarily legal. He can answer as to whether his proposal would terminate upon the conclusion of the generic matter.

It is a combination of law and a combination of fact. We ought to know what he proposes. Whether it is what the Commission will agree should be followed or not, that is another matter.

He can testify, I think, as to whether he would have his proposal integrated with the generic thing or otherwise. He indicated that his proposal would be integrated with the 80/20 procedure. Now, I think he can testify as to whether his proposal would be integrated with any generic decision that the Commission may make.

MR. CLARK: Your Honor, I'm not objecting to Dr. Wilson describing his proposal. What I am objecting to is the question asking the legal effect of some future order and whether or not it will make his proposal merely

temporary.

JUDGE MATUSCHAK: That objection is sustained. The objection generally, though, as to testifying as to whether he intends his proposal to be integrated within the generic conclusion, I think he can testify as to that. So to that extent, we will overrule the objection.

THE WITNESS: I would agree that if the Commission adopts rules that replace the existing directive with respect to the 80/20 split, that it would then be appropriate to take any nuclear incentive plan and to integrate it with those new general rules. So in that sense, the recommendation that I am making integrated with the 80/20 split would pertain until such time as the Commission replaced the 80/20 split arrangement, and then an integration with the new general format would be necessary.

But I think that the specifics with respect to Philadelphia Electric and its nuclear plants and the incentive features that I have proposed with respect to those nuclear plants would remain intact and could be integrated with either general format that the Commission would go with.

BY MR. MacGREGOR:

Q. But as I understand your previous answer, you have not reviewed the generic rulemaking proposed regulations and cannot comment to the extent to which your proposal is

consistent or inconsistent with those proposed regulations?

A. I have not reviewed those regulations, no.

Q. Mr. Wilson, the target performance standard you have proposed in this case is a 65 percent capacity factor; is that correct?

A. Right.

Q. Would you agree with me that this is higher than the historic performance of Philadelphia Electric Company nuclear units?

A. Yes. I have shown that in my exhibits.

Q. Would you also agree that it is higher than the historic experience of other comparable units as shown on your Exhibit JW-3, specifically referring to the GE and Westinghouse units, of the type which Philadelphia Electric Company operates?

A. Going back over that period of time, yes. But I think in that regard, it is important to point out that the operating results of those GE and Westinghouse units involved a period particularly subsequent to Three Mile Island in which there was a great deal of downtime that was experienced by a number of plants in order to go through major retrofits in order to be put into an operating state that was consistent with new NRC regulations.

Those problems having been addressed during this period and Limerick having been designed and built so as to

overcome those concerns, I don't think that it's reasonable simply to take that historic period and say, "Well, they operated at 60 percent and therefore we ought to expect them to operate at 60 percent in the future." We really don't have any basis for believing that the post-TMI down experience with many major reactors will repeat itself regularly. That was, hopefully, a one-time fix that was made.

Q. Just a couple of questions on JW-3. I take it that schedule is not part of the changes you submitted?

A. That is right.

Q. Am I correct, looking at page 1 of 4, the No. 1 unit appearing in the General Electric Unit sheet, the WPPSS plant is indicated as having an average capacity factor of 84.8 percent; is that correct?

A. Yes; but as you can see, for a very short pericd of time that plant didn't go into commercial operation until December of '84.

Q. So that unit only operated for --

A. It's only in there for a period of --

Q. Eighteen days?

A. Yes; that's right.

Q. So it only represents 18 days of operations of that unit; is that correct?

A. That is correct.

Q. And similarly with LaSalle 2, the 75.7 percent capacity factor achieved by that unit represents operations for approximately one and one-half months?

A. That's correct. Likewise, LaSalle 1 is only in there for the first year; and normally, you would expect the first year operations for plants to be relatively good.

Q. I believe you have agreed with me that the 65 percent figure is higher than the historic performance of PECo units and comparable units.

Would you also agree with me on JW-4 that the 65 percent number is generally higher than the average projected by the company over the 1987 to 1990 period shown on that schedule, the average for the years being 61.7 percent?

A. Yes. If you are referring to page 1 of JW-4, yes.

Q. That's correct.

A. Higher than the company projects in every year except 1989. However, the company's projected operations are within the 60 to 70 percent band.

Q. But the average is 61.7 percent for that period?

A. Yes.

Q. As I read your testimony, you have not presented any challenge to those projections, is that correct, as to their accuracy or any other reason to believe that they are

in error?

A. I haven't addressed that. They are low. If you look at what the company is projecting for Limerick 1, for example, it is well below what would normally be expected for first year operations of an efficient nuclear power plant.

I testified I think with respect to the Florida Power and Light Company's St. Lucie plant and the performance incentives that the Florida Commission set up for that plant and how it, in fact, achieved in excess of 90 percent during its first year of operations under a performance incentive.

Q. But as I understand your answer, you haven't examined the underlying reasons for those capacity factors?

A. I have examined some of the underlying reasons, yes, and I have testified about that. I think that we are all aware that there may be water supply limitations, for example, with respect to Limerick 1.

Q. Is it your testimony that these figures represent any cutback on Limerick operations due to inadequate water supply?

A. I don't think that the company has articulated it that way, but I think that the company, from my reading of how they elected to take the plant down shortly after it goes into commercial operation, it looks to me like they are

attempting to accomodate the limited water supply.

Q. I take it you haven't examined that issue in detail?

A. Well, I presented data on the water supply limitations, and it appears the company is planning to take the plant down during a period of time when the water supply is limited. It doesn't appear to me that that is merely a coincidence, and it certainly is not something that you would expect would be required with respect to a nuclear plant like that.

Normally, you would expect that plant to be able to operate continuously for more than a year after it goes into commercial operations and essentially to have the first major work on it done at the time of its first refueling.

Q. Did you examine any NRC requirements that might be related to the reason for that scheduled outage?

A. I have not reviewed the NRC requirements. I have reviewed what the company has described for its reasons for taking the plant down. I have not adjusted the capacity factors that the company predicts. All I am doing is suggesting that those capacity factors seem to be on the low side.

Q. Now, you present figures for 1987 to 1990 on your JW-4, and you indicate that this material is taken from Exhibit JJC-1; is that correct?

A. Yes.

Q. Do you agree with me that JJC-1 presents no projection for the year ended June 30, 1990?

A. That is right. The 1990 figures are simply the average of the preceding three years.

Q. So the number is not a projection of operation for the year 1990, but it is simply an average for the period '87 through '89?

A. Yes. I think I indicated that in the work papers that '87, '88, and '89 are the company's numbers and that I used the average for those three years for 1990.

Q. On Exhibit JW-6, page 1 of 5, am I correct that you present an analysis of the rewards and the penalties that would result based upon a 55 percent aggregate capacity factor and a 75 percent aggregate capacity factor under your performance standard proposal; is that correct?

A. Yes.

Q. Would you agree with me that these figures indicate in part the result of placing the company at risk for 100 percent of increased fuel cost for operation below 60 percent but rewarding the company with only 50 percent for performance above 70 percent? We can see that difference by examining the figures for 1987, for example, which show that if the unit is operated at a 55 percent capacity factor, there would be a loss of $37.1 million to the company;

whereas, if the unit is operated at a 75 percent capacity factor, there would be a gain of only $10.9 million; is that correct?

A. That is essentially correct; although, you are looking at the original figures before the adjustments.

Q. And the same general result would apply to the revised figures as well?

A. The same general result would apply, but the 10.9 number as adjusted is 13.6. But your basic point is correct.

Q. Am I correct then that the 75 percent capacity factor line reflects 50 percent of the reduced fuel cost that would occur from operation at a 75 percent capacity factor; is that correct?

A. Yes.

Q. If we were to double that number, the 13.6, it would become 27.2 million?

A. Right.

Q. And that number would indicate that the increase in fuel cost from operation at a lower capacity factor is greater than the decrease in fuel cost from operation at a higher capacity factor?

A. Yes.

Q. On Exhibit JW-5, page 1, you show total power requirements by source. Would you agree with me that as

originally filed, your number for the peaking units indicated identical output during each of the years 1987 through 1990 of 130,260 megawatts?

A. Yes.

Q. I see that you've corrected that on your revised JW-5, page 1. I take it it would not be reasonable to assume that the peaking units would have identical output during each of the four years listed on that page?

A. That is right.

Q. And again, are the 1990 figures averages of 1987, '88, and '89 numbers or are they separate 1990 projections?

A. They are in part both, but they do reflect some averaging of the earlier year numbers. You can see that there is an increase in power requirements as we go from 1987 through 1990. So, obviously, the generation must increase over time, but the operations of the plants are assumed to be essentially the same in 1990 as they were over the preceding three-year period.

Q. So then the 1990 numbers were not provided by the company; they were extrapolations by you of the '87 through '89 figures?

A. Yes. I believe I have given you work papers to show the development of those numbers.

Q. At pages 30 to 36 of your testimony, you discuss

several incentive programs in other jurisdictions; is that correct?

A. Yes; that's right.

Q. Now, would you agree with me that as you describe the Arkansas plan, that if substandard performance of a unit is attributable to an outage lasting longer than 30 days, Arkansas Power and Light is entitled to recover 90 percent of excess fuel costs from the 31st day forward?

A. You are reading my testimony at lines 19 through 22?

Q. That is correct.

A. Yes; that's what I said there.

Q. So under the Arkansas plan, there is a limit of the loss which the utility will suffer for substandard performance?

A. That is correct. And then I did put in a qualification to that, however; that that is a matter which the Commission would take up in a subsequent rate case and that it specifically reserves the right to make a full disallowance.

Q. And the California plan discussed on page 31 places the shareholder at risk for only 50 percent of the loss resulting from operation below the performance standard; is that correct?

A. That's true. I should emphasize that in both

of these cases, we are talking about standards that are plant-specific. The Arkansas reference has to do specifically with the ANO-1 and ANO-2 plants, and the California standard that I discuss at page 31 has to do specifically with the San Onofre Unit No. 2 plant. So those are different in the respects that you have mentioned, but they also are different in that they are plant-specific rather than something that is being implemented for all of the plants on a combined basis.

Some of the down-side risk that the Arkansas and California Commissions were concerned about I think is in effect covered by adopting a standard that applies to five plants simultaneously. Whereas, it may be that you would have an unusual situation particularly in a refueling year with an individual plant operating at 40 or 45 percent; and if you had an individual plant standard, you may be particularly concerned about that.

When you have five major plants operating under a combined standard, by virtue of the combination itself you are taking care of a good bit of that concern.

Q. Have you made any analysis, Mr. Wilson, of the potential financial impact on the company of a performance standard that applies to all of its nuclear units as opposed to one which would apply to just one unit?

A. I have presented in Statement 1B an analysis which does address the issue of the financial impact on the

company of the standard that I have recommended. That is set forth in Exhibit JW-20.

Q. Have you performed any analysis to compare that risk with the risk which would be imposed if there were a performance standard similar to the two we've discussed on just one unit for Philadelphia Electric Company?

A. I'm not sure what you mean, "have performed an analysis." It is something that I've considered and I can talk with you about it, but you would have to tell me more about exactly what you have in mind in terms of a standard applying only to one unit.

Do you mean standards that would apply to each of the five units on an individual unit basis?

Q. No, just one of the units.

A. Which unit?

Q. Limerick 1, for example.

A. If it applied to Limerick 1 alone, the impact on the company would tend to be greater, because the operations of Limerick 1 would not in any way be averaged with or offset by the operations of the other plants.

For example, if Limerick 1 obtained a 90 percent operating result its first year or if it obtained a 40 percent operating result its first year, the reward or the penalty would be greater in association with that performance than would be the case if that unusually good or unusually poor

performance were in any way offset or averaged with the operations of the Salem and Peach Bottom units.

Q. Have you performed any specific analysis to demonstrate that fact?

A. Well, that's mathematical. I have not made a computation of what the dollar amounts would be on a unit by unit basis.

Q. You also discuss the New Hampshire plan on page 35 of your testimony. That plan applies to unscheduled outages for each generating unit of Public Service of New Hampshire; is that correct?

A. Yes; that's right.

Q. In that jurisdiction the amount of a loss or gain is 10 percent of the difference in the energy cost; is that correct?

A. That's right.

Q. Would you agree with me that in the six plans that you discussed, only California has both a performance standard for a particular unit and an incentive mechanism similar to the 80/20 mechanism that is proposed for PECo in this case?

A. As I understand your question, you are essentially asking me: what are the ECR or fuel adjustment clause provisions that apply to non-nuclear plants in each of those states. I do know that in California, there is an ECR

mechanism that has some similarities to the 80/20 ECR mechanism that is proposed for PECo.

Q. That is why I excepted California from my list.

A. I really don't know what the cost recovery rules are in Arkansas or Connecticut or New Hampshire on coal-fired generation. That is a matter -- you'd have to look at the fuel adjustment clause in order to know that.

Q. Am I correct that the California plan that applies generally to its fuel costs does have a cap on the maximum gain or loss?

A. With respect to the coal costs generally, I think it's 10 percent as opposed to 20.

Q. And is there also a cap calculated based on common equity return?

A. Well, I've described the nuclear cap at page 51. It is my recollection that the ECR itself has a 10 percent cap in it, but I don't recall any reference in the ECR to a rate of return type consideration.

They do have a ECR proceeding in California every year in which forecasted fuel costs and generation mixes are considered, and conceivably capital cost considerations are taken into account at that stage; but I don't recall anything in the fuel clause itself that refers to a rate of return limitation.

Q. Have you reviewed Mr. Brennan's testimony on the

80/20 issue in this proceeding?

A. Some time ago.

Q. Are you aware as to whether Mr. Brennan's testimony contains a discussion of the California plan and the equity return cap established in that plan?

A. I think he mentioned it, but I have been involved myself recently in a number of Southern California Edison proceedings and I have my own knowledge on that matter.

Q. But you don't know whether there is a cap calculated on a common equity return basis on the 90/10?

A. I don't think there is. It is my testimony that I don't recall a rate of return limitation. I do recall the 90/10 limitation.

I have a copy of the Southern California Edison material that I submitted to you if you have a particular reference.

Q. Do you have a copy of Mr. Brennan's testimony with you?

A. No.

(Document handed to witness.)

Q. I would ask you to review page 14 of that testimony, lines 13 through 25, and ask you whether that is consistent or inconsistent with your understanding of the California plan?

(Witness perusing document.)

A. Lines 13 through 25 to the bottom of the page?

Q. That is correct.

(Witness perusing document.)

A. Well, he states there that in addition to the 90/10 split that we're talking about that -- he states that the California Commission believed that there should be a further limitation with respect to risk for shareholders and that they established a 160 basis point cap on possible losses to stockholders.

That is not consistent with my reading of the energy cost adjustment clause in California. But it may have been something that was discussed within the context of the hearing and somehow related to the 10 percent cap.

Q. Finally on your Statement 1A, Mr. Wilson, I would like to explore just for a moment the relationship of your incentive program to any prudency analysis of various outages.

Now, if the average nuclear capacity factor for the company in a particular year falls below 60 percent, is there any provision in your program whereby the company could avoid or limit the amount of loss by coming in to the Commission and demonstrating the prudence of its actions in the incurrence of its energy cost or is it an automatic adjustment without opportunity to establish that partial recovery might be appropriate?

A. Well, I don't really intend to make a proposal here that limits the Commission's flexibility in the future. I do intend to make a recommendation that would establish an approach under which fuel adjustment -- the cost adjustment or revenue adjustment for fuel costs would be fixed or would be established, but I think that a company always has the ability to come before a Commission and say, "There are particular extenuating circumstances that we would like you to consider and revise or reconsider the application of your general rule in this specific context."

I'm not proposing that that opportunity to come before the Commission and gain relief be denied. On the other hand, I certainly would oppose the incorporation of anything that was automatic on the other side. That is, if a company was simply to say, "Our outage is attributable to force majeure kinds of situations; it is not something that is attributable to imprudence on our part," I don't think that that ought to be something that is an automatic exception from the rule.

The reason for that is that other than fueling and scheduled maintenance, I don't know of a single nuclear outage that has ever occurred for any nuclear power plant in this country where the company has come forward and said, "Well, that is attributable to something that we did."

If we did not have force majeure conditions, you

would see that the average operations of nuclear plants in this country would be between 80 and 90 percent. They are not. And what I'm doing is recommending a standard that already has built into it a lot of outage that would not be considered by utility companies to be outages that were their fault. There are outages in there that are attributable to NRC regulations. There are outages in there that are attributable to faulty equipment that has been provided by vendors. They are outages in there that are attributable to a whole array of things. And having established a standard on that basis, force majeure should not be a usual reason for exceptions to the standard.

Q Let me see if I understand your answer. If the company can come in and demonstrate that there were particular causes which resulted in a capacity factor lower than 60 percent in a given year which were not in any way the fault of the company, would your adjustment still apply?

A I think you get into -- you possibly get into some questions of a legal nature with respect to timing, but I would say that there would be nothing in our proposal that would prevent the company from coming into the Commission and saying, "There is an occurrence which happened last week or there is an occurrence which is about to happen which for the following reasons we think we should not be subject to the performance standards that you have adopted

at some previous proceeding and we would like you to reconsider the application of that standard to us under the new set of facts which we're presenting to you at this time."

In other words, I think that the recommendations that I am making here are appropriate given where we sit at this time and what is known. But as in all regulatory matters, I'm not attempting to write something in concrete that would not be adjusted in the future as circumstances may warrant.

Q. Thank you, Mr. Wilson.

I would now like to move to your Statement 1B. Am I correct that this statement addresses your proposal for a phase-in plan for Philadelphia Electric Company's rate increase in this case?

A. Yes, it does.

Q. Am I also correct that your testimony discusses several different phase-in options, but that your specific proposal in this case is outlined on page 52 of your testimony and consists of a combination of a ten-year phase-in and recovery period and the use of sinking fund depreciation? 51 and 52 might be a more appropriate reference.

A. Yes. And we should also make reference, I think, to Exhibit JW-18, which pertains to that scenario.

Q. And that is your proposal in this case; is that correct?

A. Yes, it is, although I have set forth alternatives, and each of the alternatives has some attractions that are associated with it.

I have a preference for this one under the circumstances, but the others are reasonable, too. It is not a question of me saying this one is right and the others are wrong; the others are reasonable alternatives as well. This one has some particular attractions that I find give it an edge, but the Commission may have other concerns that

would direct them to one of the other alternatives as preferable. I wouldn't object to that.

Q. Would you agree with me, on page 51, lines 8 through 11, that you conclude that your alternative plans -- under either of the phase-in and deferral plans, that the company could have difficulty maintaining a BBB bond rating in the near term future? Is that your testimony?

A. Yes, it is, although that depends upon -- it really depends upon the relative weighting that coverage is given as opposed to some of the other indicators. I may have overstated that qualification, because as you move forward into '88 and '89, on a projected basis, you really do have a solid BBB, and, on the basis of some of the indicators, even an A rating.

Standard & Poor's has I think indicated quite clearly that their primary focus in applying the benchmark is going to be on a projected basis rather than a spot basis.

But if you just look at the 1986 results, you would have to say that on the basis of cash flow, you would look like a BB company instead of a BBB company. On the basis of capital structure and coverage, you would not; so it depends upon the relative weightings of those measures. That is why I said in this answer "in the near term." Given the future orientation of the raters and the rapid improvement

that takes place in '88, '89 and '90, I expect the BBB rating would be maintained under any of those scenarios.

Q. And the analysis of those scenarios that you present assume the company is granted the entire rate increase request in this proceeding; is that correct?

A. Well, it shows what the increase would be in the second column.

Q. Does it assume that the entire increase is granted and then phased in over some time period?

A. It would be granted and it would be phased in. On the other hand, I would say this, that if the Commission determines that a disallowance is appropriate, it is certainly feasible to structure a phase-in arrangement to accommodate a disallowance.

None of these, however, have a disallowance built into them.

Q. Two of the options you examined are set forth on Exhibits JW-12 and 13, an equal percentage rate increase phase-in or an equal dollar rate increase phase-in; is that correct?

A. Yes; 12 is equal percentage, and 13 is equal dollar.

Q. On the equal percentage rate increase table at JW-12, under your plan there would be an $861 million rate decrease in year 11 of the plan?

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A. Yes.

Q. Under the equal dollar rate increase proposal, there would be a $773.5 million rate decrease in year 11 of the plan?

A. That's right. That is presuming there are no other factors that change over the period of ten years.

Q. As I believe you indicated in a previous answer, the phase-in, as long as it complies with FASB-71, will have no significant impact on earnings and coverages, but will have an impact on the company's cash flow; is that correct?

A. Yes.

Q. And you have shown certain cash flow indicators in your Tables JW-16 through 20; is that correct?

A. Let me back up and say that there could be an impact on coverages, depending upon the indenture restrictions with respect to other income.

If you've got indenture restrictions with respect to other income such as AFUDC or deferred income as a result of a phase-in plan, there may be limitations as to the extent to which non-cash income would go into the coverage.

Q. And, in addition, there will be certain cash flow differences under your plan and the company's plan; is that correct?

A. There will be cash flow differences, right, but

there will be, as you pointed out, no rate of return difference.

Q. We have calculated that over the period 1986 through '91, that the difference in cash flow under your plan and the company's plan would be approximately $680 million.

A. Which one are you looking at now?

Q. Your preferred proposal, a combination of phase-in and sinking fund.

A. That is JW-18. I think you can make that comparison here directly by looking at JW-11 and comparing that with JW-18.

JW-11 does set forth Philadelphia Electric's phase-in plan. I have not made the calculation that you are talking about, but you can see that in years 2, 3 and 4, -- let me do this; there is a correction here that I forgot to make on JW-11.

Under the "Revenue Increase" column on JW-11, all of the numbers that say "233.6" should be "223.6." That is just a typographical error; it doesn't affect anything else. But all of those numbers that say "233.6" should say "223.6."

You can see, by comparing those numbers with the numbers in JW-18, that the company will pick up on the order of $60 million to $65 million more in revenue increases in each year under the company's plan than would occur under

my plan.

Another major factor that would go into your computation is that the company's plan essentially establishes the revenue requirement over the full term as being the same as what it is in the first year, and I show here on JW-11 that that results, in the first six years, actually, in a $275 million over-recovery, because the assumption that the company makes in that regard is not really correct and each year the actual revenue requirement will go down, because depreciation occurs, you will have a smaller rate base, you will have accelerated depreciation taking effect, you will have rate base offsets as a result of accumulated deferred taxes. And I have taken those factors into account in JW-18, the fact that the rate base goes down because of depreciation and because of accelerated depreciation.

The company does not do that, so over a ten-year period, if that is the basis of your comparison, you are going to have probably close to half-a-billion dollars of excess revenues simply because the revenues are set, under PECo's plan, without attention to the accumulated depreciation and deferred taxes, whereas, under all of the plans that I have presented, I have recognized the declining nature of the revenue requirement associated with the plant because of depreciation and deferred taxes over time.

Q. Have you recognized any other factors that

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might be changing over the next ten years, such as capital additions for Limerick, or other cost increases that may occur over that time period?

A. No. What I am doing here is reflecting the phase-in of the Limerick costs that exist at this time. I have not attempted to build in, for example -- if you want to assume that nuclear fuel costs are going to go up or that labor costs of maintenance are going to go up, I would say that that would be something that would be subject to the Commission's scrutiny within the context of a general rate case or in an ECR proceeding; but it is not something that should be presumed in advance here.

Q. Neither the company nor you is trying to establish rates for an 11-year time period in this proceeding, are we?

A. That's true. I would presume that even if PECo got its plan adopted, which would appear to produce fairly large excess income over time, that there may be other factors, for example, Limerick 2, that would force PECo to come in before the Commission at a later date prior to the time that ten years has elapsed.

But if PECo is able to get its proposal in, a proposal that is really providing $275 million worth of excess income in the first six years of operation, there might be a tendency for them to stay out as long as they could, if

they had that type of a fixed arrangement in place.

Q. Of course, the Commission is free to raise or lower the company's rates at any time, either on a complaint or its own investigation; is that correct?

A. Yes, consistent with regulatory rules and law.

Q. Your JW-16 presents various financial indicators under PECo's phase-in proposal; is that correct?

A. I'm sorry; I was looking at 17. Yes, 16 does, and those are carried forward into 17, where they are compared with the alternative approaches that I have discussed.

Q. Andon JW-19, you present financial indicators reflecting your combination sinking fund and phase-in proposal; is that correct?

A. That's correct.

Q. Am I correct that neither of these tables reflects the application of the 80/20 ECR or your nuclear performance standard?

A. That's true, but that is shown on JW-20.

Q. It is shown on JW-20 for the company's phase-in proposal; is that correct?

A. No. JW-20 pertains to my proposal, which is the combination sinking fund/phase-in proposal.

Q. I don't know if this schedule is revised or not. My JW-20, page 1 of 1, says "Financial Indicators Reflecting PECo's Phase-In Proposal."

A. That was wrong, and it has been revised.

MR. CLARK: It was one of the ones in the package.

THE WITNESS: PECo's phase-in proposal is 16. 20 is the combination sinking fund/phase-in.

BY MR. MacGREGOR:

Q. When you say "Efficient Operating Performance" and "Poor Operating Performance," I take it you are referring to application of your nuclear performance standard program?

A. That's correct; and this combines the phase-in with the nuclear performance standard.

Q. It does not include the 80/20 ECR provision?

A. No, no assumptions are made with respect to either superior or inferior performance under the 80/20. The assumption is that under the 80/20 the company is on target.

Q. As I understand your testimony, Exhibits JW-19 and 20 are comparable, in that they both reflect your combination sinking fund and phase-in proposal?

A. Yes. The difference between them is that 20 incorporates the performance consideration as well, and performance, which is the subject of Statement 1A, is not incorporated in 19.

Q. So the only difference between JW-19 and 20 is the application of your nuclear performance proposal; is

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that correct?

A. That's right. 19 assumes that the operations of the company are in the 60 to 70 percent range. 20 shows what the results would be at 55 percent and 75 percent.

Q. Can you explain for me why, if you look at pre-tax coverage including AFUDC in 1986, coverage declines from 2.7 to 2.6 times under both the efficient operating performance case and the poor operating performance case?

A. That may be rounding; that is, the difference between 2.7 and 2.6. I guess I can check that, but that may take me a few minutes to check. Maybe you would like me to do it at a break.

Q. Perhaps we could do that. It would seem counter-intuitive to me that with the efficient performance, that the coverage would go down.

A. I can't think, off the top of my head, why that would be. I will have to check that.

Q. One final point of clarification. On page 39 of your testimony at the bottom you state that, "A number of recently constructed publicly owned thermal plants, such as WPPSS 2, Hatch, Vogtle, and Seattle City Light's share of Centralia, are being depreciated using the sinking fund method;" is that correct?

A. Yes.

Q. Am I correct that the Vogtle plant is still

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under construction and not scheduled for commercial operation until 1987?

A. I think that's right.

Q. And while the plant is under construction, there would be normally no accrual of depreciation?

A. Well, that would certainly be true for the Georgia Power Company. That plant has partial ownership by some publicly-owned municipal systems.

The statement that is made here has to do with the treatment that is made by the publicly-owned municipal systems. And in this case they have adopted procedures, both for Hatch and for Vogtle, which are southern company plants, --

Q. Would you agree with me, though, that Georgia Power has not adopted sinking fund depreciation as an investor-owned utility for the Vogtle plant because it is still under construction?

A. That is true, and certainly with respect to Centralia, I think that the investor-owned utilities that are owners of Centralia have not done that either. I am talking here about the publicly-owned systems. There are some privately-owned systems that have adopted the sinking fund approach, but I don't think for nuclear plants.

Q. With respect to Hatch, which is in service, you would agree with me that Georgia Power Company, as an

investor-owned utility, employs straight-line depreciation for that plant?

A. It is the publicly-owned systems that have.

Q. Do you know whether Georgia Power Company employs straight-line depreciation on the Hatch plant?

A. I think they do.

Q. Is it also true that the Centralia plant is a hydroelectric plant, not a thermal plant as you state in your testimony?

A. I believe it is coal-fired. There may be some hydro there, but I believe you're talking about a coal-fired plant.

Q. We will cover that in rebuttal.

MR. MacGREGOR: Thank you, Mr. Wilson.

That's all I have, Your Honor. Thank you.

JUDGE MATUSCHAK: Let's take a ten-minute recess.

(Recess.)

JUDGE MATUSCHAK: Does Staff have any cross-examination of this witness?

MS. CHESTNUT: No, Your Honor. Staff has no cross for Dr. Wilson.

JUDGE MATUSCHAK: Consumer Advocate?

MR. POPOWSKY: Just a couple of questions, Your Honor.

CROSS-EXAMINATION

BY MR. POPOWSKY:

Q. Dr. Wilson, with respect to your Statement No. 1B, the phase-in testimony, if I turn to page 3 of that testimony at lines 12 to 15, am I correct that you are making -- for purposes of this testimony or for purposes of your exhibits reflected in the testimony, you say, "Assuming that the full capitalized costs of constructing Limerick 1 are found to be includable in rate base under the appropriate 'used and useful' and 'prudence' tests."

Am I correct that that is the assumption that you have used just for the purposes of presenting your exhibits in this case?

A. Yes.

Q. But have you made a determination independently that, in fact, all of the costs of Limerick 1 are or should be includable in rate base under the used and useful and prudence tests?

A. No.

Q. To the extent that any costs of Limerick are found not to be includable in rate base under used and useful and prudence tests, would any of your phase-in recommendations still apply?

A. It would depend upon the magnitude of any disallowance that was made. There are disallowances that could be made that wouldn't change the phase-in the scenario that I propose at all.

If there were large disallowances that were made, disallowances of $1 billion, that may mean that the phase-in -- the specifics with respect to the phase-in would have to be adjusted in order to accommodate that kind of a disallowance.

So I would say that a determination should be made -- a primary determination should be made about the amount of allowance or disallowance that is going to be associated with the plant, and then the optimal phase-in approach ought to be structured so as to accommodate that disallowance.

So if we're talking about a couple of hundred million dollars, it probably wouldn't change things significantly. If we're talking about $1 billion, you might want to make some modifications to the phase-in approach that is shown in Exhibit 18. It may mean that there should be some modification to the approach that is proposed there.

MR. POPOWSKY: That's all the questions, I have, Your Honor.

JUDGE MATUSCHAK: Is there any further cross-examination of this witness?

(No response.)

JUDGE MATUSCHAK: Do you have any further cross-examination, Mr. MacGregor, as a result?

MR. MacGREGOR: No, Your Honor.

JUDGE MATUSCHAK: Any redirect?

MR. CLARK: Your Honor, may I have one moment?

JUDGE MATUSCHAK: Yes.

(Pause.)

MR. CLARK: Your Honor, I do have just a couple of questions.

REDIRECT EXAMINATION

BY MR. CLARK:

Q Dr. Wilson, an issue came up in the company's cross regarding the Centralia plant that you mention on page 39 of Statement 1B.

Have you been able to determine what type of facility Centralia is?

A Yes. My recollection was that it was a coal-fired plant, and that is correct. It is a 1,330 megawatt coal-fired plant. It is owned jointly by the City of Seattle, Pacific Power and Light, Washington Water Power,

Puget Sound, Portland General Electric, the City of Tacoma, and two public utility districts in the State of Washington. It produces between 6 million and 7 million megawatt-hours a year. It has a heat rate of 10,834 and a coal cost of 1.42 cents a kilowatt-hour. So it is a coal plant.

Q. You were also asked about your Revised Exhibits 19 and 20 and the pre-tax coverage including AFUDC and why that number on Revised Exhibit JW-19 is 2.7 and on JW-20 that same number is 2.6.

Have you been able to determine the reason for that change in the number?

A. Yes. It is a rounding error. The precise number is 2.67. So it should be reflected as 2.7 in both instances.

The same applies with respect to the 1989 pre-tax coverage number on JW-20. That is shown there as 2.8. The actual number is 2.86. So it should actually be rounded to 2.9.

MR. CLARK: That's all the questions I have, Your Honor.

JUDGE MATUSCHAK: Is there anything further of this witness?

MR. MacGREGOR: No, Your Honor.

JUDGE MATUSCHAK: The witness is excused.

(Witness excused.)

JUDGE MATUSCHAK: It has been requested that we

adjourn at this time. We will adjourn at this time until 1:00.

(Whereupon, at 12:00 noon, the hearing was adjourned, to be reconvened at 1:00 p.m., this same day.)

AFTERNOON SESSION

(1:10 p.m.)

JUDGE MATUSCHAK: We can begin.

Whereupon,

ARIE P. SCHINNAR

having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. RAINEY:

Q. Mr. Schinnar, would you state your full name and business address for the record, please?

A. My name is Arie Schinnar. My business address is the University of Pennsylvania, the Wharton School, 3814 Walnut Street, Philadelphia, Pennsylvania.

Q. And for whom are you testifying in this proceeding?

A. I am testifying on behalf of the City of Philadelphia.

Q. And do you have before you a document entitled, "Direct Testimony of Arie P. Schinnar, Ph.D."?

A. Yes, sir.

Q. Does this document contain 36 pages of stated testimony, 18 figures and two appendices?

A. Yes, sir.

Q. Was this document prepared by you or under your direct supervision?

A. Yes.

MR. RAINEY: Your Honor, I would like at this time to have this document marked for identification purposes as City Statement No. 1.

JUDGE MATUSCHAK: The motion is granted.

(Whereupon, the document was marked City Statement No. 1 for identification.)

MR. CALVERT: Your Honor, generally when that is done, it is done subject to a timely motion to strike.

MR. RAINEY: I didn't move it into evidence. I just had it marked as an exhibit.

MR. CALVERT: I'm sorry, I withdraw my comment.

BY MR. RAINEY:

Q. Dr. Schinnar, do you have any additions, corrections, clarifications or deletions which you would like to make to City Statement No. 1 at this time?

A. Yes. The modification and clarification are of two types. In the first case, with the exception of minor typographical errors that I will not make now but we can submit later -- it doesn't change the content of the testimony, so I will not make the changes now.

But there are some small numbers that have typographical errors that I would like to correct now. The first one is on page 14, Table 4. In that table, there are four columns.

On the right column, the second number is 31.8. I would like to enter a correction to 31.6.

In the same table, in the third row, in the column which is labeled, "4%", the third number is 28.2. I would like to enter a correction, 28.6.

My next number that I correct is on page 16. In the bottom question and answer, in the answer paragraph, the fifth line has a number, 6.5. The correct number is 6.55. That's a minor correction, and I apologize for the typographic error there.

The second clarification I would like to make --

MR. RAINEY: Before you get started, Dr. Schinnar, I would just like to state to Your Honor and all parties that we will be providing an errata sheet which will provide all the corrections to Dr. Schinnar's testimony.

JUDGE MATUSCHAK: Very well.

THE WITNESS: The second clarification that I would like to make is in regard to the study. As you very well know, the city has asked me to look in this case at whether the rate increase has an economic impact on the Philadelphia region and, if that impact is adverse, whether it can be avoided.

Since you have read the testimony, the answer is yes to both questions. The clarification that I would like to offer is in regard to how some of the figures were obtained,

that upon rereading the testimony and consulting with the company's experts, it was apparent to me that it was not clear.

I therefore would like to explain the following. Basically, there are two types of analyses performed in the same model. One is of a static nature, and the second one is of a dynamic nature.

And if I may, I would like to show, for further clarity, very briefly, the structure of the model so we all have a clear understanding of it, describe it very clearly in terms of the chart that I have in the testimony, because it is not fully explained, and then stop.

It is a form of further clarification.

MR. CALVERT: Your Honor, is this meant to be an addition or amendment to the testimony? I am a little confused as to what we are getting here.

MR. RAINEY: I think what he is getting at, Your Honor, is a means of clarifying a model which is very technical, which is only implicitly described in his testimony, and therefore he would like to explicitly describe the operations of the model for the sake of the Judge and the other parties of record in this particular proceeding.

I think it will be subject to some cross-examination. To the extent that everyone has a clear understanding of

exactly what is being talked about, I think it would be helpful.

MR. CALVERT: Your Honor, obviously, the more every party understands the model and the testimony, the better, but I think the procedure is a little bit unusual, that apparently this is some amendment to the testimony.

JUDGE MATUSCHAK: We will consider it as supplemental oral testimony, to clarify the written testimony.

MR. RAINEY: Thank you, Your Honor.

THE WITNESS: Thank you.

(Slide - Figure 1.) (Slide projected.)

I will use a visual aid to project the figures that I have in the testimony. The first is Figure 1. It shows the basic components of the model that was used to analyze the rate increase.

It contains a detailed description of the Philadelphia economy. Attached to that, or integrated with that, rather, is a demand submodel.

The purpose of this demand submodel is to show how various components or various parts of the Philadelphia economy respond to a rate increase.

This rate increase is fed in through a price submodel that converts the rate that PECo is proposing into what we refer to usually as a real price increase. And this is done by adjusting for inflation.

And further, there is a growth submodel which

benchmarks the model in various time periods when we are seeking to explore the behavior of the economy over a longer time period.

MR. CALVERT: Your Honor, just for clarification, as I understand it, Figure 1 is simply the Figure 1 on page 4 of the written testimony.

Is it not, Dr. Schinnar?

THE WITNESS: I am leading to the figure.

MR. CALVERT: Again, I am not sure that this isn't just oral testimony about which we already have a written testimony, which is I thought how we were proceeding here.

MR. RAINEY: The clarifications,Your Honor, if I may, although it goes to some specific figures that are in the testimony, are not described in the detail or clarity that Dr. Schinnar is providing to Your Honor and the parties in this particular case.

So that it really is not a matter of the fact that just the figure is there, therefore what Dr. Schinnar is saying is repetitive.

JUDGE MATUSCHAK: Let's see where we go.

THE WITNESS: Thank you, Your Honor.

Very briefly -- I have only three more charts --

(Slide - Figure 9.)

THE WITNESS: -- what I am showing here is the price submodel and the demand submodel, and the growth submodel

that we have just discussed in a bit more detail on the description of the Philadelphia economy.

The key element in that description is what is called an interindustry transaction table. It is a table that describes the trade among the sectors in the Philadelphia economy, the relationship between them and the interdependence between them.

What feeds into this, if you will, economic production process of the region is final demand, which consists of purchases by various consumers.

There is a government and investment community. There is the export, which is the consumers outside the regions. There is also imports coming in, and household final demand, which are the residents in Philadelphia.

Once this model is subjected to these demands for goods and services, we obtain an expression of labor that is employed in this particular economy.

(Slide - Figure 10.)

If I may offer the next chart to complete the description of the economy, Your Honor, you will see again the three price components that I described earlier.

And what we have done is complete the link between labor, where it is employed in the various sectors, what type of skills it has by the sectors, the earnings by various income groups, the labor participation, the household

structure by income, the consumption patterns, the purchases of commodities and how it translates into sectors again.

The reason why this extension is performed is because the rate increase, the impact of which will be felt or will be described through the demand model, will ultimately affect residential ratepayers. I wanted to make this clear.

(Slide - Figure 18)

And in the next shot, very briefly, since this is the essence of the Philadelphia economy and the way it is described, I would like to offer a brief description of how the model then operates when it is subjected to both rate scenarios of various electric rates or growth scenarios which represent different scenarios about the future of the Philadelphia economy under different growth parameters. This is Figure 18 in the testimony, again.

We have just described the structure of the economy, and on the left top side is a detailed description of the price.

As you can see, this is the rate increase, Your Honor. It gets deflated, it gets subjected to inflation, which comes in here, and adjusted, so the rate increase is counting in it a relationship to the inflation rate in the economy.

Once this is computed, we have a secondary inflation spiral which then affects the transactions in the economy. For example, if there is an increase of prices as a result of

the rate increase, it would then affect how the economy trades goods and services.

And further, then this rate increase comes in and affects the demand of various sectors and consumers. The demand model or submodel here affects labor participation, and I could describe that later.

It affects the transactions. It affects also the government expenditures, as well as, it goes to the population by looking at residential ratepayers in terms of relative prices, climate condition, appliance stock, demographic characteristics, population, the housing characteristics, and produces the kind of response of the population.

The growth component is basically linked to U.S. growth scenarios, since we are not in Philadelphia an isolated economy. We depend on trade with the rest of the economy.

It is very important to consider the rate increase in front of us under various possible future growth scenarios of the country.

So, we have the job growth in the U.S. going through a process and producing a scenario that benchmarks the Philadelphia economy in some future state.

What is a result of this analysis are two possibilities: one, what we refer to as static analysis or comparative

analysis -- comparative static analysis as I refer to in testimony.

What is basically does, it shuts down this growth component. It looks at 1981, where all of this data is anchored to, and asks the following question: holding any kind of trends in the economy constant, like various growth trends in various sectors and so forth, it asks the question of how would 1981 look in terms of employment and other results if the price structure of the economy was different, meaning if we had a higher or possibly a lower rate, whatever is proposed.

The second analysis asks the same question, but not in isolation. What it does is, follow the economy to include in it past trends in terms of growth.

We know, for example, just for illustration, that manufacturing has not been growing as fast as services in the Philadelphia economy.

So now, we bring this in and we look at the economy two years from now including both the rate change and includes in it the inherent trends in the economy.

So, these are the two analyses that I have performed to develop the testimony. And just to briefly summarize -- and this is the last chart, Your Honor --

(Slide - STARLOC Model Specifications.)

This is a chart that is not in the testimony, but I

needed this background in the testimony to clarify it. What we have seen in a schematic fashion a few moments ago, the model, it has a computer program, an implementation of the model.

And then it has two applications. One is the static analysis, and the other is the dynamic analysis. Now, in the static analysis, as I described earlier, growth must be set to zero.

In the dynamic analysis, you have the option of running zero growth, if you would like to repeat that, or 1 percent, 2 percent, 4 percent, or any particular scenario.

These were designed, although the basic program and the model is identical, they were designed for two different purposes.

The static analysis was designed for the purpose of obtaining detailed economic impact analysis by sector, by skill, and by various zones in the regions, for example New Jersey suburbs, Philadelphia city and Pennsylvania suburbs.

It is a very labor-intensive program, meaning you have to enter the paramaters, every time you want to make a run, you have to enter the parameters and obtain the run and then repeat it again.

It enables you, however, some flexibility in the sense that you can specify for different, for example,

customer classes, specific rates.

You enter one inflation rate, one time period, and growth must be set to zero, because it is the comparative static analysis.

And the output -- and here I tie it back to the testimony -- is in the form of Figures 4, 5 and 6, and it describes one static analysis, and it gives you the results.

Now, when you run the dynamic analysis, because it was intended to look at many possibilities or many futures of the economy, we didn't generate all this output, because we would like to see some gross figures for a comparative basis.

So, the purpose of it is to provide a forecast of the economic impact in aggregate figures, which are identical to these, for growth being set to zero, under different economic conditions, and these economic conditions are automated.

Rather than sit here and enter each parameter and get one answer, you can for example specify that I would like to look at this rate increase or that rate increase, 28.2, 37, 18.4, or any string of numbers rates that you would like to look at.

You can further enter an inflation rate that would be set at 4, 5 percent or any other number, in the form of a string. You can enter various phase-in periods -- let me just correct a typo -- by time period, I mean here. Phase-in

period as well, it's the same thing.

But you enter one number here, and here you can enter three years, four years, or any other number of years, and growth rates you can set at zero, you can set at 1 percent, or any number of growth rates.

What then the computer does automatically is, it generates all of these possible combinations. And instead of generating one printout which gives you one future scenario based on the paramaters here, that is on two pages--it takes two pages to generate this -- you can get somewhere in the neighborhood of 60 different possibilities on only one page.

And the purpose of this is to generate of course a more efficient way and analysis of possible impacts on the economy. And Tables 4 and 5 would generate that, using this procedure.

The model, as it is implemented, is identical. It just has two implementations in terms of its use. Just to close that clarification, I would like to stress that in this static analysis, what we try to do is, the reason why we hold growth fixed to zero is that we would like to be able to isolate, Your Honor, the effect of a rate increase alone.

What we try to do here in the dynamic analysis, Your Honor, is to provide, if you will, a projection which takes into account other trends in the economy such as growth,

such as propensity of certain sectors to stay in growth, propensity of other sectors irrespective of what is going on to leave under present conditions.

And that is the purpose here. This is an attempt to isolate the specific impact of a rate increase. This is an attempt to look into the future on the conditions of growth and building in various trends.

Your Honor, this completes my clarification.

BY MR. RAINEY:

Q. Dr. Schinnar --

MR. CALVERT: Excuse me just a second.

So that the record isn't completely fouled up, are we going to have this document that was just up on the screen entered as an exhibit?

MR. RAINEY: We may enter that as an exhibit.

MR. CALVERT: I would ask that that be done, Your Honor. Otherwise, no one will have any idea what was just said.

MR. RAINEY: We will then mark that as City Exhibit No. 2, Your Honor. May we provide that at the break, Your Honor?

JUDGE MATUSCHAK: Very well.

THE WITNESS: I have it, but it doesn't have the red scribbling on it which I made on the chart.

MR. RAINEY: Your Honor, we will have this marked as

City Exhibit No. 2, and at the break, we will provide copies for the court reporter as well as all parties.

JUDGE MATUSCHAK: Very well.

(Whereupon, the document was marked City Exhibit No. 2 for identification.)

BY MR. RAINEY:

Q. Dr. Schinnar, with those additions and corrections, is City Statement No. 1 true to the best of your knowledge, information and belief?

A. Yes, sir.

Q. And if I were to today ask you the questions contained in City Statement No. 1, would your answers be the same as contained therein?

A. Yes.

MR. RAINEY: Your Honor, at this time, I would like to move for the admission into evidence of City Statement No. 1, subject to any objections or timely motions filed by any parties in this proceeding.

JUDGE MATUSCHAK: Under those conditions, the motion is granted.

(Whereupon, the document marked City Statement No. 1 was received in evidence.)

MR. RAINEY: Thank you, Your Honor. Dr. Schinnar is available for cross-examination.

CROSS-EXAMINATION

BY MR. SCHINNAR:

Q. Good afternoon, Dr. Schinnar.

If you would turn for a moment to your resume or curriculum vita at the back of your testimony, under education -- it is Appendix 1 to your testimony.

A. Yes.

Q. Under education, I see that the first institution you have listed there is the Pells Art School in New York. Did you receive a degree from that institution?

A. No. It was one year of rendering and sketching in New York. It was tutorial. It was formal, however.

Q. Was it towards any particular degree or any particular profession?

A. No, sir. When I enrolled in that program, I was already an established cartoonist at a rather young age. I have been published, including the New York Times, and it was 1968 when I arrived in the country and I was saving for college and going evenings to just refine the quality of my language, if you will.

Q. Now, in 1971, it appears you attended Texas A&M University?

A. That is correct.

Q. And you received what I understand to be, what, a bachelor's in environmental design?

A. Bachelor's in environmental design and architecture.

Q. That was an architecture degree?

A. That is correct, sir.

Q. And in 1973, you received a master's in architecture from SUNY Buffalo?

A. That is correct, architecture and environmental design.

Q. And environmental design. Is it fair to say, then, that up until you got your Ph.D. in 1976, that your basic field of endeavor was in the architecture field and environmental design, if you will?

A. In a broad sense, and for further clarification, that when I was working for example in Texas towards my architecture degree, I was working in the Architecture Research Center, and the research there dealt with analysis and programming of urban settings.

In Buffalo, where I got my master's degree, I was also already instructing in architecture and urban planning during the time, and was also directing urban research projects.

And the focus there was on urban policy research, and for that very reason I proceeded, I moved out of the technical aspects of architecture, which I did by and large to support myself through school, and then proceeded into the policy

side, and that was the logical continuity into my Ph.D. studies.

Q. And then in 1976, you obtained a Ph.D. from the Carnegie-Mellon University, is that correct?

A. That is correct, sir.

Q. Now, of the formal education, that concludes your formal academic degrees?

A. Except for an honorary degree from the University of Pennsylvania.

Q. Right. I think you list that later on.

Now, I take it that you are not an economist, you do not have an agree an economics?

A. Carnegie-Mellon has a very peculiar structure, if I may answer it in the following way. I do engage in managerial economics in both research and teaching, as well as in regional economics.

The degree at Carnegie-Mellon was in urban and public policy, which entailed extensive course work and research, intensive research in economics, operational research and statistics.

Indeed, my dissertation was called, "Economic and Demographic Forces." So, there was substantial focus on economics.

I am also teaching presently at the Wharton School and, in another program at the University of Pennsylvania, courses

in economics.

Q. Was your degree at Carnegie-Mellon awarded by the economics department?

A. At the time, there was no economics department at Carnegie-Mellon.

Q. And you do not have a degree, whether it be a master's or a Ph.D., in economics as such, subject to the clarification that you just made?

A. My degree does not say economics.

Q. Now, I think you have indicated in your earlier remarks that earlier this week, Monday, Tuesday, Wednesday, that you met with the Philadelphia Electric Company's experts at your offices to discuss your STARLOC model and the various programs that operate that model?

A. That is correct. My meeting extended over three days, and that partly explains the state of my voice.

Q. As you recall, you answered a series of interrogatories that were posed to you by the company. Do you recall that?

A. Yes, sir.

Q. And you indicate in your testimony that the STARLOC model that you are using for purposes of your testimony in this case was based on an earlier version or an earlier STARLOC model, is that correct?

A. That is not exactly the way you stated it. If I

may restate it, and you can tell me --

Q. Well, it was based on an original STARLOC model of some kind?

A. There was an original model of the Philadelphia economy that was labeled STARLOC. Subsequently, the city asked to make an adaptation of this model --

Q. Well, we will get into that in a minute. But the purpose of the initial model was to support government and the business community in their decisions concerning regional economic policy and to forecast local effects of federal fiscal policy?

MR. RAINEY: I'm sorry, Mr. Calvert. Would you give us the cite to -- are you reading from an interrogatory response?

MR. CALVERT: I happen to be, but I am asking the question. I am merely asking a question.

MR. RAINEY: I would like to know what interrogatory response number you are reading from, please.

MR. CALVERT: I am reading from Interrogatory Set 6, Question 1, Answer to Question 1(a).

THE WITNESS: If you would kindly wait a minute until they find that.

BY MR. CALVERT:

Q. Sure.

A. What is the question again, please?

Q. Question 1, Answer 1(a).

A. Yes, I have it.

Q. The purpose for which this original model was built was to support government and the business community in their decisions concerning regional economic policy and to forecast local effects of federal fiscal policy, is that correct?

A. That is correct.

Q. Now, you indicated that the model was adapted for purposes of your work that led to this testimony, is that correct?

A. That is correct.

Q. Could you describe the process of adapting the model to that purpose?

A. I would be glad to do that.

THE WITNESS: If I may, Your Honor, bring up the chart we just looked at?

JUDGE MATUSCHAK: Do you want to refer to that as Figure 10, so we may have it in the record?

(Slide - Figure 10.)

THE WITNESS: I am referring to Figure 10.

BY MR. CALVERT:

Q. Which is page 25 of your written testimony?

A. Right.

The [illegible] three boxes, the three cells which have a

color in it consisting of a price submodel, demand submodel and growth submodel were added subsequently to the original structure of the Philadelphia economy.

So, the regional STARLOC consisted of these components. And that was updated in terms of data. But the basic structure consisted of the cells that I point to, and I will gladly read all of them.

It consists of the interindustry transactions --

Q. Well, you don't have to read that into the record, because we do have the figure. But for purposes of making the record clear, what you are saying is that the price submodel that is shown on Figure 10, the demand submodel and the growth submodel were the things that were added, and the other boxes shown in Figure 10 were the original model, the structure of the original model?

A. The structure of the original model, yes.

Q. If you look once again to your Answer to Interrogatory 6, Question 1, and then there is Answer 1(b) there, you indicate that there have been no major alterations to the structure or formulation of the original STARLOC model, but there have been updates of the data bases and a disaggregation of the energy categories to electricity and other components where applicable.

And then you describe that the principal change entails the development of a link among the three submodels

that we have just talked about?

A. That is correct.

Q. Although I think you did a little bit of it in your opening remarks --

A. May I remove that?

Q. Yes, you may take it down.

As I understand your STARLOC model, it consists of a series of component parts, if you will, the boxes or the rectangles that we have seen in the various charts that you have referred to, is that a fair statement, put together then in one model?

A. There are more parts than are presented here. This is just a schematic summary.

Q. So that, indeed, this is only a few or an outline version of the component parts, of which there are many?

A. There is more detail in each box, not necessarily in every box, but in a number of them.

Q. Now, Dr. Schinnar, has the STARLOC model that we have been talking about that you have developed for purposes of your testimony in this case been subjected to critical academic review?

A. Up to the stage that it has been applied, yes.

Q. It has?

A. I would also benefit in responding to your question from a clarification of what is it that you refer to

"critical academic review."

Q. Has there been any discussions, for example, about the model that have appeared in any refereed journal?

A. To answer your question, in its present form as you have seen projected and as applied exactly, no. The technical report that you have, as you note, is dated, Draft, 1-24-1986.

It was specially put together for the benefits of your experts. We did not have an opportunity yet to subject it to refereed journals.

However, I would like to point out that this work and this implementation of the model is an outgrowth of many years of a lot of research that I have been pursuing and other colleagues have been pursuing, going back all the way to 1976, when in the process of a seminar I formulated a link between economic and demographic accounts as a graduate student at the time.

And at the encouragement of the faculty at Carnegie-Mellon, I submitted it for publication. It was accepted, apparently refereed, I have learned later on, by Richard Stone, who much to my delight is the recipient this year of the Nobel Prize in economics, and was immediately published while I was a graduate student before I completed my dissertation.

I am citing that just to illustrate to you that I have

been working on this kind of model building for many years. To give you another illustration, there is another variant of a similar structure that was built in 1982 at the request of the U.S. Senate.

The purpose of that request was to construct a multi-regional model of the U.S. economy that would enable a subcommittee on government oversight to check the impact of various fiscal budget proposals on various regions.

The focus there was on a particular region, but eventually it has been used throughout nine regions of the U.S. economy.

We are using this for four years now annually, and it has forecasted with great success these impacts.

Q. Now, you have indicated background, and you have indicated that the concept of putting together components into a model that can model certain aspects of the economy, you have a background in.

I take it, however, that there has not been any refereed journal in which the STARLOC model that we are dealing with here in your testimony had been presented? I think you have already answered that, have you not, this model?

A. I'm sorry. My answer was a complex one. Various portions of it have been refereed and published and circulated widely. By "portions," I am not talking about a specific

implementation, but similar formulations.

This particular version that you have seen, as you are aware of, has just been used and just been documented and is in the process of documentation, especially with regard to the data.

Q. You mentioned similar formulations, so I take it the parts that have been refereed or are in refereed journals or critically reviewed in the past have not been the specific formulations that you are using in this case?

A. Not exactly.

Q. All right. Now --

A. However -- may I complete my response?

Q. Is it more than just "not exactly"?

A. I would like to refer to your earlier question.

Q. Please, just answer the questions one at a time, and we'll be able to get through this I think in a little more of a sequence here.

MR. RAINEY: I'm sorry, Your Honor. I think Dr. Schinnar should be allowed to fully explain his answer, as all other parties have been allowed to have their witnesses do.

JUDGE MATUSCHAK: He refers to a previous question here. Let's proceed.

MR. CALVERT: Your Honor, at this time, I would ask that we have marked as PECo Exhibit No. 22 for identification

a copy of a document which is I believe the technical report that Dr. Schinnar has referred to.

MR. RAINEY: I'm sorry, Your Honor, was Dr. Schinnar allowed to complete his last answer?

JUDGE MATUSCHAK: Can you have him look at it and see if that is his product?

MR. CALVERT: Sure.

(Document handed to the witness.)

BY MR. CALVERT:

Q. Is that the draft technical report, Dr. Schinnar, that you referred to?

A. Yes.

MR. RAINEY: What marking have you given that?

MR. CALVERT: PECo Exhibit No. 22.

(Whereupon, the document was marked PECo Exhibit No. 22 for identification.)

BY MR. CALVERT:

Q. Dr. Schinnar, we have marked as PECo Exhibit No. 22 a document which I believe you have identified as your draft technical report you referred to earlier, is that correct?

A. That is correct.

Q. Now, it mentions that it is a draft. How will this report be changed in the future to make it a final?

A. Well, first, as such, it is fairly complete. But

because of the need to respond to the interrogatories, I haven't had an opportunity to check every word for typos and things of this nature.

But having reread this, it is a fairly complete characterization of the model, and accurate.

Q. So that when you say "draft," all you are referring to is the fact that you are going to clean it up for typographical errors, but the substance of the document won't change?

A. That is correct.

Q. Now, did you write this technical report as documentation for your STARLOC model?

A. With the intention that it would be submitted very soon for publication.

Q. But as documentation for your model?

A. Yes, correct.

Q. Now, if you look at the bottom of page 3 -- I know there are a lot of page 3's, but the first page 3 --

A. Yes.

Q. It says that, "The present report, which contains specifications, key parameters and essential data of the STARLOC model, is the first in a series of papers on the model's development."

A. That is correct.

Q. And you say, "Later reports referred to in the

text will include..." and then you go through and you list STARLOC Reports 2 through 6, correct?

A. That is correct.

Q. Have any of these reports been prepared so far?

A. No, sir.

Q. Will these reports add to the documentation for your STARLOC model, just as this draft report that we have in front of us now does?

A. If you would let me have the question read again, so that I can --

(Whereupon, the reporter read from the record, as requested.)

THE WITNESS: The structure of these reports, as I mentioned, by and large consists of taking each section in this report and providing more detail on the data, how it was obtained, how was it adjusted, completed, estimated, and entered.

As a mathematical specification, this document is complete.

BY MR. CALVERT:

Q. For example, if you turn to page 7, it states there -- I'm sorry, Section II,page 7 -- it states there, the first full paragraph, "Greater detail on the construction of the Philadelphia data base from which the model was assembled will be given in STARLOC Report 3, forthcoming,"

for example.

A. Yes.

Q. And if you turn to page 2 of Section V --

MR. CALVERT: Your Honor, a quick way to find it is, if you look at the figure numbers in the right hand column, if it's figure 5, you're in Section V.

JUDGE MATUSCHAK: Yes.

BY MR. CALVERT:

Q. Page 2, it says -- you are describing some of the difficulties in the modeling process -- and you say, "To overcome these difficulties, we undertook the estimation of a residential energy demand model using data from the Residential Energy Consumption Survey (1981), which is reported elsewhere (See STARLOC Report 4, forthcoming)."

So, the detail on that difficulty will be set forth in that report, I take it, or on overcoming that difficulty?

A. It is also partly described in this document, as I refer to issues of colinearity. I have also responded to some interrogatories related to that, and that is the nature of the difficulty.

If I may explain what the word means -- since we are in a technical report, I get carried away with technical issues -- colinearity is a reference where data is redundant.

You may have several measures of the same thing, but they may be labeled different. For example, if we have a

variable called "wage" and a variable called "income," although they may mean different things, when the data is collected, it may actually be completely a mirror image of the other.

And when this is treated statistically, it generates problems. At the Wharton Policy Modeling Workshop, in my laboratory, we have techniques that enable you to remove this redundancy from the data, and this is what I am referring to. So, it's a rather minute technical point, but of significance.

Q. Fine. Now, if you look on page 4, for example, of that same section, about in the middle of the page, you are talking about estimates for different variables, and you say there, "Estimates for other variables of the model are provided elsewhere (see STARLOC Report 4, forthcoming)," correct?

A. Correct. There are a total of 44 such variables in the model.

Q. And how many of those variables will be discussed in Report 4?

A. All of them, including the ones that I presented here.

MR. CALVERT: I would like, Your Honor, at this time to mark as PECo Exhibits Nos. 23 and 24 certain answers to interrogatories of Dr. Schinnar.

JUDGE MATUSCHAK: Very well.

(Whereupon, the documents were marked PECo Exhibits Nos. 23 and 24 for identification.)

MR. CALVERT: Just for the record, Your Honor, PECo Exhibit No. 23 is IR-PECo-City-6, Answer and Interrogatory 5, and PECo Exhibit No. 24 is IR-PECo-City-6, the Interrogatory and the Answer to Interrogatory No. 8.

BY MR. CALVERT:

Q. Dr. Schinnar, you had indicated -- first, let me ask you, are PECo Exhibits Nos. 23 and 24 true and correct copies of the answers you gave to those interrogatories?

A. I should read them first.

Q. Please do.

(Witness perusing document.)

A. Yes, they are. I haven't checked them with my copies, but I believe they are.

Q. I believe them to be accurate. If you will look at the first one, which is Exhibit 23, the question relates to information about the matrices and coefficients relating to your model and asks for all assumptions and estimates employed with respect to those things.

Your answer says: "STARLOC Report 3 will contain a complete documentation of the updating procedures employed."

Do you see that?

A. I see that.

Q. Now, earlier you had referred to some answers to interrogatories where some information was provided, and I take it this is at least one of the ones you were referring to?

MR. RAINEY: Excuse me, Mr. Calvert; would you read into the record the entire response? I think you're taking out of context what the full answer is.

So that the record is clear and complete, if you want to read any part of that, I would request that the full response be read.

MR. CALVERT: Well, of course, the full response is in the record, but I am happy to read it.

It goes on to say, "Because early completion of the written report is impossible, company experts are scheduled to consult with Dr. Schinnar regarding these matters at PMW on February 10, 1986."

BY MR. CALVERT:

Q. Is that correct?

MR. RAINEY: That is Policy Model Workshop, Your Honor, at the Wharton School.

BY MR. CALVERT:

Q. Dr. Schinnar, that is a fair rendition or reading of the answer, I take it?

A. Yes, it is; that's close enough.

Q. My question was: earlier you had indicated that information had been given in answer to interrogatories relating to these reports, and I take it that partly what you were referring to was this answer?

A. And I am also inviting the company experts to come and spend some time with me.

Q. Now, if you look at the next answer, PECo Exhibit No. 24, the question refers to Tables 2.2, 2.3, 2.4, 2.5 and 2.6 of PECo Exhibit 22, which is your technical report, correct?

A. Yes.

Q. And as I understand those tables, though we're going to talk a little bit more about them later, but those tables are the basic starting point data for your model?

A. Much of it; not all of it.

Q. And the question (b) there says: "Specify in details all procedures used to validate the tables." And

jl5

your response in 8(b) is: "Validation was based on detailed comparisons of similar data from different sources." And you refer us back to PECo Exhibit 23, and say: "See response answer 5 above." Is that correct?

A. Yes.

Q. Now, when the PECo experts visited with you earlier this week, were you able to provide them detailed comparisons of similar data from different sources?

A. I was not asked, as far as I can recall.

Q. You were not asked?

A. As far as I can recall. You must bear in mind that I spent two-and-a-half days with five experts, and I have been bombarded by many questions and answered literally hundreds of them. As far as I can recall; though it is quite possible.

Q. It is quite possible they asked?

A. It is quite possible.

Q. And I take it you didn't provide that information, because, among other things, at this point you don't have it, do you?

A. No. The problem with that particular data is that it is archived. If I may explain that a little further.

Q. Please do.

A. At the University computers certain data is not being used, for example, over a month or two months; because

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of demands on the computer, it gets put on tape and archived, pretty much, like stored in a basement.

In order to obtain it, you have to retrieve it again. So in that respect I am unable to respond to it.

We have another problem, and one of the experts experienced it himself. The computer system now is being changed from what is called a DEC-10 computer to a VAX-8600. The new computer is being installed. As a result, the computer is often down or dependent on installation in order to move data from one computer to the next one.

It happens to be down in this particular semester. Therefore, it is extremely difficult to go back and obtain these archives of data on such a short notice.

Also, I would like to point out that while I was asked to provide data, and including the response to these interrogatories which were due this week, I spend nine hours one day with a group of five experts, another seven, eight hours with two of the experts the second day, and three hours -- a wild guess; I lost track -- the next day. So I didn't have much opportunity to respond to the many questions.

Furthermore, I was provided with ten reports to read at the same time in response to our interrogatories, and I readily admit it is beyond my capability.

MR. RAINEY: Your Honor, as a further statement, if

you will remember last Thursday when we spoke about the scheduling of Dr. Schinnar for today, as well as his responding to questions by the company at his Policy Modeling Workshop, we stated at that particular time that it was unlikely or highly improbable that Dr. Schinnar would even be able to respond to the Set 6 and that that should not be then used by the company to hold up the cross-examination today. So that his responses in fact do go to an extra-ordinary effort on his part to get those things responded to in written form as well as address the needs and concerns of the company officials who met with him over the last three days.

MR. CALVERT: Your Honor, that is all very interesting. I think it is inappropriate of counsel, however, to answer a question directed at the witness.

All I am trying to do is get this witness' responses; not counsel's.

MR. RAINEY: It is further clarification of what was stated, and was within my sole recognition, because Dr. Schinnar was not there at the time that Mr. Calvert and I came before Your Honor on the record last Thursday.

JUDGE MATUSCHAK: Let's proceed.

BY MR. CALVERT:

Q Dr. Schinnar, looking further at PECo Exhibit 24, question (c) says: "Provide a copy of the equivalent

historical matrix against which" -- in this case -- "each table was validated." And you said: "Providing equivalent historical matrices for each period of validation imposes undue burden."

Now, does this go back to the question of it being archived, and a similar answer that you have just given us?

A. Yes.

JUDGE MATUSCHAK: What is your answer?

THE WITNESS: Yes.

BY MR. CALVERT:

Q. Now, 8(d) then says: "Provide comparable tables that include the PECo price increase. To the extent that the tables do not change due to PECo's price increase, so state." And I think maybe it was a typographical error here, but the answer says: "Tables" -- should that be "do change"?

A. Correct; do change.

Q. "And these changes are computed internally by the computer program."

A. Correct.

Q. That is what your STARLOC model does in that box.

A. That's correct.

Q. "To generate these tables, the computer program sub-routines would have to be modified, which would impose undue burden."

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A. That's correct.

Q. So you are not able at this point to get the computations as would be reflected in the tables because they are inside the computer and you don't have the program at this point to bring them out; is that a fair statement?

A. I am unable at this point to provide it; yes, that is correct.

Q. And this is something that the experts had asked for, was it not?

A. That is something that the experts have asked me, yes, including yesterday. And it is something that I explained yesterday to, I believe, one of the lawyers of the company over the telephone.

Q. Now, you have described today that the STARLOC model is a complex compendium of components that you have indicated to us; correct?

A. It is comprehensive, and in being comprehensive there is a certain complexity in it.

Q. And, indeed, it took a long time for you to put this together. As you describe, you have been working on this, on parts of it, for some years.

A. That's correct.

Q. Now, my experts tell me that when they met with you, that you had described how the model was put together, using my terms, part by part, component by component; you

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would work on it as one component, and check that component, and then you would work on another component; is that a layman's way of expressing what was basically done?

A. I have discussed each component with the experts, and indeed I described, and when they were assembled, they were assembled component by component, but not separately.

Q. All right. We'll get to that. I think I understand that.

Now, as you were assembling the individual components, did you test every individual part individually, separately?

A. As I stated in my response to the earlier question, they were put together separately, however, not independently of each other. So the testing was conducted on the component as well as on the link between the components.

Q. All right. Can you describe briefly for us what that testing consisted of for the various components and the link?

A. If I may put it in layman terms, --

Q. Please do.

A. -- via an analogy. Suppose we have a room, two rooms, and 100 people are in one room and the other room is empty, and you are counting the 100 people in room A. Subsequently, these people move into room B, and you count them there again. It is very important that this counting balance is being maintained -- this is one form of illustration --

that what is coming out of one component enters into the other component and is consistent.

So in trying to illustrate how the model was tested, all the components were tested in terms of the link to the proper components that are supposed to connect and test them together in that fashion.

Q. As I understand it, the parts of this model themselves, as part of the computing process, utilize calculations and utilize data in their part to perform calculations, to perform calculations and to come up with results, which are then utilized by another part of the model; is that a fair statement?

A. That's correct.

Q. Now, did you test these what I will call intermediate calculations as you were testing the individual component parts of this model to see that the calculations were computing properly, that the data was properly being utilized, and that the results weren't somehow wrong or skewed?

A. This is a standard procedure, and it was performed over a considerable period of time.

Q. All right. Now, as you are doing that, I take it you have a computer terminal on which you can see these what I will call intermediate calculations. Is that how you would check them; you would look on your computer

terminal to see what it was that the computer was doing?

A. That would be one way to do it.

Q. Is that how you did it?

A. It was done two ways.

Q. What is the second way?

A. You observe it on the screen and occasionally you obtain printouts.

Q. Now, as you were testing these various component parts, did you obtain any printouts of the intermediate calculations as one of the two ways of checking the parts that you have just described?

A. I have to rely here on my recollection, and I cannot give you an accurate answer because we are talking about procedures that were done months ago. Also, -- well, the answer to your question is: it is quite possible that a printout was generated at the time. I just cannot give you an accurate answer to that.

Much of our time, much of our time, is devoted to observing the output on the screen, and the reason is because it appears quicker, and we also have diagnostic constraints; for example, if you have the shares that are supposed to sum to one, then if you have a check procedure that you put in where you say a series of numbers, once you sum them they are supposed to come out and sum to one, you can put in a logical statement in the computer where you

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ask, number one, see if all the numbers are positive, and the computer will perform this check.

Then you can ask the computer: please add up the numbers and show me the result, and you observe the screen and it shows 1, 1, 1, 1, and you conclude from that that all the elements there are shares because they have to be positive and that they sum to 1.

So this is an illustration where you don't necessarily have to see physically the data in order to check that it is consistent.

I am not suggesting that the data was not observed physically, but I am giving you an example that is part of model building; that you logically test whether the data is consistent, correct, whether the computations are done as they are supposed to be. This is standard procedure, and you don't need to generate reams and reams of printouts and then spend days and days reading them; and it is literally impossible, even if you had all the printouts, to find that one number that the computer can check very efficiently. You can have a minus 100, and I will give you a pile of printouts like this with numbers and give you a room and provide you with coffee, the same way the experts were provided, and I think that after one hour you would give me back the printouts.

A computer can do it very efficiently with one

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statement where you ask: go through the million numbers and find the one that is negative which is not supposed to, and then you make the correction if it is necessary.

Q. Because the answer was a little long, I want to make sure we have established: you, today, don't have any such printouts of your testing of the component parts of the model that you have been describing? Whether or not you had them before, you don't have them today in any event; is that a fair statement?

A. There are numerous printouts on the third floor in my center, but I do not know where any such printouts are that pertain to this specific test.

Q. Or even if you have any for this specific test?

A. For the specific ones, presently?

Q. Yes.

A. No.

Q. All right. Now, I take it that if the information appeared on the screen of your terminal, that if you wanted to print it out at the time, you could have printed it out?

A. That's correct.

Q. If we wanted to go back today and check the data, to check the calculations, to check what I call these intermediate calculations for any component part, could we do that?

A. Today?

Q. Yes; today.

A. Not without considerable effort.

Q. Why is that? You can't call that information up on the screen anymore?

A. You are asking a very technical question, and I will try to explain it in --

Q. Let me ask you --

A. -- layman's terms, why it can't be done.

Q. I would appreciate that, but just answer this simple question first, then I will be happy to have you explain.

Is it true that for the component parts, you can no longer call up on your terminal or your screen the intermediate calculations to check what that component part is computing or doing?

A. Without completely decomposing the model, which would take a considerable amount of effort, it cannot be done today.

Q. Now, if you turn to page 36 of your testimony, --

A. Are we done with these? Can I put these away, Exhibits 23 and 24?

Q. Hold on to them. We may or may not come back to them, but we are done for the time being.

MR. RAINEY: I'm sorry; what page did you say?

MR. CALVERT: Page 36.

BY MR. CALVERT:

Q. Now, you see there, the third line down, it says, "The model is complex" -- I'm sorry the second line down --"The model is complex and some parts are difficult to test." Do you see that?

A. Yes, and the sentence continues.

Q. Yes.

A. But that part is correct.

MR. RAINEY: Would you read the entire sentence again, please?

MR. CALVERT: No, Mr. Rainey, I won't. I will ask the questions that I want to ask, and I would hope that the Judge would let me ask those.

If you want to come back on redirect and ask further questions, that's fine, but I would like to conduct my examination the way I have it planned.

MR. RAINEY: Your Honor, I am not intending to be argumentative, but it seems to me that to the extent that matters are taken out of context, it does confuse the record and allows the Commission, Your Honor and all parties an incomplete record, and that a full sentence should be read to the extent that it is there and it completes a thought or an idea.

JUDGE MATUSCHAK: You will have an opportunity to

redirect to clear that up. Let us proceed.

MR. RAINEY: Thank you, Your Honor.

BY MR. CALVERT:

Q. Do you have your answers to interrogatories there, Dr. Schinnar?

A. I have a pile of them.

Q. The one I am referring to is Set V, Question 5.

A. The one that begins "Refer to page 35"?

Q. Yes, sir. You will see that though it says 35, in fact it refers to page 36, because the quote that I just read is part of that question.

Do you see that?

A. Yes; I'm sorry about that.

Q. That may have been my mistake; it may not have been yours. I'm not sure where the typing was.

But, in any event, in the answer to Question 5 it says, "Complex," in quotes, where we ask you what does that mean, "is a reference to an assembly of several separate sub-models with different characteristics."

A. That's correct.

Q. You also mentioned that parts are difficult to test in your testimony at page 36.

A. I didn't say "part." I said "some."

Q. Some parts; I'm sorry. Some parts are difficult to test. What are the parts that you found difficult to test?

A. Do you want specifically a list of all of the parts, or the specific ones?

Q. What I would like is a reference to the parts of the model that you are referring to in your testimony at page 36 which were difficult to test. And if it is going to be a long list, to make it easy, my second question is going to be: why were they difficult to test? If that is an easier way for the answer.

A. Let me give you an illustration, and I think that that will clarify the statement of difficulty. Often, not always, in model building you use two techniques to test -- actually three techniques, and there are probably many more. I just contradicted myself, but that is not my intent. As I was answering, I could recall various methods.

One technique is a statistical technique, which says given that you take, for example, a mean of income for a population and you say that the mean of the income is $10,000; you look at how many people vary from this mean, and if there is a large variance, and if you find that there are many people who just earn $1 and there are many other people who earn $100,000, the mean that you have, which is $10,000, is not a good representation of the range of incomes. So you look at the variation.

So this is a statistical test, a statistical method to show you whether this particular mean that you have

defined is a reliable representation of the income, say, for a particular person.

I would characterize this as a statistical test.

There are other tests that you perform when you refer to precedents. I think that it is probably more in line with the way legal procedures work, if I may extend it; it is beyond the area of my expertise. It is not uncommon to do that in model building.

I will give you again an illustration. Historically, at least in recent years -- and by "recent" I'm talking about ten, 12 years -- we have seen in the energy sector a situation where oil prices, when oil prices rise, you have electric prices rise as well. And there are reams of data to support such precedents.

As I was writing this testimony, I was faced in my mind with the scenario that we are talking about the next three years and the context that we are likely to face is a situation where electric rates are rising and oil prices are likely to dive. When I say "are likely," I am referring to December 20 when I was writing my testimony, and indeed today we know that oil prices have been diving.

In Pennsylvania I think fuel oil recently went down by 4.5 percent. I am quoting the newspaper. In New England, I recall seeing a headline in the "Philadephia Inquirer" that compares there a drop in oil prices to 8.5 percent.

So I am giving you an example where we have a new situation that did not necessarily or has not been witnessed before over a time period, and you don't have necessarily the precedent to go back and say: here are a set of circumstances that are similar to the ones we face today, and based on the outcome that we noticed then, we can see whether the present conclusions are consistent with these results. It is a very common process in model building. It is confirmatory in that respect. It doesn't mean it is true, but it gives you confirmation -- and we all deal with reason -- that this is a reasonable kind of behavior, because you draw on your own experience.

There is yet a third method, which I think is probably the best, and it is very common in the natural sciences. And if I may step out of economics for a minute, in, for example, biology, some researcher or scholar will make a discovery. It will get published. And this is not the end. There will be immediately 20 other scholars throughout the world trying to replicate this result. And only when it is replicated, it is confirmed.

Much to my regret, it is not done sufficiently in the social and economic sciences. So as far as I am concerned, as in this case, a researcher, I always prefer to see a situation where I am able to get corroboration from other attempts that are similar in nature, which is

equivalent to other views on the same matter.

That completes my response.

Q. Well, we still don't have the parts of the model that the difficulties you have described relate to, that you had trouble testing for the reasons you have given us.

A. Well, for example, in the price model, the situation where you have electric rates rising and oil prices diving; there is very little on that in the literature, but there is theory that would suggest that there will be a particular outcome.

If I may pause for a minute to drink tea for my throat.

(Pause.)

Q. Please feel free to stop any time you need to.

A. Thank you.

Q. What other parts, other than the price model, as you have just indicated?

A. What I meant when I said was "difficulty" was degrees of difficulty.

Q. All right. What degree of difficulty did the price sub-model fit into?

A. Well, this is a new phenomenon, so --

Q. Is that very difficult then, or impossible?

A. You have to rely on theoretical results, and you

don't have the precedents to go and say: my model does that and I see a similar situation where it was performed.

If you turn, to respond to your question, to page 37 of my testimony, I have illustrated the performance of the growth model. And if I may use a chart to point it out.

Q. Sure. Everyone has it in front of them, including the Judge, so if you just want to refer to it -- I don't care how you do it, but it is probably just as easy to refer to it. We all have it in front of us.

A. I am rather visually oriented as an individual, and it is easier for me to point it out.

Q. That's okay with me.

A. This is slide figure -- let's look at Figure 16 of the testimony. What we observe here is, if you will, a visual test of the growth model. At the bottom we have different years, at the bottom axis, and at the vertical axis you see the rate of growth in the manufacturing sector.

Q. Excuse me; what is that the growth of? What is growing there?

A. Employment.

Q. Employment.

A. Employment. The black dots connected by the solid line show, over time, what happens to the rate of change, the rate of growth in employment, in the Philadelphia region.

The white dots and the lines connecting them show what is happening in Philadelphia as forecasted by the model.

Here is an example where you have tried to represent a reality, a pattern of reality. It is a rate of change in the level of employment, and as you note, it is not smooth. It fluctuates considerably.

So the success of that particular test is, for example, visually -- you can do it statistically -- is to look at it and by and large it captures the pattern.

Q. This would be described as a very good fit?

A. That would be described as a very good fit on rate of change, which is equivalent to modeling the fluctuation in the stock market; and if we all knew how to do that, we may not be sitting here.

Q. If you could model the fluctuation in the stock market as well as your growth sub-model models the performance in manufacturing, we would all be rich?

A. I would be very wealthy.

Q. All right.

A. Now, if I may now explain the difficulty.

Q. Sure.

A. In part, this depends on a variable that represents wages in Philadelphia in relationship to wages in other regions of the country. There is such a variable in this model. And if we observe the figure in my technical

report, -- and I will find that particular figure. I don't believe I have a chart of it.

Q. That is PECo Exhibit 22.

A. PECo Exhibit 22, Figure 3.3. I'm sorry I neglected to prepare a transparency.

What this figure represents is the same time periods; the one to three refer to '65 through 1983 that you see on the chart projected on the screen.

The vertical axis is a ratio between the wages in Philadelphia to wages elsewhere in the country. As you can see, all of the bars are above 1. The bottom is 1. One represents the fact that the wages in Philadelphia equaled wages elsewhere.

And there is a pattern. It is flat for a while, and then it starts diving and levels off. If you look at the last five years, it slows down in terms of its decline. In fact, there is a year where it increases slightly.

Now, here is a scenario. Most economists that have been studying these patterns in the Philadelphia economy have argued that this is a very positive sign because if the cost of manufacturing, which includes wages in it, is dropping in Philadelphia, then the region will become attractive for the location of industry because the costs of production would be lower.

Now, that is why, for example, Professor Anita Summers

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that testified a year ago on behalf of PECo argued that there are very positive indicators in the region that suggest that growth is not going to be lagging as much behind the national economy as it has been for some ten or 20 years that she documents, both in her testimony as well as in a book that she just co-authored with Tom Luce.

The question that I face at the end of this chart is the following: I notice that there is a leveling off of the drop in wages. The question that I am facing as an applied economist -- and I know that you would like to put this term in quotation based upon your earlier questioning, but I don't consider that in quotation marks. As an applied economist I ask the question: what will happen to relative wages over the next three years?

One scenario is that they will continue to decline, and that is very good for the economy, because there will be more industry located or less industry leaving; there will be a growth in opportunities for employment. The other possibility is that it will remain flat, that it will not change. The third possibility is that it will start to rise as we see suddenly in the last column, and that's what happened in 1983. We don't have data beyond 1983 on that point. It has not been published yet.

My response is that if it continues to increase, especially when we know that consumers or households will be

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faced with increased electric rates, and there will be some pressure because the cost of living will rise, there will be some pressure on employers to accommodate employees, that this will reduce the growth of employment, for example, in manufacturing, because local wages are more expensive and become less attractive suddenly for industry to locate or attractive for present industry to leave. So we are reversing past strengths.

Q. Just to follow up on that last point --

A. If I may; it is very short.

Q. Okay.

A. Faced with such a possibility, we have taken the conservative approach to say: we are going to keep wages in relation to other regions constant. Ideally, you would like to know what it is, but just based on the reasoning that I presented to you, it is likely to increase and reduce growth in the region, but not knowing that, as any analyst would do, you take the conservative approach and don't speculate on it.

So when I am referring to the difficulty of testing, I am pointing here to a point that you are facing an unknown, and you don't know, unless you have a way to predict what happens to wages; and there are ways to do it, but we haven't yet done that. In fact, there is a project that is going on in the Wharton School, the Wharton Policy Model Workshop,

that looks at another complete implementation of this model for the purpose of looking at wage taxes. In that particular application, these wages would be modeled in a very explicit way.

I am just giving you an illustration of an unknown which raises difficulty in testing a component of a model, and the general approach is to be very conservative.

That's all.

Q. You would expect then, I take it, that if relative wages in the Philadelphia SMSA declined, that in theory jobs would increase?

A. This is what estimates of the model and our parameters here documented and support to show that this is true.

Q. When you're talking about difficulty in testing, did you test the sensitivity of the STARLOC to using an assumption of declining relative wage rates?

A. This is not an assumption, sir. This is an exact data presented here.

Q. You assume, though, that in the future, for purposes of your model, that the relative wage rates in Philadelphia would be constant; correct?

A. For the purpose of the forecast; yes. And I restate what I said earlier, that such an --

Q. Please don't. I understand what you're saying.

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A. I'm sorry.

Q. My question to you is: you weren't able, I take it, based on the answer you have just given us, to test the sensitivity of your STARLOC model to that assumption?

A. I know the sensitivity because I have an exact parameter for it.

Q. When you say "exact parameter," what do you mean?

A. We are getting somewhat technical. At the end of the technical report, Table 3.1 -- and, again, I apologize; I didn't expect to have a question on that, and, therefore, I don't have a chart. It is a rather ugly-looking equation. There are two equations, two rows there, and the second row contains a set of numbers; there is a Greek symbol called Gamma, and then an equals sign, and then a string of numbers, which are called coefficients, and then a "w." The "w" represents the ratio that we have seen in the chart that we've seen in Figure 3.3. That "w" represents the various numbers in Figure 3.3. They range from the 1.1 to 1.06, meaning -- if it is 1.06, it means that roughly speaking, wages locally are 6 percent higher. If it is 1.01, it is 1 percent higher.

What you see there in front of "w" is the coefficient, .056, and under it you will see a number in parentheses, which is -1.14. This is a statistical test of the stability of that parameter. And any ratio like this as a rule of

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thumb that is greater than 2 indicates that this is a reliable number. And, again, I am talking in a very non-technical fashion.

Q. This is regardless of sign, by the way, too?

A. Yes. And the sign is negative.

Q. Right.

A. And as you can see, if "w" increases, meaning if the wages locally will be higher, growth will go down.

Q. And vice-versa, if the wages locally are lower, growth would go up?

A. That's correct.

Q. And this is growth in jobs; that's what we've been talking about?

A. We've been talking about that.

Q. Just so the record is clear, I think you may have mis-read the numbers there. The number before the "w" is .565; correct?

A. Correct.

Q. And the number, the "T" statistic is what I believe it is --

A. The "T" statistic.

Q. -- is -4.14

A. That's correct.

Q. Since we're on this topic, let's take a look at this for a minute. As I understand what we have here,

Table 3.1 of your technical report, PECo Exhibit 22, are the equations that you have plotted on Figures 16 and 17 of your testimony; is that a fair statement?

A. No.

Q. Weren't those the equations used to check the fit with the actual data that you did in Figure 16 and 17?

A. These were the equations that I estimated from the data.

Q. I see. Okay.

A. And then, if I may refer you to the body of the report, -- this is getting more and more technical -- on Section 3, page 3, at the bottom of the page there is an equation or mathematical expression which is labeled on the right as "3.8."

Q. Okay.

A. And another one on the next page which is labeled "3.9." This is the exact representation of the equations that were estimated in Figure 3.1.

Then, as you can see in Equation 3.10, they are set up simultaneously, and then going through a complex mathematical process they are solved, and the solutions appear in Equation 3.11, 3.12, with two sets of parameters, Alpha, which gives you the rate of growth in manufacturing, and Beta, which gives you the equation to forecast the rate of growth in non-manufacturing.

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These equations are then being used in this figure, as you see, to make a forecast.

Q. Explain to me again then what Table 3.1 in your technical report, what those two equations represent.

A. The first equation is an estimate of an equation that represents or that fits a difference between rate of growth in non-manufacturing and rate of growth in manufacturing. This is Beta minus Alpha.

Q. Right.

A. This is the first equation. The second equation represents the rate of growth in total jobs, manufacturing and non-manufacturing.

Q. In the local economy.

A. In the local economy.

Q. And what you are saying is that Figures 16 and 17 are the national economy?

A. No.

Q. No. Those are local economy?

A. This is the Philadelphia economy; yes.

Q. You said that the Gamma was the percentage growth in local employment in Table 3.1, the second equation?

A. Yes.

Q. The Delta, as I understand it, is the percent growth in U.S. employment?

A. That's correct.

Q. Then the "T" is the time trend?

A. That's correct.

Q. And the "w" you have already explained; it was the relative wages.

A. That's correct.

Q. Now, the R^2 for that equation is .90. And am I correct in saying that that means that 90 percent of the variations in the growth Gamma, growth in the local economy, are explained by this equation?

A. Ninety percent of the rate of growth; that's correct.

Q. Looking at that equation, what is the most important variable in the equation in terms of effecting that result?

A. How do you define importance? They are all important.

Q. In the statistical sense. In other words, isn't it true that the percent growth in U.S. employment, the 9.07 "T" statistic, would be the most important, - statistically, the most important variable in that equation?

A. That's not true. That is your interpretation of the statistics. It simply tells you -- and I will refer to -- I love the discussion, but I feel awkward in that context to indulge everybody in it. I refer you to my previous illustration for statistical tests where I said that if you

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have a mean of income of $10,000, and if this mean represents a range between $1 and $100,000, then this statistical test applied to that mean of $10,000 would give you a very small number.

What it says is that $10,000 is not a good, stable representation of the income.

In this particular case what it does say, this parameter that was estimated is a very good representation, and by analogy I would say that this represents a situation where the $10,000 income ranged between, say, for the purposes of illustration, between $9,500 and $10,500. So the $10,000 gives you a very good, if you would, ballpark average figure.

That is exactly what this parameter means. It does not mean that this is important necessarily, or unimportant. It simply means that you can say, with a certain degree of assurance, that it is not zero. And in this case it has a positive sign.

Q. I take it that for this equation it has some importance, otherwise you would have had some other variable in there that would have a "T" statistic that would indicate to you that it also could estimate within the ballpark fairly well.

A. I could have hypothesized, for example, that this variable should be important in the way I estimated it or the

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way I formulated the problem, or it could very well be that the actual variable statistically would prove to be statistically insignificant.

Again, let me illustrate. Suppose I have the income variable there and the range is between $1 and $100,000. The fact that the particular estimate says that the "T" test, the test for this parameter, is insignificant does not mean that income is unimportant, because if it meant -- I can show you many studies where income was used and where it turned out statistically insignificant; it doesn't mean that income is not important. It just happens to mean that in this particular attempt to either forecast or analyze the problem, the income variable either doesn't play a role or has not been properly formulated.

Q. By the person proposing the equation.

A. Specifying the equation; yes.

Q. Isn't it true that the PE experts asked you to run the STARLOC model with a different assumption of relative wages in the future and that you had indicated that because of the way it is programmed, that that is something either that you couldn't do or you couldn't do without a great deal of work?

A. I recall a discussion of income. My response was that it would be complex.

Q. I'm talking about relative wages.

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A. Again, --

Q. Relative wages with a different assumption with respect to future relative wages.

A. We have to rely on my recollection. I remember a discussion of trying to run the STARLOC model with wages in it, changing in a particular way, and we discussed wages. Wages appear in more than one place. And my response was that it would be difficult because it required that I enter and reprogram the model in a number of places in order to generate the kind of forecasts that the PE experts requested.

Based on that -- and this is just one example -- my response was that it will be an undue burden and time-consuming.

Q. I take it from that answer that the relative wages, as an example that we're using here, and the assumption with respect to what they will be in the future fits into various of the sub-components or sub-parts of your overall model; is that a fair statement?

A. Yes.

Q. And that, in fact, the model internally does calculations with respect to those relative wage rates as part of what its internal computations are, is that a fair statement, in various parts of it?

A. Not in every place it appears as a relative wage.

Q. But in some.

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A. Some places it appears as the actual wage. In this particular place it is the only place where it appears as a relative wage. Okay?

Q. I see.

A. So if we take the notion of income, the notion of wage will appear in a number of places. Let me give you an illustration.

If you want to estimate -- and I know from working in economic forecasting, in running the so-called PECo model for forecasting the amount of electricity, it has income; and the reason why it has income is because a number of studies show that people with high income will have a higher level of electricity consumption.

JUDGE MATUSCHAK: If you can find a convenient place to break, we'll take a recess.

MR. CALVERT: Certainly; this is convenient, Your Honor.

JUDGE MATUSCHAK: We'll take a ten-minute recess.

(Recess.)

JUDGE MATUSCHAK: We can proceed.

MR. RAINEY: Your Honor, I would like at this particular time to move for admission into evidence City Exhibit No. 2, which was a chart regarding the STARLOCK Model Specifications, which Dr. Schinnar earlier showed on the screen, if there are no objections to that.

JUDGE MATUSCHAK: The motion is granted subject to any exceptions or objections timely made.

MR. RAINEY: Thank you, Your Honor.

(Whereupon, the document marked as City Exhibit No. 2 was received in evidence.)

MR. CALVERT: Your Honor, one of my problems is that I don't have a copy of it.

MR. RAINEY: I will provide copies.

JUDGE MATUSCHAK: This is with the understanding that he will provide copies to counsel and furnish us with a copy.

BY MR. CALVERT:

Q Dr. Schinnar, before the break, we were talking about the component parts of your STARLOCK model and the lengthy description of the various problems and difficulties in testing parts of it, if you recall that, some of the parts.

A I described the nature of the difficulties which, if I may add, are not unique in any way to this model. They

are equally applicable to any demand forecasting model that PECo has used or any other technical expert who uses the model. So these are general.

Q. After all of the components of the model that we've been talking about have been tested separately, did you then re-verify all of the intermediate calculations to ensure that the collection of components -- namely, the entire model when put together -- produced correct calculations?

A. That is correct. These are by and large end-up conditions. You test them as you move the one component to the next.

Q. When the model is actually put together, when all of the components now are interacting, did you test, re-verify, go back and look into the internal intermediate calculations to see that now that everthing is hooked together that it is all functioning as you had tested it and predicted it would function earlier?

A. It is totally unnecessary, because if something -- if one plus one equals two in one component and then two plus three equals five in another component, when you take one plus one and add to it later on the three, you end up with a five. So there is a complete logical continuity, and it's totally unnecessary. It is totally redundant to do that.

Q. So you're saying that when you take these separate

components and you put them together and they start acting now or interacting together, that as long as you tested the individual parts, that process of putting them together and asking the internal computer -- your model to compute, that there is absolutely no reason to verify that the internal intermediate calculations are being done correctly? Is that your testimony?

A. That is correct. There is only one way -- I shouldn't say one way -- principal way to test when you put together these components, which is common practice. It is (a) sensitivity analysis and (b) try to find out whether the model's performance is corroborated by what other studies seem to suggest by using, for example, different techniques.

What you are evaluating now is the overall performance of the model, and that is the principal objective.

Once the subcomponents have been tested and put together, the test of the ultimate model is whether it performs in a reasonable way and whether there are other studies done in other situations or in other contexts which point to similar patterns of behavior. And if that can be established, which I have done and have established, you are at the point where you use it for policy analysis, and that's what we have done.

Q. Let's turn again, if you would then, to Exhibit 22,

PECo Exhibit 22, which is your technical report. At page 7 of Section 3, at the bottom there, it says, "Incorporation of Growth in STARLOCK." Do you see that at that bottom of page 7, Section 3?

A. Right.

Q. It says there, "At present, the STARLOCK model does not include an endogenous growth component, because only scant information is available on investment and trade flows in and out of the Philadelphia SMSA." It goes on to say, "Instead the above growth model is used to exogenously propel the model to some future state. This procedure does not include the multitude of adjustments entailing, for example, changes in household consumption behavior, the labor migration in and out of the region, or inflation effects on interindustry transactions." Correct?

A. That's correct. It is a wish list.

Q. I take it with respect to the last sentence I read relating to "This procedure does not include the multitude of adjustments," and so on, that those are adjustments that do not appear in your model; is that correct?

A. It's correct.

Q. And it goes on to say, "Rather it locates the 'present economy' in some 'future state' where final demand is adjusted in 'real terms' to reflect the level of exports, government purchases and investment that would stipulate the

level of employment forecasted by the exogenous growth model described in this section."

Do you see that?

A. Yes.

Q. Then you say, "We do this referred to above by inverting the model to solve for 'f'," and then you have an equation there, is that correct, equation 3.31? And as I understand it, the f* is final demand?

A. Correct -- let me correct myself. It is partly correct. It is the government expenditures, the investment. It has nothing to do with household consumption, which is elsewhere in the model, which has been very carefully modeled and corroborated.

Q. I understand that. But at the end of the equation there, there is an L^*_a.

A. Correct.

Q. And that's the amount of labor by sector, as I understand it?

A. Correct.

Q. And then it goes on to say, "L^*_a is a forecast obtained from the growth model." So this shows the interactive nature of your model, as I understand it.

A. If I may qualify that, it doesn't show that. It simply relates logically the level of exports, investment, and government expenditures, that given the consistency of

the model can be derived or deduced.

Q. In this case, as I understand then, the growth sub-model computes a number, L^*_a?

A. Correct.

Q. And passes it on through this equation to another part of the model?

A. No. It simply solves logically for what must have been the level of government, exports, and investment that would have produced that level of employment. It is a one to one correspondence.

Q. First, this equation 3.31, this is an equation which comes up with an f* or a final demand figure for the items you've indicated internally in the model?

A. A part of the final demand.

Q. A part of the final demand. But this is a calculation done internally; correct? It is not printed out as a separate output of the model?

A. At present, it isn't.

Q. And your sentence goes on here at the end to say, "The f* is then inserted into the STARLOCK model." Now, what did you mean by that phrase, "inserted into the STARLOCK model"? Again, in layman's terms, what happens with that number within the model?

A. Since you are in the economic growth scenario, because you have activated the growth model to forecast, for

example, given past trends -- and I would like to bring up the chart that I put away, not realizing we were going to continue the discussion of the growth model.

(Slide - Figure 16.)

A. Just for the purpose of discussion, suppose we are in this particular year --

JUDGE MATUSCHAK: Identify the figure.

THE WITNESS: I'm sorry, Your Honor. Figure 16. Suppose we are at the year '69 and I would like to observe employment three years down the road in the future. So I go one, two, three (indicating), and this is the level of employment.

Now, something has generated this level of employment, part of which is exports, government expenditures and investment; and in the consistency of the model, we can solve for exactly as close as possible -- I shouldn't say the word "exactly" because there are no exact numbers in science -- the level of that component of final demand which would have produced these employment figures.

What this does is it enables us to take, therefore, final demand or the component of final demand that includes investment, government, exports and conclude that these would be under this particular growth scenario the final demand three years in the future that would generate the employment.

So what we are doing is basically benchmarking the model in some future state. That is the purpose of this exercise.

BY MR. CALVERT:

Q. And the f* number can't be printed out separately from your model at this time?

A. It was, as I mentioned earlier, like every other component, which at present it would require extensive effort to enter and produce.

Q. And is the same true of the L^*_a in this equation? That's not a separate output of your model?

A. I just want to check logically what we have here.

(Witness perusing documents.)

A. What is perfectly coming out is the aggregate growth in manufacturing employment and in non-manufacturing employment, which are additions of these L* components.

L* has 23 components. We have added together the non-manufacturing sectors and so forth.

Q. So that the answer to my question is: no, L* can't be printed out, essentially?

A. That is correct, but there is an aggregation. There is a form of it that comes out.

Q. I understand.

Now, you've indicated in I believe your opening

remarks about the -- in fact, I think it's City Exhibit 2 that you have your STARLOCK model, and then you have what I would call programs that run the model. I think you gave them a different term. But is that a layman's version of really what you describe there with your dynamic and your static?

A. The answer is that your statement is not accurate. As a program representing the model, there is one program that is duplicated, and then the interface with the person running the program and what appears as the print-out has been changed in order to meet the specific objectives of each analysis; in one case a static analysis and in another case a dynamic analysis. So it is the same program that was implemented for one type of analysis and for another type of analysis.

Q. But basically the program is STARLOCK. That is the middle of the other two parts that come together?

A. That is most of it. The rest of it is simply -- I will give you an analogy. The analogy is what you enter into the program and what you see coming out that is different. But the core, the computation and what I call the program of the model implementation is the same.

Q. All right. Now, I think you went through and described what the static file produced in terms of Figures 4 through 8 of your testimony.

A. In that particular chart.

Q. In that chart, which is City Exhibit 2. And then I think you also described the dynamic file, as you called it, would produce Tables 3, 4 and 5 of your testimony; is that correct.

A. We can both see that. If I may put this back?

Q. Sure.

(Slide)

Q. What I'm referring to there is the lower right-hand corner of City Exhibit 2, which is Figures 4, 5, 6, 7 and 8 comes from the static file, and you say here Tables 4 and 5 come from the dynamic file.

A. I believe it is true.

Q. Table 3 did also.

A. I hope I didn't misquote the tables, but that was my intent.

Q. I think you did it right. My only question is: does Table 3 also come from the dynamic file? That is on page 13 of your testimony.

A. On what page is that?

Q. Thirteen.

A. That is coming out of --

Q. The dynamic file?

A. That is correct.

Q. Now, as I understand it, from City Exhibit 2 here,

you have up there under the static file, "Growth = 0"; correct? It is in orange up there.

A. Yes. In illustrative form "Growth = 0" means that this program was benchmarked in 1981 as a static analysis.

Q. As my experts tell me, when you actually have this particular file up and running so it appears on the computer screen, there is a command which says to put in a growth figure. And if I understand what you're saying, even though it says to put in a growth figure, the figure that should go in there is zero; is that correct?

A. Are you saying presently, today?

Q. No. Before Tuesday evening of this week.

A. Tuesday evening of that week, that was correct. The only correct input into this program was zero.

Q. Why was that?

A. As I said initially, it is the same program that was set up for two purposes. It has exactly the same components.

The reason why you have to enter a zero is because if you enter any other number, there is a parameter that is set that even though you may have put in a four, it assumes that you are putting in a zero. It is set internally to do that.

Ordinarily and in many computers being used in many offices, if a program is being released and when you're not

supposed to do something, then the program would tell you, "You've just entered number one; you shouldn't do that," or it will not appear there.

Since this model was built to be used at present by myself and my staff, it was not necessary to do until it is available for general use.

I did not anticipate when I wrote the testimony and even later that I would have Philadelphia Electric experts coming to sit and participate in running the models. When I say "anticipate" is when the model was implemented December 20th for use.

Q. If I understood what you just said, if prior to Tuesday evening of this week, if you had entered zero -- I'm sorry -- if you had entered any number other than zero for the growth component, the growth variable, you still would have gotten static results. Your computer was designed simply to ignore that number, i.e. read it as zero; is that correct?

A. It doesn't enter. It is like a disconnected wire, if you would. It doesn't enter it and doesn't process it the way it should be, and it was not intended for that use. So what you get is not what you expect to get; and therefore, you are misinformed when you run it this way.

Q. So that it wouldn't run as a static program?

A. It runs as a static program. When you enter zero,

you get the right result.

Q. But if you enter something else, it won't pick up that growth component. But are you saying then that you don't get --

A. It is not connected, because it is set to be benchmarked to '81; and although there is a calculation inside being performed, it is completely irrelevant and, if you will, it is meaningless.

If you do that, it is something that is meaningless.

Q. So that it's not still running as a static program even if that growth number is one?

A. It's not running as it is intended to run.

Q. Now, on Tuesday evening, as I understood it, you changed that static file, did you not, in order to allow some growth number other than zero be placed into the static file?

A. Yes, with an explanation, if you will.

Q. Fine.

A. When in the presence and under the instructions of one of the PE experts the model was to be used for sensitivity analysis -- we started with the static analysis and the expert suggested a sensitivity analysis with statics being zero and various rate scenarios were hooked in, 28.2 to replicate the testimony, and then 25 percent, 20, 15 -- I don't remember the numbers. Just the rates were changed.

When the expert was satisfied -- I was at the time talking to somebody else. He was advised not to change the growth parameter, as it was mentioned earlier. It appeared on the screen. The print-outs appeared.

When I was alerted to that, I asked the expert or advised him that he was not using the program properly and I would like him to stop and then use the dynamic one, because he sought to simulate 1 percent growth, 2 percent growth and so forth.

The expert nevertheless requested to continue with the exercise, and I advised him that this is not the proper exercise but let him continue.

Afterwards, indeed, we ran the dynamic analysis correctly which was the one that was used to generate the Figures 4 and 5.

Q. Tables 4 and 5; correct?

A. That's right; Tables 4 and 5. Then you have in your possession all of the print-outs.

Not having used before the comparative static model to do what was done by the expert, I checked it after it was left and released the link to 1981, which was basically the same as saying that there is a particular element that says, "You are zero under any circumstance." You change it to, "You are what you are told to be," which is the instruction being provided.

Once this was done, the program was ready to do the dynamic simulation. I replicated for the benefit of the Philadelphia Electric Company exactly the runs that the experts sought to do, except that I was under the impression that he left town. Fortunately, I got the call in the morning and I was advised by your office that he was still here, and I was more than delighted to advise him that the prints are available, and he showed up shortly thereafter to pick them up and then at his own interest and expense sought to continue the sensitivity analysis and a number of runs, because what apparently the company expert was interested in was the detailed output coming from what was previously the static analysis and not the aggregate analysis.

So the intended use of the expert of this program was different, which was not our intended use. The kind of detail that we sought was not the design that was put together for me to report in the testimony, and I think there are reams of print-outs that you have as a consequence of this analysis.

Q. So that Tuesday night, you rewrote the static file or redid the file to change this link?

A. The answer is no.

Q. Well, you must have done something, because suddenly the static file is acting differently than it did

earlier in the day on Tuesday; correct?

A. I explained to you exactly what I have done.

Q. Which is a change in the file, isn't it?

A. It's not a change in the model. It is a change in the instruction that is done internally. There are two ways to change instructions.

Q. All right.

A. You can have it where you are being asked -- or it is called "technically prompt it." What is the growth rate? You sit at a terminal just like a typewriter and you say 5-1-0.

There is another way to change it, and that is to enter the program and say what was written internally be zero always. So you say, "Be what you are being instructed to be." So it's not a change in the program. It is simply a change in the way the information is received and processed.

Q. When you make a change of that kind, is there any problem at all that by changing the command in either of the ways that you've indicated might have a change on the effect of how the program runs?

A. Not if it is a correct program and if the same program that is run is the dynamic.

Q. So you're saying that you can make changes in the commands to the program and not have any fear that it

may somehow without further checks affect the computing ability of the program?

A. If you know what you're doing, then there is no fear. The best way to check it is to compare the results of two identical results -- of two copies which are supposed to produce exactly the same thing.

Q. Would a print-out command be a change of instruction of the nature you just described?

A. A print-out command?

Q. Yes.

A. If the information is stored internally, yes, an internal print-out command.

Q. What about an external print-out command? If you wanted to look at the intermediate calculations and you asked the computer to let you do that, that is just changing a command to it, isn't it?

A. An external print-out of the model only prints out what is saved to be printed out.

Q. Saved by what?

A. By the computer. It is like you put it in a file. Suppose you say, "There is my testimony and I would like to look at Figure 3." So what this computer does is it follows your instructions and it takes Figure 3 and puts it in a folder. And then when you press a button and say "Print what's in the folder," Figure 3 appears.

Q. So you could ask the computer to, one, create a file, and then, two, to print out that file. Would there be problems with affecting the internal workings of the program if you were to give it those two commands?

A. If the information is there, there would not be a problem.

Q. Well, you say "if it's there." In other words, whatever is being computed, whatever internal intermediate calculations are being made, are those what you would call as being there; I mean they're in the computer?

A. That is correct.

Q. So it would be simply a matter of asking for a file to be generated by the computer for whatever the internal figure was.

We've been talking about f*. Let's say you wanted to find the f*. You'd say to the computer: "Make a file for the f* and then please print that out."

A. That's not correct.

Q. How would I get at f*?

A. Let me explain what is happening. Suppose you had the folder that I described and I have testimony with 40 pages, and it happens to be that in that folder there is a calculator, and what you put in this folder are pages with numbers, and the calculator computes these numbers.

Now, it happens to be a particular calculator that

takes up a lot of room in the folder and there is only room for two pages at a time, and you would like to compute simultaneously all the 40 pages.

Now, what I am describing is a particular computer language which was used to write this program that has the same logic. It has certain advantages to it. An advantage is that you can actually interact with what is going on and ask, "What if this changes? How will it affect that?" and so forth.

As a result -- I'm describing the calculator -- it takes up a tremendous amount of space. So you can process only two pages at a time.

For that reason, since you have, say, between page 1 and page 40 a lot of intermediate pages, if they were to be saved and waited for you to be printed out, it would not be able to complete all the calculations and the program -- and that's a technical term -- it will crush. It will stop running and give you a message saying, "I don't have more memory than for two pages."

Q So in terms of STARLOCK, to fit into the example that you just gave us, if I understand, what you are saying is that there are results of intermediate calculations and because you have hundreds of equations and I assume, therefore, thousands of results, you can't store them all.

So what you're saying is you can't look at them all

because they're not retained between pages 1 and 40, in essence. Is that a fair rendition?

A. That is right. Once page 2 is computed, whatever is retained is necessary for that computation to carry over to page 3. Page 3 is being entered and the computation is being performed. But I'm simplifying it. I'm just giving you why, because of limitation of that information.

Q. It is a very complex process I guess is what you're telling us.

A. It's not a complex process. It's just how computer languages work.

Q. If I understood what you were saying about your static and your dynamic file, as of Tuesday evening, to the extent that one could compare the outputs of the two programs, the results coming from the two programs were identical after the changes you made Tuesday; is that correct?

A. As far as I know.

Q. And before Tuesday evening, you could not get identical results from the two programs; is that correct?

A. That's not correct.

Q. That is not correct? Print-outs now I'm talking about.

A. You could do the static analysis on the dynamic version as well, as I point out. Since the growth here is

flexible, you can set it to be zero, one, or anything you want. Here you can set it only to be zero.

Q. So that if you had set the growth at zero on the dynamic file and then ran it, you would get -- to the extent again that you could compare it. As I understand, they print out different things. Some of them overlap; some of them don't.

A. The aggregate, the summary is, and the detail is here.

Q. Right. But then you could get comparable results?

A. Yes.

Q. Look for a minute to page 18 of your testimony. That's where you talk about your static analysis.

As I understand the static analysis both as described there and as you described it, you have a zero percent growth. Now, that is in employment? What is the growth component?

A. As I pointed out, for the purpose of discussion, I simplified things. It means that we are in 1981, as I point out -- let me just point this out. You are looking again at 1981 under a different price structure. It is like a hypothetical.

Q. Right.

A. A situation, if you would.

Q. But it's the Philadelphia SMSA economy in 1981. But now you are imposing a different price structure on that economy; is that a fair statement?

A. I'm observing the economy under circumstances in which there is a different price structure.

Q. And indeed that price structure is zero percent growth, no growth?

A. Growth is meaningless if you're looking in the same year.

Q. I'll accept that. And then you have a 5 percent inflation rate.

A. That is the particular run.

Q. On page 18 of the static analysis?

A. That is correct.

Q. And you put in a 28.2 percent electric rate increase over three years?

A. Right.

Q. In your testimony, you have here a parenthetical phrase that frankly I didn't understand at page 18, the third line up from the bottom: "The forecasts do closely resemble the patter of a 3 percent growth rate." What did you mean by that?

A. My intent in this parenthetical result is the following. If you would kindly turn to page 19, Figure 5. The heading says, "Percent Loss in Job Growth by Sector,"

and under it says, "Total loss is .92 percent." So it is almost one percent. It is nine-tenths of a percent.

This is a level of loss in employment growth. And if in turn we turn to page 14, Table 5, the third row which says "3 percent," and the third column which says "4 percent" or "5 percent," and you subtract the 4.7 -- I think I better show it on a chart that I have.

(Slide - Table 5)

A. I am projecting here Table 5. The 3 percent is a reference to U.S. Growth Rate. If I look here I see 5.7, which is the growth rate in Philadelphia identified here without electric price hike, and the footnote explaining it, "Assuming annual rise in electric rates is commensurate with inflation."

Then I move to a scenario where we have 4 percent inflation and I observe 4.7. 5.7 minus 4.7 is roughly one percent. It is one percentage. One percentage I meant to mean is roughly the .92 percentage that we observed. That was my intent.

Q. That's what the parenthetical referenced?

A. I'm sorry. I didn't make it clear, but nobody asked me about it in the interrogatories. So I assumed it was clear.

Q. Looking at Figure 5, you indicated this shows the

percent loss in job growth by sector. This is Figure 5. This is on page 19 of your testimony.

A. Correct.

Q. Now, as I look at that figure, it appears to me that the finance, insurance and real estate sectors, as indicated by the figures there, are the most sensitive to the increase in electric price according to your model. Would that be a fair statement?

A. That's what these figures seem to suggest in a comparative static analysis.

MR. CALVERT: What I would like to do is mark as PECo Exhibit 25 a copy of this document.

(Whereupon, the document was marked as PECo Exhibit No. 25 for identification.)

BY MR. CALVERT:

Q. Dr. Schinnar, first can you identify what these numbers are?

A. Subject to check.

Q. Subject to check would be fine.

A. They appear to be a particular roll in one of the data matrices. They represent the share of expenditures of each of the 23 sectors in our model on electricity.

Q. For example, if you look there at Sector 15, it is .0134. Now, am I correct in interpreting that to mean

that for every dollar of output, that sector spends $1.34 -- I'm sorry; 1.34 cents on electricity?

A. Yes, if I may rephrase. For every $100, $1.34 on electricity.

Q. That's fine. Thank you.

Now, as I understand it from the very last appendix in your testimony, Sector 15 is the finance, insurance and real estate sector that we were just talking about on Figure 5; correct?

A. I believe it's correct. Let me check.

Q. It's the last page.

A. In the testimony?

Q. In the testimony.

A. Bear with me a minute.

(Witness perusing document.)

A. That is correct.

Q. Now intuitively, wouldn't you expect that the sectors with the highest fractions would show the greatest sensitivity to electric price increases?

A. Could you clarify please what you mean by "intuitively"?

Q. Yes. Wouldn't you think that the sector whose cost of electricity is the greatest portion of its output cost would be the most sensitive to any change in the price of electricity?

A. In terms of employment in that sector?

Q. Let's begin with that.

A. Is that what your reference is?

Q. Sure; let's start there.

A. The answer is no.

Q. Why do you say that intuitively that wouldn't be the case?

A. Because of the following situation: indeed, when expenditures on electricity go up for a particular sector, less resources -- in this case, monies -- is available to spend on other resources. In that respect, there would be an impact on the rate of employment.

For example, the Temple University president stated publicly in this hearing that if the electric rate goes up by 28.2 percent -- I presume that was the figure -- tuition will go up. And I believe that in other testimony of the University of Pennsylvania, Dr. Feldman is also suggesting that the employment will go down.

The reason why employment in the FIR . . sector is not just dependent on how much you spend on electricity is that the FIR sector is serving other sectors as well.

So if we take a university, for example, which happens to be an environment or an education sector which I'm familiar with somewhat, if as a result of an increase in the electric rate that sector has to spend more of its

resources on electricity, and as a result, it purchases less services from the FIR sector and the FIR sector is losing business.

So what is important is the relationship between the FIR sector and the other sectors and their share. And if I may take an illustration. Sector 14, which spends -- what is Sector 14?

Q. Retail trade.

A. Right. In retail trade, for every $100 of business, $2.67 as opposed to $1.34 are spent on electricity. That sector will have less money to spend on other services, and the FIR sector, therefore, will incur a further loss. So there is a link between the electricity intensity of how much other sectors spend on electricity and the level of employment of the particular sector that services them.

I recall the conversation with one of your experts, and a similar line of reasoning was offered. That was on Monday. We discussed it, and my answer was the same. The same expert felt that the result that you are suggesting as intuitive was intuitive to him and apparently checked it out overnight on a two-sector version of the economy; and according to what I learned the next day in a conversation when I met with that expert again, that I was right; that this particular intuitive interpretation is not correct.

Q. In fact, when you did have that conversation,

didn't you indicate that intuitively you agreed with him on Monday?

A. Not true.

Q. Now, you referenced Dean Lacouras' testimony, public testimony, in this case. You indicated that he said that if electric prices go up, what, tuition would have to rise?

A. Yes. I was basing it on my recollection that it was linked to employment; and as I was recalling it, he was talking about tuition. So it was not a relevant example to the case I was trying to make. I'm sorry.

Q. But in any event, it was his thought, as you understood it, that the electric price increase that would be applicable to Temple University would be passed through in its entirety then to the students, or would that mean that professors would get a little bit less in their pay-check next year because all of it wouldn't be passed through to the ultimate purchaser of that service, namely education?

A. I cannot represent to you what he intended when he said it, but you are describing a plausible scenario.

Q. That all of it wouldn't be passed through; that the professors would have to eat a little bit of that price increase?

A. I assume I would feel it only on the skin being a professor at the university in Philadelphia.

Q. Now, are all of your data sources that are used in your STARLOCK model 1981 data?

MR. RAINEY: I'm sorry, Mr. Calvert; would you repeat the question?

MR. CALVERT: Sure.

BY MR. CALVERT:

Q. Are all of your data sources used in your STARLOCK model 1981 data?

A. If I may obtain a clarification?

Q. Sure.

A. Is your question intended to mean that the data used in the model was collected from 1981 by the original source?

Q. Well, let's begin with that question.

A. The answer is no.

Q. So at least from your original source, it was data from an earlier period than '81?

A. Some earlier like 1980; some later like 1982. There are procedures widely accepted and routinely used to adjust data for a particular year.

There is no data with a wide range of variables that you want that is available for one particular year. As an illustration, the U.S. Census is available every ten years. The Census of Business Manufacturers is available every five years. And I can go down the list. Everybody uses the same

data and follows the same procedure of updating years.

Q. When you say updating now, you mentioned you had some '82 data and let's say some 1980 data. I take it you used certain procedures to bring that data to a 1981 Philadelphia SMSA economy which is what you used in your model?

A. That's correct.

Q. Now, are you suggesting then that if any two modelers that wanted to utilize data and present a snapshot, if you will, of the Philadelphia SMSA economy in 1981 and had the same 1982 and 1980 data, original data, that they would end up with precisely the same data matrix for 1981?

A. If they used the same procedure.

Q. But there would be other procedures, different procedures, depending on the modeler, depending on the person doing the process, that they might use, I take it?

A. It depends on the problem more than on the person, if the person is making the adjustment correctly. Because they are logical adjustments that professionals building models are using, that PECo is using or in the demand modeling where, for example, a number of coefficients are being updated as well. These are standard procedures and we use these standard procedures.

Q. Are there names for the standard procedures or are they just procedures?

A. For example, there is a procedure called RAS.

There is a procedure called Regional Purchase Coefficients. There are procedures that interpolate called interpolation where you have two points and you find the middle point. There are many such procedures.

Q. All right; there are a lot of those procedures.

MR. CALVERT: I would like to mark as PECo Exhibit 26, if I could, some further answers to interrogatories.

(Whereupon, the document was marked as PECo Exhibit No. 26 for identification.)

BY MR. CLAVERT:

Dr. Schinnar, if you could take a look at PECo Exhibit No. 26, and I believe, to describe it, these are two interrogatory answers and an attachment to Set VI of your interrogatories.

They are IR-PECo-City-6, question and answer 3, 4, and then what is referred to as "Data Sources," which is an attachment to IR-PECo-City-6-3.

Do these reflect the answers that you gave?

A. They appear to reflect.

Q. Turning, if you will, to the Data Sources, please, I notice there, for example, under number 2, "Output by Sector," the second item down is "Census of Manufacturers 1977/1982."

A. Correct.

Q. What does that refer to?

A. It is a reference to the fact that the Census of Manufacturers is published in 1977 and then again in 1982. I assume because of limitation of funds it appears this way.

We have looked at both, for example, in order to check, in this particular case, the relationship between expenditures, the wage bill in each of the sectors, and total sales.

The reason why we looked at these two time periods, as an illustration, since they were available, was to see

whether their relationship is stable over that time period, and indeed it turned out to be.

I am mentioning these here because we are -- this is part of a listing of data that we are assembling that will be reported in great detail in one of the STARLOC reports that you cited earlier.

Q. Turning your attention now a second to number 3, Matrix A, --

A. Number 3.

Q. -- and it says "Source: Regional Science Research Institute, 1981."

A. Correct.

Q. Does that "1981" refer to the fact that that is 1981 data, or is that the date of the report that you received from RSRI?

A. This is the date for which the data was provided by the Regional Science Research Institute. In other words, it is intended to reflect the Philadelphia economy as it appeared in 1981.

Q. Did you at any time, as the basis for your STARLOC model, take data from RSRI that was 1972 or 1977 data, which you then updated to '81 using the procedure you described?

A. The updating to '81 is done -- the initial updating to '81 on this is done at the Regional Science

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Research Institute.

To the best of my knowledge -- and your experts have asked me that question before, and I would like again to state that you asked on Monday, Tuesday and Wednesday while I was with them, and I didn't have an opportunity to check.

Subject to check, to the best of my knowledge, the data provided was a process in which 1977 data was updated to 1982 and provided to us.

That is to the best of my recollection. I did not have a chance to check that out as the experts have requested.

Q. Did you check the updating procedures, the process, that RSRI performed to bring its data, whatever year it was, up to '81?

A. The Regional Science Research Institute provides this service as a commercial service nationwide. We know the methods being used, which is a computer program and it is called Regional Purchase Coefficient, which is a standard method used and the one that is recognized professionally as the most appropriate one to employ in such a situation.

I do not have access to the proprietary code which the Regional Science Research Institute has.

Q. Do you know, in their updating process on this computer, do they maintain printouts so that one could check to see whether or not the updating was done in a consistent

and proper manner and the manner you described?

A. I think you should direct your question to them. I could not speak on their behalf.

Q. I would like to make a data request on the record, if I could. Would you find out for us whether it was the '72 or the '77 RSRI material that was updated to '81 that you hadn't had a chance to do before?

A. I will make an effort to reach them and get confirmation or to dig up the documentation that I have available and provide it to your experts.

Q. On the second page of the Data Sources document there it says --

MR. RAINEY: Mr. Calvert, if I might, in conformance with the procedure that was followed in terms of the writing down the oral data requests for PECo, we would request that you write that down.

MR. CALVERT: No problem. I will send you one.

BY MR. CALVERT:

Q. Number 6 is "Matrix S," and it talks about the 1980 U.S. Census and says "Table 222," and it talks about earnings in 1979. Do you see that?

A. Yes.

Q. I take it, then, once again, as an example, you updated the 1979 earnings set forth in that table to 1981?

A. That's correct.

Q. Did you keep any work papers on your updating efforts for all these various sources set forth in PECo Exhibit 26 that you did?

A. I'm sure there are notes that various staff members of my research team have on these, but they are not documented in typewritten form and are not available for examination.

Let me point out that when I met with the experts, the company's experts, Monday and Tuesday and Wednesday, Wednesday morning -- on Monday I met with five of them and we discussed many things in great detail. It is fortunate that the process stopped on Wednesday, because if it continued into the evening I would have not been able to speak today.

I was not asked in detail at that meeting about their procedures for each of their things, and I was more than willing to describe to them that information.

To the best of my recollection, I remember being asked about the table that you mentioned, Table 8, and, again, the response was that I would like to check on it. I didn't have an opportunity yet to do that for all of these reasons.

I was also ready to discuss all the updating procedures.

Q. Did you provide any work papers to the experts?

A. There are no work papers, as I said in the report, as yet available that document for public release of that information.

Q. In essence, what we refer to as work papers are going to be one of the later STARLOC reports that we talked about earlier?

A. That's what I took to mean work papers. I think at the University we call them working papers, which are the ones before they appear in print and publication. So when you say work papers, I assume you are referring to working papers.

Q. Well, I am referring to work papers as we use them in the context of this case, which are the papers that show an audit trail, if you will, of how you go about doing your calculations, you or any other expert do their calculations.

If I understand your answer, you're telling me that that kind of work paper will be available for your model, for this updating procedure, when we see the next STARLOC report, whichever one it is, 3, 4, whatever?

A. Which we are working on.

Q. Do you have work papers, however, now, handwritten or otherwise, that you are using as the basis for this report?

A. I have notes which were generated by staff

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members, in various forms, in the institution.

Q. And you didn't turn those over either to your attorney or with your testimony in this case I take it?

A. Because they are not available for public release. I have to check and confirm and write it all up.

Q. Is that because you want to check to make sure that the various researchers, graduate students, or whoever, who were doing the actual update work for you did it in conformity with your guidelines and how you wanted it done?

A. No. I have checked that already. I was involved in every step of the process. But when they have documented what they have done, I have not checked whether their handwritten notes reflect precisely the procedure that was indeed implemented.

And to the extent that they don't reflect accurately, for me to release that information would be to misinform you.

Q. Did you think it was important, therefore, for you to check the actual calculations done by your research assistants after you had given them the various conventions and standards that you wanted them to use to do this updating process?

A. I always do.

Q. Why is that? To make sure they are done accurately and correctly?

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A. Because I have long experience in model building and because I am also a policy analyst where I am building models to effect or to guide policy decisions; and it is a very important step and I want to make sure that the results are correct.

Q. What you have told us in a couple of different places is that we are looking here with your data sources at the Philadelphia SMSA in 1981. It is the 1981 snapshot, if you will, of the economy in the Philadelphia SMSA, certainly, that was used in the static file.

A. That's correct.

Q. Now, why didn't you update your economy so we're talking about today's economy, 1986?

A. There is no information about 1986 that would enable me to update every entry in the data of the model to the present. There is usually a lag of a number of years, and not only that, it is very common in government statistics that even though, for example -- I will give you an illustration.

I recall an interrogatory regarding the growth rate in the Philadelphia economy in 1985, which arrived before the information was available, and I recall writing that it is not available yet.

I have subsequently learned that it was January or February when the figures for 1985 have been released, and

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that information is available. Although this information is published by the government, for a period of three years it is considered preliminary estimates. So for three years it gets updated, and very often, more often than not, changed.

So you really have, inasmuch as information is reliable and used, nearly a three-year lag before you can take a number and assume that it is the best number available at any point in time.

Q. Why didn't you then update to 1983?

A. For the following reasons: first, 1983 is very close to 1981. Second, 1983 comes, so there isn't a big time difference. 1983 comes after the year 1982 where we had a recession, and the economy is responding in quite a unique way. Many parameters tend to be -- potentially could be unstable when you have suddenly a recession and a recovery in a period.

So it was my judgment that 1983 as a base, as a stable base, for an analysis that is performed around 1985-1986, in which most professional economists are forecasting a reasonably stable period, would not provide a reliable base for such analysis.

Q. If I understand what you're saying there, then, among other things, is that if you looked at the economy in 1981, it would look different than the economy in 1982 because that's where we had this recession, and it may well

look different or at least you couldn't be sure exactly what it was going to look like in 1983; is that a fair statement?

A. That is fair; and for that reason, we have included the growth model which captures the pattern of growth and decline in great detail in each of the sectors, so that you can incorporate these trends over time; and there are clear dependencies between the sectors and it needs to be incorporated.

Q. As I understand some of the economic assumptions in your STARLOC model, one of them is that you assume that wages are constant in real terms?

A. That's correct. If I may add, I am holding it constant for the purposes of the analysis presented in the testimony.

Q. Now, in your testimony you also indicate, I think on page 13, that it is your belief that the real growth in the U.S. economy over the next three years will be something like two to three percent.

A. I based it on the range of forecasts which were published.

Q. I understand. You said that before.

A. Yes.

Q. Do you think it is a realistic assumption then that real wages would be constant in an economy experiencing

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real growth?

A. There isn't necessarily a one-to-one correspondence, to the best of my knowledge.

Q. I'm not asking about the one-to-one relationship. But if you have real growth in the economy, in the two to three percent range, wouldn't you think it would be realistic to assume that there would be some growth -- how much I am not asking you to predict -- in real wages?

A. When I refer to growth in the U.S. economy, I am referring specifically to growth in employment. I am not referring to growth in the Gross Domestic Product.

Q. Are you saying then that you think it is realistic that in an economy that is experiencing -- a domestic economy that is experiencing a two to three percent real growth, that wages will be constant?

A. It is certainly a possibility.

Q. In an economy that is experiencing two to three percent real growth in GDP, are you saying that it is realistic to assume that there would be no growth in real wages?

A. I am saying it is a possibility. I am purely relying now on my recollection. I would have to look at data.

Q. Have you made any study of that possibility or effect?

A. To the extent that I recall, I know, for example, -- when you refer to real growth in the economy you are talking about real growth in the Gross Domestic Product, the so-called GNP -- Gross National Product, so-called GNP; I'm sorry -- that while employment, growth in employment, follows the general trend, the fluctuations in real Gross National Product are much larger than employment.

From my recollection, the rise in real income, as you refer to it, doesn't follow the magnitude of fluctuations, the rise and fall, really -- doesn't follow the magnitude of fluctuations that the Gross National Product follows.

Q. Does it follow the trend?

A. I have not had an opportunity, or I do not recall. I have never analyzed the trend of the relationship between them.

Q. So you really don't know; correct?

A. That's correct.

Q. In your model, you assume, do you not, that any input cost increase in an industry is exactly passed through a corresponding price increase by that industry?

A. Where do I make that assumption?

Q. I'm asking you: do you?

A. I don't. There is no such assumption stated in my specifications.

Q. My experts that met with you tell me that that is

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in fact one of the assumptions which, through their review and actually their discussions with you, they understood was implicit, if not explicit, in your model.

A. We had a lengthy discussion on that very item, and to the best of my recollection -- and I think I recall the discussion, considerable discussion -- that was a statement made by one of the experts. I do not accept that statement as being a true reflection of the total pass through.

In other words, my formulation of the model does not reflect your statement as it tries to characterize it as an assumption in my model.

Q. Are you quarreling with my term "assumption"? I don't -- if assumption is the problem -- what I want to know is: how does your model act? I would like to know, if I have an input cost increase -- and I don't care if you assume it or if the model does it -- but do you then get that cost increase in an industry exactly passed through a corresponding price increase by that industry for that service or good?

MR. RAINEY: I would like to object, Your Honor. I think to the extent that counsel is asking about costs of service or anything having to do with costs being passed on would be outside the scope of Dr. Schinnar's testimony, and to the extent that it is not a part of his testimony in

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this particular case, that he would not be the person to ask questions regarding the cost of service.

MR. CALVERT: Your Honor, --

JUDGE MATUSCHAK: This is cross-examination. We are going to overrule the objection.

MR. CALVERT: Thank you, Your Honor.

THE WITNESS: May I have the question read again?

BY MR. CALVERT:

Q. Sure. Let me try it again. I don't want you to be hung up on the word "assume," that it is your assumption.

What I want to know is: how does your model act, whether it is through an assumption that you put into it or how it computes; but what I want to know is that in your model, does an input cost increase in any industry -- is that passed exactly through a corresponding price increase by that industry for its goods and services?

A. The model computes as a model of this nature should compute. The nature of the magnitude of what I would refer to as secondary inflation will generate an increase in the price in this particular case of one particular sector.

A hypothetical I would give you. Suppose the electric rate for the hotel sector, lodging, goes up by 29.6. There may be a rise in the cost of hotel services of, say, 1.5 percent. I think here I could rely on the illustration

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provided by the president of Temple University, who suggested that if PECo increases the rates by the magnitude that is proposed, he predicted that tuition would go up by 3.3 percent.

But as you stated yourself, there is a possibility that that does not reflect the entire cost; that professors would in return incur a loss in income. And, at the same time, that there will be less purchases of other goods and services. For example, financing, the finance sector. If you reduce the purchases, you don't expend the money, and it is not necessarily being passed through.

What I am trying to explain here is that the model does not automatically pass through everything. It takes account of all these adjustments and gives you a figure, as I illustrated in the case of hotels, of 1.5 percent inflation as added to the cost of the particular service.

Q. Let me try an example that I think I understand, and this may clarify exactly what you're saying. Let's say we have an industry that produces lightbulbs and they cost $1. Electric prices go up 1 cent per lightbulb. Would your model tell us that the price of that lightbulb would be $1.01 after that price increase?

A. Absolutely not. The reason, for example, is: we know, as well as PECo knows, through response to interrogatories, we know that from examining the model that Wharton

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Econometric Forecasting Associates built for PECo, that if you increase the price of electricity in different sectors, as well as households, the consumption will go down.

So, for example, if we increase the price of electricity and the level consumed goes down, the result may be and is an increase of expenditures, but it doesn't reflect the total increase in cost.

To give you an example; if an item costs $1 and I consume two items, the total expense on that item is $2. Two items is $4. If the cost goes to $2, and in response to that I consume only or I buy only one item, so the price now is $2, I only purchase one, and the product is $1. In this case there was no increase in expenditures -- I'm sorry, I am incorrect. The product is the price of two times quantity 1. To illustrate, let us say the quantity is apples. $1 is the initial cost of an apple and I purchase two apples; the cost is $2. Now the price of an apple goes up to $2, but I purchase only one; my cost is still $2.

So it doesn't necessarily mean that it translates into a total pass-through.

Q. With respect to that example you just gave, is that how your model works in terms of response to price increases, the demand response? Namely, would your model tell us that if you spent $2 to buy two apples and the price

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went up to $2 for one apple, that as a response to that you would buy one apple?

A. This would be the case of, in technical terms, what we call an elasticity of one. Now, if you would kindly refer to Figure 11 on page 27, and if you would observe -- let me see if I can get the transparency for that.

Q. Dr. Schinnar, just before you get into that, just so we're not talking about apples and oranges, as it were, we're talking about elasticities of output, and you're talking about elasticities of energy, I believe.

A. No. I was talking about the purchasing of apples. That was the example you have given me.

Q. But on page 27, that deals with price elasticities for energy, does it not?

A. For electricity. You asked me about my model.

Q. Yes. I want to know about that.

A. And that is what I am referring to. I don't have apples in my model; I have electricity.

Q. But you do have price increases and you do have responses to those, --

A. Yes.

Q. -- for goods and services.

A. Correct.

Q. For finished goods, do you not? And you're

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saying that the model would react to energy prices the same way it reacts to finished goods and services?

A. No, I'm not.

Q. Then let's focus in on finished goods and services. I just didn't want you to get off on a tangent.

A. I was interpreting your question about apples.

Q. Maybe I didn't make myself clear. Let's call the apple a finished good, all right? We can even call it a lightbulb. Let's make it a lightbulb; there is a finished good. If a lightbulb costs $1 and I buy two of them, so that I spend $2 on lightbulbs, and then the price goes up per lightbulb to $2, will your model tell us that I would buy one of that finished good now instead -- when the price doubles that I would buy 50 percent less?

A. No, it doesn't.

Q. It does not act that way?

A. It does not. If I may add to the response.

Q. Sure.

A. To completely draw an analogy to your question, it would mean that if we increased the electric price by 28.2 percent, that employment would go down by 28.2 percent. I am drawing an exact analogy to your statement; or that output in the economy would go down. That is why I am saying it is completely out of line, and very much out of line, with the model that I have.

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Q. I guess what I'm saying is, I'm not sure that that reflects an answer to my questions. I am talking about goods and services, and you are suggesting that electricity prices are not the only costs that go into the output of an item.

A. Absolutely. There are many other costs.

Q. Right.

A. And they have their own inflation rate.

Q. Looking at Appendix 2, the last page of your testimony, which is the economic sectors, can you tell me, for each of the 23 sectors set forth there, if the price of the products produced in each of the sectors goes up by 1 percent, by how much will the demand for those products in that sector drop? Do you have a table or any calculation?

A. I can give you a ballpark figure.

Q. For each one of the sectors you could give me a ballpark figure?

A. For seven of the sectors, meaning seven aggregates of the sectors that appear on page 19.

Q. What I am really interested in is not the aggregate, but is all 23.

A. As I explained to you, and as your experts are aware, the output as it appears from the model is in the form of seven sectors.

Q. So that kind of detail is captured within the

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intermediate calculations of the model?

A. That's correct.

MR. CALVERT: With Your Honor's indulgence, we would like to put in our next exhibit, which I believe is PECo Exhibit No. 27.

(Whereupon, the document was marked as PECo Exhibit No. 27 for identification.)

BY MR. CALVERT:

Q. Dr. Schinnar, I show you what has been marked as Exhibit 27, which is, I believe, a copy of IR-PECo-City-2, which is an answer to question Interrogatory 7. Is that a response that you gave us?

A. It appears like it is.

Q. What this talks about is it talks about page 6 of your testimony where you reference Dr. Summers' and her assessment that she gave in the Limerick Unit No. 2 investigation; correct?

A. Her name is mispelled, by the way. There is no apostrophe after "r." Her name is Summers.

Q. Again, I'm not sure whose mistake that is, if it is yours or mine, but in any event, I accept that.

A. It is not mine.

Q. All right. You reference there that the source of the -- the basis for your statement set forth on page 6 of your testimony was Dr. Summers' rebuttal testimony, and

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you cite a sentence of that testimony.

I would like to read to you the remainder of that testimony, and it states -- after the sentence that you have in there it says, -- and this is Dr. Summers now -- "I stated, however, that most of the studies that have been done on the relationship between energy costs and employment suggest that it is a small influence.

"As Dr. Rodberg pointed out in his cross-examination" -- now, this is a quote of her from Dr. Rodberg's cross-examination.

A. Can I see that while you're reading it?

Q. Sure. "It is very difficult to extract from the overall employment change in a region the effect of a factor such as change in electric rates, and to my knowledge, no one anywhere succeeded in doing that kind of disaggregation. I don't think anybody could claim that you could look at the actual employment change in a region and see the effect...the change in energy prices because there are so many other things going on in an economy that affects the level of employment, movement of industry, people, et cetera." And she gives a citation to the transcript 2955.

When you prepared your testimony and referenced Dr. Summers in it, did you consider that portion of her rebuttal testimony?

A. I saw it, yes.

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Q. And you considered that when you gave your reference to Dr. Summers?

A. Definitely.

Q. If you look on page 18 of your testimony, you, as we discussed before, for purposes of your static file you talk about -- a 28.2 percent electric rate increase is assumed; correct?

A. Static analysis.

Q. Fine; static analysis.

A. Yes.

Q. Is that rate increase assumed for the entire Philadelphia SMSA?

A. Correct; yes.

Q. On page 3 you set forth, at the bottom there, what the Philadelphia SMSA includes. You say it includes Philadelphia, Bucks, Chester, Delaware and Montgomery Counties in Pennsylvania, and Burlington, Camden and Glouchester Counties in New Jersey; correct?

A. Yes.

Q. And I assume, just for completeness, we're talking about the entire counties in each one of those, Pennsylvania and New Jersey?

A. Yes; that is the definition of the Philadelphia SMSA.

Q. Does Philadelphia Electric Company service

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New Jersey?

A. Not to my knowledge.

Q. Does it service all of Bucks, Chester and Montgomery Counties?

A. I understand it to be serving nearly all. I forget -- I do not recall what small fraction it doesn't serve. I also am aware that it is serving a portion, a small portion, of another county, but I would have to check my notes.

But it captures nearly completely the five counties in Pennsylvania.

MR. CALVERT: I would like to have marked as the next exhibit, Exhibit 28.

(Whereupon, the document was marked as PECo Exhibit No. 28 for identification.)

BY MR. CALVERT:

Q. Dr. Schinnar, PECo Exhibit No. 28 is a copy of the territory covered by Pennsylvania Power and Light Company's tariff. Are you familiar with those areas covered by the PP&L tariff?

A. I couldn't state that I am familiar with all of them. There are many areas here. But --

Q. Generally.

A. -- I think that they include the three counties in New Jersey that are part of the Philadelphia SMSA. I

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will have to check that. I haven't read over this. I see Bucks.

Q. Let me direct your attention; it might move along a little more quickly. On the first page you will see that Bucks County is referenced, and certain townships in Bucks County are referenced.

A. That is correct.

Q. And then down then is Chester County and, again, a few townships in Chester County are referenced, and on the next page, in the first column down near the bottom, three up, it mentions Montgomery County. Do you see that?

A. That's correct.

Q. Those are counties, are they not, parts of counties, and those are the townships that are actually serviced by PP&L as opposed to PECo? Correct?

A. Correct.

Q. Now, neither the New Jersey counties nor the PP&L service territories are receiving a 28.2 percent rate increase over three years; is that correct?

A. Well, I am not aware that PECo is receiving one as yet.

Q. But for purposes of your model, you are assuming they are.

A. I have simulated a scenario in which the electric rate increase in the Philadelphia SMSA increases by 28.2

percent.

Q. I take it, however, that since we know that whatever happens in this case, that New Jersey is not going to have the rate increase PE is asking for here because they are not part of the territory, nor will the PP&L parts of the Philadelphia SMSA which it services receive that rate increase because they are not part of this PE territory; is it therefore fair to say that over the -- that the average rate increase over three years in the entire Philadelphia SMSA would have to be something less than the 28.2 percent over three years that PE is asking for in this case?

A. On average. However, there would be a distribution in which the rate in the Philadelphia region, the Pennsylvania part of the SMSA, would be higher than the rate in the New Jersey part of the SMSA.

I assume that this is what you are suggesting by your statement.

Q. No. Really what I am suggesting is just that the average rate across the entire SMSA would be less than the 28.2 percent over three years.

A. I thought that I heard you say that the rate in the New Jersey part from which I have here the document, the increase is going to be lower.

Q. What I am asking you is, let's assume that it will

j72

be lower. Assuming that it will be lower, and assuming that the PP&L rate increase for the next three years in the portions of the Philadelphia SMSA that it services to be lower than 28.2 percent, isn't it fair to say then that the total rate increase for the Philadelphia SMSA will be lower over the three-year period than 28.2 percent, on average, average across the area.

A. On average, with an understanding that in the Pennsylvania part it will be higher.

Q. Assuming that in fact the rates in Pennsylvania are higher than the rates in New Jersey.

A. The rate increases in New Jersey.

Q. The rate increases. All right.

Now, if the model that you have, your STARLOC model, were run with lower electricity price growth rates, I take it that in your static model, in your static file, that you would get a number lower than the 19,000 jobs that you claim were not created as part of your analysis?

A. I expect from what I have seen; yes.

Q. Again, hypothetically, if PE in this case were to recover only 50 percent of its common plant for Limerick, wouldn't this further reduce the Philadelphia SMSA percent rate increase from the 28.2 percent over three years?

A. You're going beyond the area of my expertise.

Q. But if the --

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A. I haven't conducted any analysis of that computation.

Q. I guess I'm asking probably an even more simple question. If PECo's rate increase request was reduced, voluntarily or otherwise, I take it that -- all I'm saying is that your 28.2 percent figure also would drop.

A. Of course.

MR. CALVERT: Your Honor, I would like to mark as the next exhibit, PECo Exhibit 29.

(Whereupon, the document was marked as PECo Exhibit No. 29 for identification.)

BY MR. CALVERT:

Q Dr. Schinnar, I will show what I have marked as PECo Exhibit 29. As I understand it, this is a print-out from the running of your static file with certain assumptions which I will go through with you, as input assumptions changed.

Do you recognize it to be such?

A No, because I notice on page -- if I count the cover page to be page 1, the second page to be page 2 and the third page, on the third page there is a growth figure of 1 percent. So that would not entail a static analysis.

Q Looking at this, again using the cover page as page 1, and looking at the first page and taking it down to -- there is a little line written on the third page three printed lines up from the bottom.

Do you see that little line right under the 5 there? There is a little handwritten line.

A On the second page are you talking about?

Q Well, it is the third page if you count the first page as 1.

A I see a five and below it three lines -- four lines I see growth, which is 1 percent; so it would not be a static analysis.

Q I understand. Looking at the figures above

the little line that we just referred to --

A Yes, I see.

Q Look from there back to the beginning again, so it starts with the second page, and for this discussion we will stop at that line.

My question to you is: would this be a static analysis that came out of your static file and, indeed, was run yesterday?

A If it was run yesterday it is the one, yes.

Q Let's go down and see what it tells us was inputted. Now as I understand it, it inputs the first number there that we have, which is the 3; and the 3 shows that this is for a rate change over a three-year period. Is that correct?

A That is correct.

Q Then the next thing we have is an inflation assumption or input, and that's at 5 percent; correct?

A That's 5 percent inflation; correct.

Q And then I'm asking you to assume hypothetically here that the rate increase that we are talking about across each sector is 18.4 percent.

A That is correct.

Q In the Philadelphia SMSA.

A Yes.

Q And then to show it is the static model I take

it we look down at the bottom there and we see a zero growth, which means that you don't have any GNP growth; is that correct?

A That is correct.

Q Now on the next page then we have a printout for the seven sectors, and am I reading this correctly that the "at" sign in the "Total" column would be a negative, so it would be a decrease, or it would reflect a decrease?

A That is correct.

Q Am I also reading this correctly then that using the assumptions which we just went through that this run tells us that there would be a decrease in jobs not created of 4,196 and a fraction; is that a correct statement?

A Yes.

Q If you will turn to the next page, does that represent a second computer run, a second printout from your static file? Again I will tell you that it was run yesterday, but from your static file?

A Just for the sake of clarity --

(Slide.)

A -- this represents a run from what you refer to as the static implementation of the model when the benchmarking to 1981 was removed in order to enable you to make a dynamic analysis with this implementation of

the model.

Q Wait am minute. If I understand, in each one of the runs we have here we have kept growth at zero, so that we are treating this model as a static model, are we not?

A No. If you go to the previous page --

Q All right.

A -- at the bottom --

Q The previous page at the bottom; right.

A This is a run that was made yesterday, on Wednesday; is that correct?

Q Yes. The part that you are looking at on that third page below the little line is because of the duplicating, th way these things are put together, is irrelevant. It is not part either of the first run we just talked about or the second run.

A Unless I have the consistent printouts, since this was cut and pasted together, I would like to withdraw my earlier statement saying that indeed this reflects a printout of my model, because, as you suggest, it was patched from pieces and I don't have a full reflection of the correct inputs into the run.

Q Do you have copies of the runs that you did for us yesterday, because since these were done yesterday, if you do, these would be reflective of those runs?

MR. CALVERT: Your Honor, could we take a moment to see on this?

JUDGE MATUSCHAK: Yes.

(Pause.)

THE WITNESS: Can I correct my earlier statement?

MR. CALVERT: It is possible to correct your earlier statement. I understand what you are saying. I would like you to check to make sure we are talking about the same thing.

(Witness perusing documents.)

THE WITNESS: I have reams of printouts, and I'm not sure that I can pinpoint. I assume that you have a copy since you got the original.

MR. CALVERT: Actually they are back in the office being duplicated. If you would let me take a look at those, if you don't mind, maybe we could find if you have one of the ones we are talking about here.

(Documents handed to Counsel Calvert.)

THE WITNESS: Just so long as I get them back.

(PECo personnel perusing documents.)

MR. RAINEY: Can we go off the record?

MR. CALVERT: Yes.

JUDGE MATUSCHAK: Yes, we will take a short recess.

(Recess.)

JUDGE MATUSCHAK: On the record.

MR. CALVERT: Your Honor, while we were off the record we were able through Dr. Schinnar's assistance to look at his copies of the various printouts, a portion of which is part of PECo Exhibit Number 29; and I believe he was able to verify with an exception that I would recite that in fact these were printouts from his model, coming from his static file. The parts that are not relevant in this exhibit, counting the cover page as page 1, on the bottom of the third page there is a number five lines up that says 24.2, and then under that there is a 5. Everything on that page after the 5 can be stricken. It is not part of the printout and was not meant to be.

If you then turn to the last page of the exhibit, the last two lines with a line in-between can also be stricken; so everything after the 27 --

JUDGE MATUSCHAK: Just a minute. You lost me there somewhere.

MR. CALVERT: Okay, the last page, the last two lines at the bottom of the page -- in other words, everything after the 27.6 and then the 5 is all out.

JUDGE MATUSCHAK: That's out.

MR. CALVERT: To the very bottom of that page.

BY MR. CALVERT:

Q Dr. Schinnar, having had an opportunity to check your records, and without taking the time to go through

the questions we asked with respect to the first run, that was at the 5 percent inflation rate, am I correct that that is indeed a printout from your static file that was done yesterday at the assumptions and with the results that we discussed a little bit earlier?

A Correct.

Q If you would turn to the fourth page of the exhibit, once again would you take a moment to check pages 4 and 5 and confirm that indeed that also is a printout from one of the runs done yesterday from your model, using the static file?

A Yes, subject to the comment that it reflects different assumptions.

Q I understand that. We will go through those; sure.

Now in this case we are talking again the first number there in the input is that we are talking about a rate increase over three years; correct?

A That is correct.

Q I'm looking at page 4 of the exhibit. That also indicates -- the next number down there says that there is a 6 percent inflation assumption here that is put in; correct?

A Correct.

Q And once again we are assuming across all sectors

18.4 percent as the electric rate increase; is that correct?

A That is correct.

Q And again at the very bottom there is the zero indicating that it is the static model, zero GNP growth --

A That's not correct.

Q I'm sorry, job growth. It is indicating it is the static model?

A There is no growth.

Q There is no growth; you are right. You are right; I stand corrected.

Now turning to the last page then we have an output by the sectors, and in this case there are no negative numbers for the total, but rather they are positive numbers, and again if I am reading this correctly the total for this particular run is 1,129.-something, and change; it is 1,129 more jobs would be created than otherwise if you utilize the assumptions that we have just talked about?

A That is correct.

Q If you would turn for a moment to page 12 of your testimony --

A Do you need this for further reference?

Q No. That is your copy.

A Thank you.

Q At page 12 of your testimony, Figure 2,

specifically; do you have that?

A Yes.

Q As I read your graphic rendition here, this indicates that PE has no nominal rate increase for the years 1989, 1990 and 1991; is that correct?

A I was looking at something else. Could you please repeat the question?

Q Sure. If I am understanding the graphics in Figure 2 at page 12 of your testimony, this indicates that PE has no nominal rate increase for the years 1989, 1990 and 1991; correct?

A Correct. This is my understanding of the proposal, the rate proposal.

Q PE's rate proposal?

A That is correct.

Q This means, does it not, a real decline in rates assuming any inflation at all during that period?

A Correct, and you realize that you are now going outside the range of the analysis performed in these printouts?

Q A different thought.

A I see.

Q I understand that. Is it true then that your model would show a creation of new jobs when real electric rates decline?

A Is that a hypothetical question, or do you have a particular printout for that?

Q No, just a hypothetical question relating to your model.

A I would respond saying that this is a real possibility, holding everything else constant.

Q As I review your rendition in Figure 2 on page 12, this shows PE's rates go up about 37.5 percent under PE's proposal; is that approximately correct?

A In this figure.

Q In this figure; and then also in this figure under your proposal that the rates go up to about 58 percent?

A Four years later in 1992.

Q They go up 58 percent?

A PECo's rate goes up to 37.5 percent in 1989. I have the figure for the percent. And in 1992 -- I'm sorry; are you proposing -- when you say "my proposal" what are you saying; it is not clear to me what you are talking about.

MR. RAINEY: Are you talking about 1996, Mr. Calvert?

BY MR. CALVERT:

Q Without ascribing whose proposal it is, let's just use the figures as they appear here; okay?

Now in the white box or the white column the 4 in

and 3 out?

A Yes.

Q In 1992 you have a rate increase of something like 58 percent or 57 percent, whatever your figures would show there; isn't that about correct?

A This is an illustration I'm giving you.

Q I understand that. I'm just trying to understand it.

A Yes, that is correct.

Q And then in 1996 under the 6 in and 5 out rendition you again have something like 58 percent in 1996, rate increase.

A Under 4 percent inflation?

Q Yes.

A Yes.

MR. CALVERT: Your Honor, at this time I would like to ask that we mark my last exhibit, which is PECo Exhibit 30.

(Whereupon, the document was marked as PECo Exhibit No. 30 for identification.)

BY MR. CALVERT:

Q Dr. Schinnar, I show you what has been marked as PECo Exhibit 30, which appears to be the answers by you to two PECo interrogatories, the first one being IR-PECO-CITY-2, question and answer 2; and IR-PECO-CITY-2,

question and answer 5. Are those the answers that you gave to those interrogatories?

A That is correct.

MR. CALVERT: Your Honor, I move at this time for the admission into evidence of PECo Exhibits 22 through 30.

JUDGE MATUSCHAK: Is there any objection?

MR. RAINEY: No, objections, Your Honor.

JUDGE MATUSCHAK: PECo Exhibits 22 through 30 are admitted into evidence.

(Whereupon, the documents marked as PECo Exhibits Nos. 22 through 30 were received in evidence.)

MR. CALVERT: Your Honor, that completes my examination. Thank you.

Thank you, Dr. Schinnar.

JUDGE MATUSCHAK: Does Staff have questions for this witness?

MS. CHESTNUT: Staff has no questions.

JUDGE MATUSCHAK: Consumer Advocate?

MR. WERSAN: I have a few, Your Honor.

JUDGE MATUSCHAK: Very well.

CROSS-EXAMINATION

BY MR. WERSAN:

Q Dr. Schinnar, my name is David Wersan; I am with the Office of the Consumer Advocate.

If I could refer you to PECo Exhibit Number 29?

A Yes.

Q That is the printout part of your computer printout results.

A Yes, sir.

Q The last two pages of that document, as I understand it, include a scenario where an 18.4 percent rate increase is phased in in equal shares over three years, and an inflation rate of 6 percent; is that right?

A 18.4 percent over the entire three-year period. There is no particular specification that this will be shared in equal amounts. It is simply for the entire period.

Q Okay, so in your model then would that indicate on average there was a 6 percent rate increase each year, or by the end of the period -- let me change it. By the end of the period the rate increase of 18.4 percent would approximately equal the inflation for that time period of three years at 6 percent?

A If I may compute it?

(Witness computing on calculator.)

Inflation of 6 percent compounded over three years would amount to 19.1 percent, so the rate increase of 18.4 percent as simulated here appears to be before the inflation rate. I'm sorry -- it is below the inflation rate.

May I also point out in view of the fact that you are referring to PECo Exhibit 29 that this run came from this document that PECo verified, and it was made at PECo's request on February 12th, and indeed it is here indicated at the top of the document the label, and it is dated and signed by the PECo consultant that requested these runs.

Q Dr. Schinnar, I guess my question though is: as I understood your model and your recommendations, to the extent the rate increase granted to PECo approximates the inflation rate or the closer the relationship over time between the rate increase and the inflation rate, the less of an impact on the economy?

A That is correct.

Q So then the resulting change in employment shown on the last page of Exhibit 29 is consistent with the fact that the rate increase in this hypoethetical turns out to be less than the inflation rate for that time period?

A That is correct.

Q And last, whereas the run shown -- the hypothetical for the first two pages has an inflation rate of 5 percent, but still you get an 18.4 percent rate increase, and that is what resulted in the decrease in employment over the time period; is that correct?

A That is correct. And the 5 percent rate increase over three years is approximately 17 percent, which is

below the rate increase which is 18.4; so the 18.4 increase is higher than the inflation rate.

Q Thank you, Dr. Schinnar.

MR. WERSAN: That's all I have, Your Honor.

JUDGE MATUSCHAK: Mr. Widoff?

MR. WIDOFF: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. WIDOFF:

Q I have several questions. My name is Mark Widoff and I represent the University of Pennsylvania and the Utility Users Committee.

First of all a general question. If I can refer you to page 12 of your testimony, Figure 2, about which you were just cross-examined?

A Yes.

Q As I know you are aware, the Philadelphia Electric Company is in the process of constructing a second Limerick plant, which is projected to come into commercial service, as I understand it, around the year 1990. Now none of the scenarios on page 12 indicate what the possible options might be for dealing with the economic impact of a second rate increase comparable to the one that we are facing at this time; is that correct?

A That is correct.

Q Would it be correct to say that the Commission

will be facing an even more complex and difficult task in terms of setting rates when, as we must assume, Philadelphia Electric Company comes in for its rate increase at that time, based on your analysis of your model?

A The analysis of my model -- the analysis conducted for this testimony with my model was limited to the three-year phase-in period that PECo has proposed. I have not included anything in it concerning Limerick 2 or any prospects of decision-making regarding rate increases as a result of that?

Q If I understand you correctly, depending on how that decision is approached and determined, the economic impact for the years roughly 1990 and following could look very different; is that fair?

A If it involved a rate increase.

Q I would like to refer you to Figures 4 and 5 on page 19 of your testimony. You have already stated --

A Let me find that.

MR. CALVERT: Figures, not tables.

THE WITNESS: Yes.

BY MR. WIDOFF:

Q You have already stated in response to cross-examination by company counsel what some of the reasons are for the differing impacts in terms of loss of jobs in the different sectors of the Philadelphia economy as

you have analyzed it. I don't want to take the time at this point to go over that again, but would it be correct to say that this analysis assumes an equal rate increase across the board for all of the various sectors?

A That is correct.

Q If the rates were structured in such a way as to fall more heavily, let's say, on the services segment, which, as I look at your chart, has a very high level of loss of employment, and if it were structured so as to have a lesser percentage on some of the other sectors, would have a smaller impact on them, what would the overall impact be?

A I find it very difficult to speculate in response to your question. It would require a precise example which would be implemented on the computer to simulate the scenario. From the data which you have provided, I cannot provide the response to that.

Q Would it be fair to say that if -- let's take the Wholesale/Retail. Would it be fair to say that if the increase was greater in that sector and less for Construction and Agriculture, that given the sensitivity of the Wholesale/Retail sector as compared to the Construction an Agriculture, that the overall effect on employment would be greater?

A I expect that, yes.

Q Dr. Schinnar, I am going to show you copies of two exhibits that have already been placed into evidence in this proceeding. One is UCC/UP Exhibit Number 1 and the other is UCC/UP Exhibit Number 6.

(Documents handed to witness.)

Have you been shown these documents?

A I have seen those exhibits.

MR. WIDOFF: Let me show them to counsel so he knows what I am referring to.

(Documents shown to Counsel Calvert.)

BY MR. WIDOFF:

Q With regard to the first exhibit, UCC/UP Number 1, it has been previously established that that is part of a submission that was made by the Philadelphia Electric Company to a Legislative Committee with regard to the desirability of introducing competition into the service territory of Philadelphia Electric, and in response to that question in addition to other information the company responded in a footnote.

A I have a copy of this.

Q The company responded that a transfer of Lukens Steel to the service territory of Pennsylvania Power and Light would mean that the rate load carried by Lukens Steel would have to be transferred to other customers, and the result would produce a 0.376 percent increase

in the rates of the remaining industrial customers, which would result in a loss of 1,127 jobs.

And then in a response to a data request the company provided us with an exhibit, a table which was prepared, as I understand it, by Dr. Perl, who was a witness for the company in this proceeding.

If you were to have employed the same methodology that Dr. Perl employed in the Lukens Steel proceeding, would you have come up with a smaller or a larger impact on the economy of the Philadelphia region with respect to the rate increase that you were analyzing in this case?

A Smaller, because if I am to extrapolate from page 3, the footnote of the response of the Philadelphia Electric Company, the September 14, 1984 inquiry of Representative James Gallagher, if a 3/10 approximately of the rate increase generates a loss of about 1,000 jobs -- and I'm just extrapolating for the sake of demonstration -- a tenfold increase which would be about a 3.7 percent increase in rate, according to this footnote, would generate somewhere in the neighborhood of 11,270 jobs lost. If I am permitted to extrapolate it now 100-fold, meaning from 3/10 to 37.6 percent, which by the way corresponds exactly to the rate increase under the PECo proposal over a four-year period, then 100 times 1,127 jobs would produce

a job loss of 112,700, which is just far out of line with what is reasonable.

And, as you are aware, a similar simulation, not quite exactly the 37.6 in my testimony, suggests a job loss of about 19,000 jobs if I were to, just for the sake of illustration, extrapolate it to a 37.6, it was somewhere in the neighborhood of -- in the middle range of between 20,000 to 30,000, possibly closer to 30,000.

So in response to your question, I would estimate about one-third of what the company is forecasting in this particular case.

Q Just so the record is clear, what you are saying is that Dr. Perl's methodology, if extrapolated, would result in a much larger impact on employment than your computer model; is that correct?

A That's correct. I would like to add as further explanation that I have also inspected and read the testimony in which Dr. Lewis Perl provides the methodology and the procedure for the calculation that he uses, and in this case his number is slightly different. He is showing that for a .376 rate increase the job loss would be about 1,409 jobs. I think that his calculations are erroneous. I repeated his calculation in a correct manner just to satisfy my own curiousity, and have a page here with the calculation, and if the calculation is done correctly using

his parameters that he introduces and eliminating some of the double counting that I assume inadvertently was introduced into his procedure, under a scenario again using his data and parameters in a similar procedure of 4 percent inflation over three years, I obtained a job loss of 27,900 jobs.

If I repeat exactly the same procedure, but assume a 6 percent inflation -- and here we really go out of range with what forecasts appear to be for the next year at least -- the job loss is 15,280.

So if I take a range of inflation,according to Dr. Perl's testimony on behalf of PECo, and the range is between 4 percent and 6 percent, in that range he would forecast between 15,000 to 28,000 -- approximately 27,900 as a job loss.

Given that his forecast for a 4 percent inflation rate is 27,900, and given that our forecast for that exact scenario is approximately 20,000, and for other reasons, I believe that our number is both more conservative and more correct in this particular case, and certainly it is within the range of studies that have been done.

MR. WIDOFF: I have no further questions, Your Honor.

MR. CLARK: I have just a couple of questions.

JUDGE MATUSCHAK: Go ahead.

CROSS-EXAMINATION

BY MR. CLARK:

Q Dr. Schinnar, on PECo Exhibit 29, as I understand this, there are two different runs, one showing an inflation rate of 5 percent for each of the three years and the second one showing an inflation rate of 6 percent for each of the three years.

A If you will wait a second, I will find it.

Q All right.

A Yes.

Q What I am trying to do is explore the impact of that shift in the inflation rate assumption; and as I look at this exhibit, what I see is essentially a 5,000 job swing between the 5 percent inflation and the 6 percent inflation; is that correct?

A In a comparative study, yes.

Q Does this indicate then that the inflation factor is a very key component to this, and what we really need to look at is the real inflation rate of the electricity prices?

A That is correct.

Q Have you sort of as a bottom line of all of this used your model to indicate what you feel the Commission ought to consider in terms of the largest real inflation rate of electricity that could be tolerated by

the Philadelphia economy with acceptable -- whatever that means; I'll ask you to explain that -- changes in impacts on the employment and so forth?

MR. CALVERT: Mr. Clark, just for clarification; when you say the Philadelphia economy, do you mean the Philadelphia SMSA?

MR. CLARK: SMSA, yes.

THE WITNESS: Yes. And I would like to point out that this was done subsequent to the writing of the original testimony. In fact, it was done yesterday as a follow-up to the sensitivity analysis that a PECo expert has conducted and has been conducting over two days. I was curious about the runs and I replicated some of the runs and did some additional runs.

BY MR. CLARK:

Q And what do those additional runs tell you?

A I would gladly show you these two. I did not have an opportunity to share it with the experts because I left that afternoon to come and testify here. I have many of the runs here. I don't have a copy with me; I didn't have time to do it, but it is available for inspection, and what I have with me is a summary of these runs.

MR. CALVERT: Your Honor, I am going to object to him putting up documents that haven't been marked as exhibits and haven't been passed out and apparently are

a summary of runs that were not given to either PE or its experts. I think the procedure is not a proper one.

JUDGE MATUSCHAK: Yes, I will agree. The objection is sustained.

BY MR. CLARK:

Q Dr. Schinnar, can you maybe tell us what that bottom line is in terms of the real electricity price increase that the Philadelphia SMSA can stand that would be reasonable in your mind in terms of economic impacts upon the area?

A Based upon my experience to date in observing the model's performance -- and as you are aware, there are recent runs; many of them were as a result of learning from the particular analysis that PE experts have performed to test the sensitivity of the model -- it appears that as long as the rate increase in electricity is generally commensurate with the inflation rate -- and I would clarify what I mean by "commensurate." "Commensurate" I mean to reflect the fact that it follows very closely and in some cases somewhat higher, but very closely; and I base that on the fact that if I look -- and I did look -- at the past 12 years of electric rate increases and compared that to a deflation rate, that PECO's increases were approximately 1 to 2 percent higher than the inflation rate. So as inflation followed a certain pattern -- and

on average PECo's rates were about 1 percent higher -- I referred to that as a rate increase that is commensurate with the inflation rate, at least in historical terms.

Based on my observation of the simulations of the model -- and let me take an exact scenario or a hypothetical in our case of, say, 3 percent growth in the U.S. economy, which is very well within the range that many forecasters believe would be the scenario for the future, for the next three years -- and especially in view of the fact that oil prices have been dropping very dramatically and there is expectation that inflation will therefore be kept low, and there will be stimulation to the national economy -- so if you consider 3 percent growth and 4 percent inflation, in order to get no impact on the economy the rate increase cannot exceed over the three years 16 percent, which amounts to 5.1 percent compounded annually.

So if the inflation rate is 4 percent and the growth rate is 3 percent, but if the rate increase for PECo is kept no higher than 5.1 percent annually compounded, or a total of 16 percent for that period, there will be no adverse effect on the economy.

Under that scenario, which means only a 16 percent rate increase, PECo would receive a 25 percent increase in revenues. So we are talking about 3 percent growth in the U.S. economy, which translates to about 1.9 percent

growth in the Philadelphia economy annually, and a 16 percent increase in the rates would result in a 25 percent increase in revenue.

Let me now take another scenario. Supposedly we maintain the 3 percent growth in the national economy, which is not unlikely. For example, in the past two years we have had rates of like 4.46 in '84; in '85 we had rates of 3.35, a slight decline, but because of oil prices I expect that it will stay stable around 3 percent.

If instead of 4 percent inflation, which I think is not unlikely, there will be an increase in inflation to 5 percent, under this scenario an 18 percent rate increase will not produce any adverse impact on the Philadelphia economy. But what is interesting in this case is that PECo will realize a 29 percent increase in revenues. So the revenue requirements of the company, which I believe were stated to be 28.2 percent, will be met with an 18 percent increase in rates if the national economy sustains 3 percent growth, as it appears to be likely in view of oil prices, the decline in oil prices, and if inflation is at 5 percent --

Q That 18 percent figure is the nominal percentage growth on an average basis compounded?

A That is correct.

Q Now what number is that on an annual basis?

A 5.7 percent.

Q So in that example you are talking about a real growth in real electricity prices of .7 percent?

A Approximately.

Q Dr. Schinnar, to the extent that you are able, do you recommend that this Commission in analyzing these economic impacts use the assumption of 3 percent for national growth over the next three years?

A Well, in my testimony, which was based on an analysis conducted on December 20th, and written over the next ten days, I stated that the reasonable range of growth is between 2 and 3 percent. At the time there was a general expectation that there would be a further drop in oil prices, but it wasn't clear.

Since then we have all learned and read that oil prices have been dropping, and practically every economic forecasting organization in this country is revising upward its forecasts of the U.S. growth, so in view of that, given that I expected a range of 2 to 3 percent and PECo has based its proposal on an approximate growth rate of 2.5 percent, which I felt was right and correct at the time, I would now suggest that 3 percent is a very reasonable number for the next three years.

Q And what would be the corresponding growth rate for the SMSA?

A It should be about 1.9 percent annually.

Q And the last question is: what is the inflation rate that you are recommending that the Commission consider in evaluating the economic impacts of this case?

A Again, in my testimony I stated a reasonable range is between 4 and 5 percent, although PECo is showing about a 6.5 percent figure, which was far out of line with what many forecasting organizations were forecasting in December. Given that range and given that we witnessed a very dramatic drop in oil prices, I am inclined to recommend that a 4 percent inflation rate is a very likely scenario.

So combining it with growth, it will be 3 percent growth and 4 percent inflation.

Q You are assuming there, aren't you, that the benefits of reduced oil prices will continue for some time; is that a reasonable assumption?

A Well, I came back in January from a conference, an international conference in Honolulu on oil prices, Management Modernization of Electric Utilities, and I have seen presentations and forecasts there of a number of individuals that came back from Singapore from the conference on oil, and from what I've seen they have forcasted that well into the '90s, the early '90s, that they expect oil prices to be between -- crude oil between $15 to $17 a

barrel.

That is somewhat lower from what we have now, but these are forecasts that we are using.

Q Thank you, Dr. Schinnar.

MR. CLARK: I have no further questions, Your Honor.

JUDGE MATUSCHAK: Is there any further cross-examination?

MR. KLEPPINGER: Just a few brief questions, Your Honor.

CROSS-EXAMINATION

BY MR. KLEPPINGER:

Q Dr. Schinnar, my name is David Kleppinger. I represent the Philadelphia Area Industrial Energy Users Group, which are primarily manufacturing customers of Philadelphia Electric Company.

Just briefly, on your Figures 4 and 5 on page 19, which identifies the jobs loss in each of the primary sectors, am I correct that the STARLOCK model itself does not explain the interrelationship of job losses between each of those sectors?

A That is not correct.

Q It does do that?

A Yes, it does.

Q Is one of those relationships that the STARLOCK model accounts for the ripple effect of one sector on

another sector?

A That is correct.

Q And is one of those relationships such that a manufacturing job loss will have potential job loss effects in the service industries and maybe financial, industry and other sectors of that nature?

A That's correct.

Q So is it safe to say that for example on Figure 4 part of the job loss that is listed as Services, Finance, Insurance, and maybe Wholesale/Retail is caused by the drop in the manufacturing employment?

A That's right.

Q So that if the loss in manufacturing employment could be minimized, perhaps it would have the ripple effect of reducing the job loss in those other sectors as well; is that a fair conclusion?

A With specific reference to the manufacturing sector, yes.

Q Thank you.

MR. KLEPPINGER: I have no further questions, Your Honor.

JUDGE MATUSCHAK: Do you have any further cross?

MR. CALVERT: Your Honor, I have just a couple very brief follow-up questions, if I might.

JUDGE MATUSCHAK: Go ahead.

FURTHER CROSS-EXAMINATION

BY MR. CALVERT:

Q Dr. Schinnar, when I believe Mr. Widoff cross-examined you about the Dr. Perl analysis, it was unclear to me. I take it that you did not take Dr. Perl's numbers and run them through the STARLOCK computer somehow?

A That is correct.

Q And so all you were doing is just reviewing that part of the data -- that part of the testimony of his in the Lukens case that you happened to look at; is that a fair statement?

A That is correct.

MR. CALVERT: That's all I have, Your Honor.

MR. RAINEY: May I have five minutes for redirect please, just a recess?

JUDGE MATUSCHAK: Yes, we will take five minutes.

(Recess.)

JUDGE MATUSCHAK: You may proceed.

MR. RAINEY: Thank you, Your Honor.

REDIRECT EXAMINATION

BY MR. RAINEY:

Q. Dr. Schinnar, you were asked a number of questions on cross-examination, and therefore I will go through those which I feel require some redirect.

First of all, Dr. Schinnar, you were asked about certain testing techniques, specifically the testing of your model, and you named three. Would you repeat those again for us, please?

MR. CALVERT: Your Honor, I object, only on the basis that it has been apparently asked and answered. He is just saying, repeat his testimony.

MR. RAINEY: I have a followup to that, and I think it is important that we list what those are.

JUDGE MATUSCHAK: I'll overrule the objection.

MR. RAINEY: Thank you, Your Honor.

THE WITNESS: I believe I discussed the use of precedents to test results. I believe I mentioned replication and corroboration, and I also discussed statistical analysis.

BY MR. RAINEY:

Q. Is there an additional one that you failed to mention, Dr. Schinnar?

A. Yes, sensitivity analysis to any model is an important part of the testing, to observe its behavior under various ranges and parameters.

Q. And Dr. Schinnar, based on the information which you provided to Philadelphia Electric and its consultants, in which ways could they have tested the model?

A. For two and a half days, the company experts have discussed in great detail the formulation, have had an opportunity to examine a printout with all the parameters of the model at the Wharton School of the University of Pennsylvania, which one of the experts has.

And indeed, one exhibit entered today is based on retrieving some of that information from our data base.

Corroboration is another procedure which I believe -- the company has the same information that I have, for example, Lewis Perl's testimony. Other materials provided by some of their witnesses should suggest that there is an impact on employment of rate, although there is some difference in regard to the magnitude of the impact.

And finally, the kind of analysis which the company has performed, I believe quite extensively, is sensitivity analysis.

I have provided on Tuesday printouts which contain about 300 different simulations of the dynamic version of the model, and in addition to the kind of runs that the

company has run on the model.

So, in terms of the sensitivity analysis which is a common methodology, I think the company had access to information that was quite extensive about the behavior of the model.

Q. Just so the record is clear, would you explain to us what is meant by the corroboration testing method and your sensitivity analysis testing method?

A. Corroboration is basically a reference to a procedure in which a particular study is done in one approach, and you use another approach, another procedure to study the same question.

And if the two point to the same direction, and you repeat it again and again, you compare these various tests, various studies, you get a higher level of confidence that your analysis is correct or that the analyses point in the same direction.

It is not unlikely that in the social sciences, you will have analysis that points to opposite direction. I am familiar with many such studies.

But from those that I examined in relation to this case, they all provide ranges of job loss using different methods between 12,000 jobs to 28,000 jobs in procedures that I believe are much cruder than the very refined, detailed model building process that we have been going

through at the University of Pennsylvania for over a year and a half now. And our forecast, I believe, of 19,000 is quite accurate.

Q. Dr. Schinnar, did the consultants to PECo test your model at your workshop?

A. The consultants of PECo have run sensitivity analysis tests on the model.

Q. And you are talking about Monday through Wednesday of this week, is that correct?

A. The runs began on Tuesday morning, with some delays in the afternoon because of computer difficulties at the university, and then continued Wednesday morning.

Q. Generally what was the reaction of the consultants to the testing of your model?

A. I can't comment on that, because I was not advised.

Q. What is the most significant way of testing the model?

A. My belief is that the best procedure is the one used in the natural sciences, where studies are replicated and supported by independent analysis.

But there are other methods. But I believe this is the best one that could be conducted.

Q. And you previously stated, the company was able to test your model in this way, is that correct?

A. The company has access to exactly the same studies, the same past testimonies that I have examined, as well as to a sensitivity analysis which it had conducted over the two-day period that it had access to the model.

Q. Dr. Schinnar, you were also asked questions with respect to communities not served directly by Philadelphia Electric Company.

Would you state for us, what is the relationship of the communities not served by Philadelphia Electric Company to the Philadelphia Electric Company rate increase?

A. Well, for example, the New Jersey counties, many residents in these counties are employed in Philadelphia and are commuters.

So, any impact in the City of Philadelphia on employment would affect them as well.

There is another aspect of that impact that relates to the different rates between, for example, the electric utility that services the Philadelphia area and the electric utility that services, for illustration, the New Jersey counties.

If the rates are higher in Philadelphia and the rates are lower in New Jersey -- I know for example that Dr. Schink, who testified in the Limerick 2 hearings a year ago, did point out that difference in rates levels and rate increases across regions would produce a shift in jobs.

So, if the rate in Philadelphia is higher than the rate increase in New Jersey, for example, although on average it may appear to be a lower rate, there will be a greater loss in the Philadelphia area because the relocation into an area where the rate is lower is attractive and would attract away industry and jobs from Philadelphia.

So, the differential rate is not necessarily an advantage to Philadelphia, in effect. It's a disadvantage, because it would produce more relocations.

The net effect, if I were to summarize it, is that it could be that the job loss in New Jersey, the counties in New Jersey that are part of the SMSA would be somewhat lower.

But it would be equally true that the job loss in Philadelphia would be higher because of the differential rates. So, I believe that the overall estimate we have is quite reasonable.

Q. Would you state how the residents of communities outside PECo's service territory who work in Philadelphia, specifically how they would be affected by the Philadelphia Electric Company rate increase?

A. Well, to the extent that there is reduction in employment in Philadelphia, they would be subjected to the same losses in terms of employment opportunities.

Q. Dr. Schinnar, would you tell us why it is possible that real wages will not increase with growth?

A. If I may find my notes --

(Pause.)

A. If I may rephrase the question, as I understand it in reference to whether a change in real wages would affect the results of the analysis --

Q. Whether specifically it may not --

A. May or may not --

Q. -- increase in growth.

A. The way wages appear in the model, they appear in a number of places. They appear as -- you earlier saw the growth model. We had a W, and this reflects wages.

In this case, if real wages go up, then there will be a downward impact on employment opportunities. So, here is an example where if wages in Philadelphia in relationship to the rest of the nation were to go up, there would be a downward impact.

The reverse is true, too. If wage rates in Philadelphia fail in relationship to the rest of the nation, then there will be a stimulation of employment.

Wages locally would also have a muliplied effect, similarly to a discussion we had earlier about PECo raising its electric rate and therefore producing increases in costs of other goods and services.

A similar effect could be produced if wages go up. So, this would have a further downward trend on the economy. On the other hand, as wages make employment of labor more expensive, there could be a movement away from the labor-intensive industries, and replacing it with capital.

So, that would produce job loss as a result. Another example where wages come in -- so, all of these that I describe are downwards impacts.

You have an upwards impact in the case of consumption of electricity. We know from many studies, if income goes up in real terms, that consumption of electricity goes up as well.

But it is also true, and we have observed it to some extent in our study, that as income goes up, there is a greater sensitivity to reducing the consumption of electricity as the price goes up.

For example, in a certain income level, if you own an air conditioner, if you are at the income level where you can afford an air conditioner and the rate goes up, you can turn down the air conditioner certain hours of the day and reduce significantly your consumption.

But if you are not in this income group, if you are in a lower income group where you don't have an air conditioner, you don't have anything to turn off.

So, yes, there is a higher consumption in that case

of electricity, but also a greater sensitivity to electric rates. These are a few examples of both the positive and the negatives, and I believe from examination of the model that when an implementation of the wage factor is completed in all the proper places, that it will produce largely a washout effect and would not alter the results in any significant fashion.

Q. Dr. Schinnar, are you able to do two analyses with your STARLOC model, namely growth and static analyses?

A. Yes, as I explained in my clarifying remarks in the beginning of the testimony, that both the static analysis was performed and the dynamic analysis was performed on December 20th in the preparation of testimony.

Q. So that prior to Tuesday of this week, you were able or your model was able to do the two analyses, namely the growth and the static analyses, is that correct?

A. Absolutely correct.

Q. Dr. Schinnar, can one change from the static analysis to the growth analysis using your model?

A. Before Tuesday, it required going -- if I may use this figure again --

(Slide.)

A. -- it required doing a static analysis in this implementation, which gave the more detailed results that

we have used here.

And if one sought a dynamic analysis using this procedure -- and I have used both in the testimony -- after Tuesday, and observing the PE expert, attempting to do the dynamic analysis on this implementation of the model, I have released a benchmark to 1981 and a dynamic analysis that is very detailed can be performed here as well, and indeed a number of runs were conducted, and the results are identical.

Q. So, Dr. Schinnar, in your consultation with Philadelphia Electric Company's consultants this week, did you go from your static analysis to your growth analysis using your model?

A. That is correct. On Tuesday, we started with the static analysis, and I have copies of printouts to that effect, and then switched to the dynamic variant -- that was in the morning, early afternoon -- and produced the long-term runs, the dynamic runs that corroborated or replicated exactly Tables 4 and 5 in the testimony.

Q. Dr. Schinnar, in response to questions raised by counsel, you referred to the testimony of Mr. Lacouras of Temple University in regard to the public input testimony, is that correct?

A. That is correct.

Q. Specifically referring to the afternoon session of February 4, 1986, is that correct?

A. That is correct.

Q. Dr. Schinnar, I would like to show you a transcript of his public input hearing testimony of February 4 --

MR. RAINEY: Would counsel like to take a look at this?

MR. CALVERT: Yes. Do you have any specific pages you want to --

MR. RAINEY: Page 14, the paragraphs referring to Mr. Lacouras.

(Counsel Calvert perusing document.)

BY MR. RAINEY:

Q. If you will, Dr. Schinnar, would you read the last four full lines on that page regarding the --

JUDGE MATUSCHAK: Let's have some reference to the page in the testimony.

MR. RAINEY: I'm sorry. I'm referring to page 14 of the transcript, Your Honor, specifically the transcript of February 4, 1986, the afternoon session of the public input hearing in which Mr. Peter J. Lacouras testified.

JUDGE MATUSCHAK: Very well.

THE WITNESS: I quote: "Approval of this rate increase would mean $104 additional tuition for each Temple student by the third year, and each year thereafter, and only to cover the additional electric bill."

BY MR. RAINEY:

Q. Dr. Schinnar, would you infer from that that the increase in tuition of $104 is directly tied to the increase in the PECo electricity bill?

JUDGE MATUSCHAK: Well, the statement says what it says. We don't need his interpretation of it.

MR. RAINEY: Very well, Your Honor.

I have no further questions at this time.

JUDGE MATUSCHAK: Anything further of this witness?

MR. CALVERT: Yes, just a little bit, Your Honor.

RECROSS-EXAMINATION

BY MR. CALVERT:

Q. Dr. Schinnar, going back to some questions by Mr. Rainey about the effects of lower job growth in Philadelphia and/or New Jersey depending on whether or not the rate increase that we're talking about in this case applied across the entire SMSA or only here in the Pennsylvania portion of it, you indicated that indeed there might be a few more jobs created in New Jersey, but that would be compensated in some way in your mind by a greater reduction in growth in Philadelphia, is that basically correct?

A. That is correct.

Q. Now, does your model make this determination, or is this simply your economic hypothesis based on the

question that was asked?

A. The model presently does not make this determination. I am basing my explanation of the impact of different rates between regions on testimony by Dr. Schinck in Limerick 2.

And if I may refer to it and quote --

Q. Well, my question was whether or not this was your analysis or whether or not it comes from your computer, and the answer is it is your analysis as opposed to something that you have done on your STARLOC computer?

A. My conclusions are not drawn from the model that I presently have.

Q. My next question is: we are talking about testing of the model and what the PE experts were able to do and so on.

You had a series of questions by Mr. Rainey about that. Do you recall those?

A. I remember them.

Q. You had indicated that the PE experts were able to do some sensitivities on your STARLOC model over the last couple of days, correct?

A. Sensitivity analysis, yes.

Q. And basically, is it true that what they did is, they checked outputs based upon the various input assumptions?

A. That is right. It is a procedure in which you subject the program, computer model to a wide range of parameters.

For example, I remember runs where even decline in electric rates were tried, to see what the impact would be on job growth. The range, for example, in terms of rate increase, I remember one particular set of runs done by the PECo expert that went all the way from 28.2 rate increase to minus 5 percent.

Now, the purpose of an exercise like this is to see whether the results make sense in view of these variations in the ranges. You could do the same thing for the inflation rate. You can do the same thing for growth rates.

And based on that, you see whether the model is producing sensible results as opposed to a possibility that results come out independent of the inputs.

Q. Is it also true that the PE experts were not able to do any sensitivity analysis of the intermediate calculations, for example sensitivity analysis relating to the relative wage rates in the Philadelphia SMSA?

A. That is correct.

MR. CALVERT: Your Honor, that's all I have.

JUDGE MATUSCHAK: Is everybody ready to adjourn for the evening?

MR. CALVERT: Your Honor, although that is all I have

of this witness, and he certainly may be excused, I do have a motion I want to make with respect to his testimony, and I can do it now, or I can do it tomorrow morning, at Your Honor's convenience.

JUDGE MATUSCHAK: You may as well do it now.

MR. CALVERT: Your Honor, I think from this testimony that we have heard today that it is clear that Dr. Schinnar and his model have not presented a sufficient amount of data that the parties to this proceeding, specifically PE but any of the other parties, and perhaps more importantly, the Commission, would be able to in any way validate or test completely the model as presented and the results as presented, and therefore the testimony that is based on that.

Specifically, I refer to two general areas. The first one is that the documentation for the model is woefully incomplete.

We have PECo Exhibit No. 22, which is a draft technical report. That report refers to several other technical reports which give the specific details about various aspects of the model, ranging from the elasticities that are utilized and are an important part of the model, we have heard today, to the underlying data bases.

These reports are to be forthcoming in the future,

but as of now, we haven't seen them.

We are not able to validate the data base in the model. We have heard some extensive testimony about how the data base has been brought up to 1981 or brought back to 1981, depending if you had 1982 data or 1975 data.

And there are procedures that are utilized to do this, to make sure that the guts of your model, that the data that you are computing from, the coefficients that you are using, are proper.

What Dr. Schinnar has told us is that there are procedures that are used for this, in fact there are many procedures that are used for this, some of them standard.

He then told us that his graduate students and his research assistants did a lot of this. I specifically asked him, I said, "Wasn't that good enough? You taught them what the general procedures were."

And he said, "No. This is the heart of my model. I checked every number. I wanted to make sure there were no mistakes."

We then asked him for workpapers. There are no workpapers. It's going to come out in a later STARLOC report. We don't have that now.

Our experts are in a position of accepting what Dr. Schinnar says or not, but no way whatsoever to test the guts of his model, what is the data he is using. We don't

have that.

Not one workpaper was produced in this case, other than this draft technical report, which as I have said before is the first of a series of other draft technical reports.

We have asked about how this model has been validated. The way it has been validated is, it's a series of components that have all been put together.

The individual components have been tested by having the interrelationships, the equations, the coefficients analyzed as a component part before it is linked together.

Do we have any workpapers, any audit trail, any way to test that in fact the model computes the way it is supposed to compute?

The answer is no, not one document. There is no way, we are told, that we can get into the archive, for two reasons.

One is that the archive is in, we have the analogy of, in the basement. It is not a place that we can easily get at. And secondly, a lot of the material isn't even archived. It isn't even in the form now that we could open the box and look at what I have referred to constantly as the intermediate calculations.

An example is, you will recall that we were talking about F*, the final demand figure that is utilized and

inserted into the STARLOC model, and according to the technical report, subjected to the impact of the Price and Demand Submodels, whose descriptions follow.

We can't test that equation. We don't know if in fact the final demand figures for exports, government purchases and investments are correct.

We can't see how the model reacts. We can't see how it utilizes the data. We don't know if in fact this model internally is doing what it says it is going to do.

What we have basically is, and I think I have even referred to it in my questions, is we have a black box. We have inputs, a relatively small number of items that can be inputted, although they can change.

For example, Gross National Product, or inflation, you can put in any number you want, but that is a category as one input.

We then have a black box which, we have been told, is very complex, with hundreds of equations that do thousands of calculations, and out comes a series of numbers.

What we just heard on my recross-examination was, yes, the PE experts were able to test by doing the parameters in the front end of what the inputs were.

Whether the outputs, assuming the middle of the box works right, made any sense based on what was going in, we have no way to open that box up and to look in there.

We have no way to open that box and to look in there. We have no way to validate the model, to validate its equations, its calculations, its data, no way to evaluate whether it does what we are told it does.

In essence, what we have in this case is Dr. Schinnar who says, "This is my input, this is my output; believe me, it works."

And there is no way to determine it works. We have heard a lot of testimony about how difficult it is to test the intermediate parts.

Either there is not enough data, or we can't get at them to test them. We can no longer test the validation of this model, once it has all been hooked together.

We have tested individual parts, but we can no longer look at the intermediate calculations, now that it has been put together.

It is on that basis that I say that this model does not stand critical scrutiny to the level that all the other experts in this case have provided in terms of their analyses, their models, their regressions.

This one does not support the kind of critical analysis which we have been doing in this case, which would allow both PE to determine if the model does what it says it will, and for the Commission to rely on any kind of results from that model and say that, based on those results,

that this testimony is acceptable.

It is on that basis that I move both to strike this witness' testimony, and also, to the extent that it was referenced in the cross-examination and the direct examination, his oral testimony, also.

MR. RAINEY: Your Honor, if I might respond to that, I think the key to the motion that has been raised by counsel is the sufficiency of the amount of data which he has referred to.

As Dr. Schinnar has stated on the stand, the company has been able, through corroboration testing methods as well as sensitivity testing methods, to test the accuracy or test the sensibilities of his model.

I think that the sufficiency of the amount of data question really goes to the question of how much weight is to be given to the methods in which the model was able to be given.

Dr. Schinnar has stated that he feels that the corroboration method is probably the most significant and most important method of being able to test the model, and that the company did have the ability to do that, and did, for sensitivity purposes or sensitivity analysis, test his model in his workshop itself.

As far as the data bases were concerned, there were government materials, U.S. Census Bureau materials, other

materials of a proprietary nature, Regional Science Research Institute materials which the company was directed to go to to pursue. They knew how to in fact obtain that material if they wanted to obtain that material.

I would just state, Your Honor, there has been no motion to compel filed against the city in this particular case nor to gain information which, if the company direly felt it needed certain information, it could have gone to Your Honor with motions to compel.

As you have been following all of the letters and what have you back and forth between the company and the city, the city has gone out of its way in making Dr. Schinnar available to the company as completing the technical report months prior to the date that it was originally scheduled to be completed, and that it has provided as much information as it could be expected to provide in this particular case under the rules of procedure -- I'm talking specifically about the Pennsylvania Code, which does limit burdensome, unduly harassing discovery.

And to the extent that the company felt that the responses that it was getting in interrogatories with respect to that particular fact was not in fact true, I would state, Your Honor, that they should have come to you with motions to compel this information.

But I would state to you that they in fact do know that this information that they have required does in fact request more than one can reasonably be expected, both in terms of time to produce the material, manpower to produce the material, and cost to produce the material, for these particular proceedings.

And Dr. Schinnar has in his testimony this morning orally and in cross-examination and his redirect specifically described the information that had been provided to the company in this particular case.

And I daresay that each time that Philadelphia Electric Company has been asked to provide information, that it has stated on numerous occasions with respect to the unduly burdensome nature of materials, that it would not be provided.

As a matter of fact, Your Honor, if I could just bring up one particular point for example's sake, during this week, while Dr. Schinnar was providing information at his offices, from 10:00 to 7:00 the first night and 10:00 to 6:00 the second, and then the morning of yesterday, on one of the evenings, Dr. Schinnar was visited by counsel for the company with a response to one of our interrogatories which we had presented to Your Honor with respect to the overdue nature of it last Thursday.

He came in with Wharton Economic Forecasting

Associates materials, which are very voluminous, and he told Dr. Schinnar that within the course of that evening -- it was very late at that particular time -- that he would have to review those materials, that those materials could not stay with him overnight, that they would necessarily have to go back with the company that evening for some reasons of proprietary, whatever.

So that in fact, the company has felt very freely to be able to say to parties that it has not been able to give them the information that they want or in the manner in which they could reasonably view it because it is burdensome, it is voluminous or what have you.

It is asking you now for the first time in these particular proceedings to find, based on what it feels is some insufficiency of testing methods of what Dr. Schinnar has done, for you to strike his testimony.

Again, I think, Your Honor, it really goes to the weight. It is a question, it is an argument between consultants with respect to how much material is needed for testing, what testing methods are the best method, and it really goes to credibility of the witnesses, and does not go to one's trying to in fact make an alleged determination with respect to what sufficient evidence is needed in order to adequately test the model.

MR. CALVERT: Your Honor, if I might just raise three

brief points, first of all the issue here is: this is not a motion to compel. It is the burden on the city to present testimony and to support it sufficiently to allow this Commission and to allow the parties here to critically analyze it.

My motion doesn't go to compelling anything; it goes to the fact that that burden has not nearly been reached by the city in this case.

The second thing is that it is not a matter of the weight given to the testimony. The reason it isn't is that the testimony has to get over a threshold level of meeting the requirements of presentation and support, and it hasn't done that in this case, again, going to the whole question of, this is not a motion to compel.

Finally, as part of the agreement worked out by the parties, and I think ultimately ordered by Your Honor, when the testimony was to be filed, all workpapers were to be filed with it. That is not a surprise to anybody. We have known that since last fall.

To the extent that we are now told that, in essence, the working papers are going to be four other technical reports that will be due sometime in the future -- I daresay not before this case is over -- we simply haven't been provided with the information that was agreed that was even needed.

That's why workpapers were put in by everybody, because that's the kind of information you need to support your testimony in this case. And we didn't get it, so I have said enough on that.

MR. RAINEY: Your Honor, if I just might respond, as Dr. Schinnar said, the workpapers associated with his testimony, there were some internalized computations, within his model itself.

That is why he in fact made himself and his modeling workshop at the Wharton School available to the consultants, so that they could in fact come and be able to view the running, the operation of the model, and what have you.

He did prepare a technical report, taking the computations as he knew them from his own computer runs and what have you, and put those together in a way that was very time-consuming, burdensome and expensive to himself in order to give Philadelphia Electric Company a back-up.

But with respect to his model itself, there were no, as he has stated, workpapers as such outside of any internalized computation within the machine which he has said would be very difficult, timely and cost-consuming for him to be able to reproduce in this particular case.

So that, in fact, although Philadelphia Electric Company has stated that no other party has had the opportunity to adequately test the model based on

information that they have received, no other party has raised that, Your Honor.

No other party has stated that it has in fact found those types of difficulties. So, again, this is Philadelphia Electric Company in this particular case saying that it would have liked the world, but that's why we have limits on discovery and limits on what is being able to be provided, which is reasonable and is feasible under the circumstances.

JUDGE MATUSCHAK: We note that there has been no attack upon the qualification of this witness. We think that the matter of the weight -- that his testimony here is to be considered, should not be stricken, but it is a matter of the weight that the Commission may wish to give this testimony.

We also call attention to PECo that they will have further opportunity to provide analysis of this testimony by their rebuttal testimony of their own experts in this particular field.

The motion to strike is denied. We think that the parties can argue the weight that the Commission should give this testimony in its brief, and also in that connection, further address the question of the weight in their further rebuttal testimony in this case.

The motion to deny is stricken. If there is nothing

further, we will adjourn until tomorrow morning at 10:00.

(Witness excused.)

(Whereupon, at 6:55 p.m., the hearing was adjourned, to be reconvened at 10:00 a.m., Friday, February 14, 1986, in Harrisburg, Pennsylvania.)

C E R T I F I C A T E

I hereby certify, as the stenographic reporter, that the foregoing proceedings were taken stenographically by me and thereafter reduced to typewriting by me or under my direction; and that this transcript is a true and accurate record to the best of my ability.

COMMONWEALTH REPORTING COMPANY, INC.

By: Phyllis Glass

Phyllis Glass

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