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THE NEW YORK CITY BLACKOUT OF JULY 13, 1977

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND POWER

OF THE

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE

HOUSE OF REPRESENTATIVES

NINETY-FIFTH CONGRESS

FIRST SESSION

ON

THE BLACKOUT OF THE ELECTRIC SYSTEM OF THE CONSOLIDATED EDISON COMPANY OF NEW YORK ON JULY 13 AND 14, 1977, AND THE ADEQUACY OF VOLUNTARY, STATE, AND FEDERAL REGULATORY MECHANISMS TO ASSURE RELIABILITY IN THE NATION'S ELECTRIC POWER SYSTEMS

OCTOBER 13, 1977

Serial No. 95–88

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THE NEW YORK CITY BLACKOUT OF JULY 13, 1977

THURSDAY, OCTOBER 13, 1977

U.S. HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY AND POWER,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in room 2322, Rayburn House Office Building, Hon. John D. Dingell, chairman, presiding.

Mr. DINGELL. The subcommittee will come to order.

This is the first of the hearings to be held by the Energy and Power Subcommittee into the blackout of the electric system of the Consolidated Edison Co. of New York that occurred on July 13 and 14 of this year. This is the second of major blackouts in recent times involving that company and that geographic area of the United States which has taken place in recent times.

The blackout raised a number of issues of grave importance to this subcommittee and to the Congress as a whole. Because of the importance of New York City as a hub of national and international banking, commerce, communications and transportation, the events that occurred on the evening of July 13 in Westchester County, N.Y. and New York City had a serious national and perhaps even international impact.

The subcommittee has had its staff inquire into this matter and the subcommittee is now preparing a detailed study of that impact.

The blackout also raised very important questions about the adequacy of voluntary and State and Federal regulatory mechanisms for resolving problems vital to assuring reliability in the Nation's electric power systems.

Parenthetically, the Chair will observe that a number of things which occurred in the first blackout were supposed to have been corrected by actions taken. The Chair observes that some of those corrective measures appear not to have gone into effect, and other things which might have headed off the blackout were not attended to by the company involved.

There have already been extensive investigations into the facts and, from the point of 20-20 hindsight, it appears clear that the blackout of July 13 never should have occurred; the lessons of the last great blackout of 1965 were simply not fully learned or acted upon. Emergency procedures designed to avert a collapse of the system—and which would have averted it—were not followed. Poorly designed parts of the system which increased its vulnerability were not corrected in a number of cases. Reserve generation

capability which was designed to avert the collapse—and which would have done so—turned out to be paper transactions not available when needed. Longstanding weaknesses involving interconnections had not been corrected.

Today's hearing will deal with one relatively narrow aspect of this broad problem: The adequacy of regulatory and voluntary mechanisms for assuring the interconnections necessary for system reliability.

The subcommittee believes that this particular investigation is timely because, at this very moment, the House and the Senate have before them legislation in the National Energy Act which would provide a new authority regarding interconnections and system reliability.

We will try to weigh what happened in the matter before us against the legislation and vice versa to ascertain how the legislation would work to prevent repetitions of the unfortunate recent blackouts.

I am pleased to welcome our witnesses today.

The Chair advises that our first witness will be Mr. Norman Clapp, special consultant in charge of investigation, New York State Public Service Commission, Empire State Plaza, Albany, N.Y. 12223.

Mr. Clapp, we are pleased you are with us. Do you have any associates you would like to have with you?

STATEMENT OF NORMAN M. CLAPP, SPECIAL CONSULTANT IN CHARGE OF INVESTIGATION, NEW YORK STATE PUBLIC SERVICE COMMISSION, ACCOMPANIED BY EVAN DAVIS, SPECIAL COUNSEL

Mr. CLAPP. Yes, Mr. Chairman, I would like to have Mr. Davis, our special counsel, join me at the witness table.

Mr. DINGELL. Gentlemen, if you will each identify yourself for purposes of the record to our reporter, we will receive your statements.

Mr. CLAPP. Mr. Chairman, I am Norman Clapp. I am the special consultant of Gov. Hugh L. Carey, in charge of the investigation of the power failure in New York City on July 13. Mr. Evans is here at the table with me, and he can identify himself.

Mr. DAVIS. My name is Evan Davis. I am associated with Cleary, Gottlieb, Steen, & Hamilton in New York City, which is special counsel to Mr. Clapp's investigation.

Mr. DINGELL. Mr. Davis, we are pleased you are with us.

Gentlemen, you are recognized.

Mr. CLAPP. Mr. Chairman and members of the subcommittee, I am very pleased to accept the invitation to appear before you here today. Although the investigation I am conducting for the Governor of New York is still incomplete, it has gone far enough to identify the inadequacy of Consolidated Edison Co. extra high voltage interconnections with neighboring electrical systems as one of the critical elements of the July 13 New York City blackout.

It is true there were a number of other factors, but certainly this was one. It is one that definitely warrants the attention of this subcommittee, and through it, the Congress. The public must ultimately look to the powers of the Federal Government over inter-

state commerce for its protection against deficiencies in regional bulk power grids upon which local utility distribution systems, even one as large as Con Edison, must depend for efficient and reliable service.

For your information and background, let me summarize very briefly the status of our investigation.

On the night of July 13, as the Con Edison system collapsed in New York City and its adjacent service territory, Gov. Hugh Carey requested the New York Public Service Commission to undertake at once an investigation into the causes of the failure and to develop recommendations for corrective action which would prevent any future major power failures in the State of New York.

To avoid any possible suspicion that such an investigation might be self-serving, he sought to place the investigation in the charge of an outsider who had no previous role in or connection with past policies or decisions of either the company involved or the Public Service Commission as the public regulator of the company.

Governor Carey asked me to undertake the direction of the investigation on those terms and requested the Public Service Commission to retain me as a special consultant in charge of the investigation with full responsibility for the investigation and such corrective recommendations as I am able to make to both the Governor and the commission.

On July 25, the then acting chairman of the commission, the Hon. Edward Berlin, so designated me, and for this purpose I was delegated the investigative powers of the commission to take sworn testimony, subpena witnesses, and perform related functions.

As special counsel, I am assisted by the law firm of Cleary, Gottlieb, Steen & Hamilton of New York City and Washington, D.C., represented by Messrs. Alan Applebaum, Evan Davis, and Lee Mitau. Mr. Davis is here at the witness table with me today.

I have also the assistance of a special engineering consultant, Mr. Charles P. Almon, Jr., a former director of systems operations for the Tennessee Valley Authority. He has previously served as vice chairman of the Advisory Committee on Reliability of Bulk Power Supply to the Federal Power Commission in its investigation of the Northeast blackout of 1965.

In our investigation we have worked closely with and have had the invaluable assistance of the technical task force of the New York Public Service Commission's Power Division. This task force was set up by the commission to investigate the New York blackout the very night it happened.

In view of the number of separate investigations of this catastrophe, we are endeavoring in our own efforts to bring together in our record the results of the various inquiries, probe more deeply where critical questions seem to remain, and apply our own independent analysis in formulating whatever recommendations I will have to make to the Governor and to the Public Service Commission.

Mr. Chairman, I view the investigation we have undertaken as consisting, really, of three phases. Phase 1 is the process of determining what happened in the collapse of the Con Edison system between 8:37 p.m. and 9:36 p.m. on July 13, and why. We have received all the various reports made by the Public Service Com-

mission's task force, the Federal Power Commission, New York City's Special Commission of Inquiry, and the Consolidated Edison Co. itself on these questions and have reviewed them in some depth in 2 days of public hearings on September 20 and 21.

We have made further inquiries of the company and the New York Power Pool, looking toward another set of hearings to be held on October 25 and 26 relating to phase 2 of the investigation. This is directed toward the examination of ways and means of increasing the reliability of the Con Edison system by improvement of the ConEd system itself and its operation.

Phase 3 will be addressed to the examination of ways and means of increasing the reliability, not only of ConEd's service, but also of other utilities in the State of New York as well, by improvement of the bulk power system, particularly the transmission grid outside the ConEd service area.

We expect to be going into the questions of phase 3 in November. When we have completed that phase of our investigation, I am confident we will have more to discuss with this subcommittee at that time.

At this time, however, it can be said without any reservation that the inadequacy of ConEd's interconnections to the south and east was the final fault that brought the system down. There were other equally important contributing factors, deficiencies in system design, inadequate response in bringing on reserve generation, confused communications, errors of human judgment, and mechanical failure which set the stage; but it was the opening of the Long Island interconnection and the failure of the Linden-Goethals tie at 9:22 and 9:29, both because of overload conditions, that brought on the shutdown of the system.

If other things had not happened earlier, or if some things had happened which did not, the final showdown on the interconnections to the south and east would not have occurred and the deficiency would have been moot in this instance.

But the fact is, the crisis did come and the interconnections were found wanting. The obvious question is, Why? That is a question of proper concern to this subcommittee, the Congress, and the Federal agencies to which the Congress has delegated certain powers and responsibilities for regulating bulk electric power supply.

This particular instance not only poses the problem of dealing with an inadequate bulk power interconnection between neighboring utilities. In the case of the Linden-Goethals tie, it also raises questions as to the adequacy of the machinery for decisionmaking and protection of the public interest in bulk power supply arrangements between the voluntary power pools of the utilities, between the systems of the various regional reliability councils, and across State lines.

The Linden-Goethals interconnection is between the Consolidated Edison Co. of New York and the New Jersey Public Service Electric & Gas Co. Each is in a different power pool. ConEd is in the New York Power Pool. New Jersey Public Service is in the Pennsylvania, New Jersey, Maryland Power Pool, PJM. Each is under a different regional reliability council set up under the National Electric Reliability Council structure and the auspices of the Federal Power Commission, and each is in a different State.

Let me review for you the critical significance of the Linden-Goethals interconnection with New Jersey Public Service Electric & Gas Co.

The ConEd service territory includes prctically all of the city of New York and portions of Westchester County. Altogether it serves more than 8 million people. Its peak load is approximately 8,232,000 kilowatts, or 8,232 megawatts, a peak that was hit this summer during the July heat wave. It was carrying a load of 5,868 megawatts at 8:30 p.m., July 13, just before the thunderstorm stuck the first blow in the events leading to the total blackout an hour later. Of this amount, 1,990 megawatts of power were being imported over the company's transmission interconnections.

The backbone of the company's service network is a north-south transmission axis of 345 kV circuits running from substations at Buchanan and Millwood north of the city to Staten Island on the south, a distance of approximately 35 miles. At the northern end the ConEd system interconnects with four 345 kV circuits in the New York Power Pool having a total normal transfer capacity of 2,500 megawatts.

At the southern end of the axis where the heavy load concentrations are, there are interconnections with the New Jersey Public Service Electric & Gas System to the west, the 345 kV Hudson-Farragut tie which was out of service on July 13, and a 138 kV Valley Stream-Jamaica tie with Long Island Lighting Co. to the east.

At the very southern tip of the axis is the Linden-Goethals tie with New Jersey Public Service Electric & Gas which operates at only 230 kV because of the transmission design of the PJM system. This gives the ConEd system a normal transfer potential of only 1,100 megawatts at the southern end of the system for importation of power, compared to 2,500 megawatts at its northern extremities.

I might add that that 1,100 megawatts includes the transfer capability of the Hudson-Farragut tie which was not in service on July 13.

On the face of it, this is an obvious lack of balance affecting the ultimate reliability of the system. An elementary hedge against localized storm hazards is dispersal of potential power sources and interconnections. The ConEd system as it now stands puts too many of its eggs in one basket at the north end of the system.

Officials of ConEd testified at our hearing last month that they were aware of this problem and had been trying to negotiate with New Jersey Public Service Electric & Gas for an arrangement which would make the strengthening of the southern interconnections possible, but the negotiations had been fruitless because the companies could not agree on an equitable apportionment of the cost.

Counsel advises me that under present law the Department of Energy has a broad mandate to promote and encourage interconnections among utilities. The Department's mandate is set out in section 202(a) of the Federal Power Act, 16 U.S.C. paragraph 824a(a), where:

> For the purpose of assuring an abundant supply of electric energy throughout the United States with the greatest possible economy and with regard to the proper utilization and conservation of natural resources,

the Department is charged with designing and promoting regional and national interconnected systems. The law describes such interconnections as voluntary, and under most circumstances the Department appears to have no power to order interconnection on its own initiative.

The Department's independent regulatory body, the Federal Energy Regulatory Commission, does have such power, however, upon the petition of a State regulatory commission or an electric utility. After an appropriate proceeding, the Department may, under section 202(b), 16 U.S.C. paragraph 824a(b), order an interconnection, but only if the interconnection places no undue burden on the opposing utility, does not compel it to enlarge its generating facilities and does not impair its ability to render adequate service to its customers. Presumably, the Department could order the construction or reinforcement of transmission facilities which supply bulk power to an interconnection.

In its interconnection order, the Department may prescribe the terms and conditions and the compensation or reimbursement reasonably due the interconnected parties.

When we asked the ConEd officers why they had not sought Federal intervention in their negotiations with New Jersey Public Service Electric & Gas, Mr. Joseph Block, the company's executive vice president for administration, replied that they feared the delay of a long drawn-out proceeding and litigation.

Mr. Chairman and members of the subcommittee, here is a dramatic case history attesting to the critical importance of adequate bulk electric power transmission interconnections, regional and interregional, intrastate and interstate. It is underscored by the tragic events the city of New York suffered in the wake of ConEd's power failure that night of July 13.

Although we do not yet know the full story of the ConEd-New Jersey Public Service Electric & Gas negotiations, what we do know certainly raises the question of whether or not the public interest in the adequacy and reliability of major bulk power interconnections can be left safely to the mercy of voluntary negotiations between individual utilities preoccupied primarily, if not solely, by their own self-interests.

It raises too, the question of whether the authority of the Department of Energy and the Federal Energy Regulatory Commission to deal with such problems, is explicit enough in the law to avoid prolonged litigation.

It may also raise the question of whether the Department itself has the institutional capability and the procedural framework to deal with these problems without excessive delay in view of their importance and urgency.

Mr. Chairman, until early this year I served as the chairman of a State Public Service Commission in the State of Wisconsin and I can attest from my own personal experience to the problems that are raised by all of the procedural impedimenta that regulatory commissions have to carry in dealing with questions of vital urgency of energy supply that are presented to them, and the regulatory delay and lag that is encountered in this field is a source of grave concern not only to the industry but also to the people who have the responsibility for regulating that industry.

I hope the subcommittee's action in convening these hearings on the New York blackout is an indication that it intends to deal with these questions and provide some constructive answers from the wealth of its wisdom and experience.

That concludes my prepared statement, Mr. Chairman.

Mr. DINGELL. Mr. Clapp, the Chair would like to thank you for a very helpful presentation. You have given us a very careful and well-thought-out statement.

The Chair observes that you have been of particular help, both you and your associates, in connection with the inquiries that have been made by the staff, and I would like to express to you our thanks at this time for that.

I would also like to assure you that it is not our intention to conduct these hearings simply for purposes of the pleasure of conducting hearings.We intend to try and see to it that the necessary and appropriate corrective measures are taken and that the problems which brought about this set of circumstances are redressed with some vigor and forthwith.

You could help the committee—and I don't ask you to do it now—if you would take a look at parts 541 through 545 of the House bill on this matter, copies of which will be made available to you by the staff.

We will shortly be going to conference on that and your comments as to the adequacy of this proposal to help redress some of the evils about which you have properly complained would be of immense value to us, because we are going to be discussing this with the Senate, which does not view this matter with the same enthusiasm that our committee does.

Mr. CLAPP. I would be very happy, Mr. Chairman, to respond to this request. If I may have the time to do it in writing, I would prefer that.

Mr. DINGELL. I think it would be unfair for you to do so now, except insofar as you might choose to do so. We will let you do it now, but I think you would be of more help to us if you give us your comments in writing.

[The following letter was received for the record:]

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October 20, 1977

The Hon. John D. Dingell, Chairman
Subcommittee on Energy and Power of the
Committee on Interstate and Foreign Commerce
Room 3204 House Office Building Annex 2
Washington, D. C. 20515

Dear Mr. Chairman:

When I appeared before your subcommittee on October 13, 1977, you requested that I furnish the subcommittee with comments on Sections 541 through 545 of H.R. 8444. My testimony was presented in my capacity as Special Consultant in Charge of the New York State investigation of the power failure in New York City on July 13, 1977. My comments, therefore, are offered in the context of that capacity. Because the investigation that I am conducting is not yet complete, I am not now in the position to provide comprehensive comments on these sections. I am prepared, however, to make the observations on Sections 541 and 545, set forth below:

1. Section 541(b)(2)(A) prohibits an interconnection, pooling or wheeling order unless the Commission finds that such order will benefit consumers by "reducing costs" of supplying energy or assuring electric supplies with "greater economy." While reduced costs or improved economy are important justification for such orders, my testimony focused on the different problem of the need for interconnection to maintain adequate standards of system reliability. There will, no doubt, be instances where interconnection for reliability purposes will be in the public interest despite the absence of cost savings. I suggest that the subparagraph 541(a)(2)(A) be modified by the insertion of the words "or reliability" after "greater economy" in order to give the Commission clear authority to deal with this situation.

2. The converse of the point made in the preceding paragraph is that interconnection which imposes no economic hardship, but which is detrimental to system reliability is not in the public interest. I recommend that the phrase "or deterioration of overall reliability of the interconnected systems" be inserted after "economic hardship" in Section 541(b)(2)(B).

3. Section 541(b)(2) also contains a requirement that a utility making application for interconnection or wheeling demonstrate that it is ready, willing, and able to provide reimbursement reasonably due for the costs

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(including capital or operating costs) incurred by the electric utility that is requested to make physical connection or to wheel energy. I assume that this requirement is not intended to undercut the Commission's authority to direct the apportionment of costs between the affected utilities (see Section 5#1(b)(5)). To make this point clear, I suggest that the words "its share of" be inserted after "reasonably due for" at line 5 of page 213 of the proposed bill.

4. Section 5#1(b)(3) provides for Commission orders directing electric utilities to increase the transmission capacity of bulk power transmission facilities. As in the case of interconnection, it appears that economic and reliability considerations should be weighed by the Commission before issuing an order directing an increase in transmission capacity. Yet, as presently drafted, 5#1(b)(3) contains no comparable provision to 5#1(b)(2) requiring consideration of these factors. I suggest adding "upon the findings specified in paragraph (2)," after "may" in the sixth line of Section 5#1(b)(3).

5. Section 5#1(b)(5) provides that the Commission may determine the apportionment of costs and the compensation or reimbursement reasonably due "if the parties fail to agree to such terms and conditions." In order to make it clear that the Commission's regulatory jurisdiction over the terms and conditions of interchange transactions is not defeated by agreement among the parties, I would suggest deletion of the conditional phrase quoted above.

6. In certain respects, the provisions of Section 5#1 go so far as to assert Federal jurisdiction over what would commonly be thought of as local distribution or retail sales. For example, Section 5#1(b)(1) authorizes the Commission to direct interconnection with a qualified cogeneration facility without specifying any minimum capacity for such facility, and Section 5#1(c) exempts action under Sections 202(b) and 205(k) from the provisions of Section 201(b) barring Federal jurisdiction over "facilities used in local distribution." Direct Federal responsibility for questions of distribution and retail sales at the local level raises in my mind substantial doubt about the practical feasibility of efficiently and fairly resolving these local questions through Federal administrative machinery. Absent some compelling showing of a need for Federal control, it would, in my view, be unwise to endanger the administrative effectiveness of the Commission by expanding its regulatory scope beyond the critical area of bulk power supply between electric utilities. I therefore recommend the addition of a statutory minimum capacity for a qualifying cogeneration facility and conforming revision of Section 5#1(c).

7. Sections 5#1 and 5#5 require that Commission orders be preceded by an evidentiary hearing. While this traditional and salutary requirement will be appropriate in many instances, evidentiary hearings are a wasteful and unnecessary burden in instances where disputes can be resolved through conciliation or where genuine issues of fact do not need to be resolved. Rather than an absolute evidentiary hearing requirement, I suggest that

the three-step procedure of 1) an informal conference and staff investigation with the utilities, pursuant to a Commission order of investigation, looking to voluntary agreement on terms satisfactory to the Commission; 2) in the event such voluntary agreement is not reached, a Commission order to show cause why specified action should not be directed upon the staff findings recited in such order; and 3) an evidentiary hearing in the event an affected utility or interested party takes a material exception to the staff findings recited in the order to show cause, and the Commission determines that an evidentiary hearing is required to resolve genuine questions of fact put in issue by such exception.

8. Section 545(a) provides for the promulgation by the Commission of "rules respecting electric utility reliability." For the reasons set forth in paragraph 6 above, I do not believe that a case has been made for primary Federal jurisdiction over all aspects of electric utility reliability including, for example, the reliability of local distribution networks. I therefore urge that the conferees substitute "rules respecting the reliability of bulk power transmission systems and pooling or wheeling arrangements" for the language quoted above.

9. Section 545 appears to contemplate that the reliability rules to be promulgated by the Commission will have the effect of preempting state jurisdiction over reliability. While Section 545(d) authorizes the Commission to delegate certain limited implementation authority to any state, the legislation does not protect the power of a State to impose more stringent reliability criteria where this course is believed to be required by local conditions. To preserve state authority in this area of vital state concern, the following sentence should be added to the end of Section 545 (d): "Any state regulatory authority may, to the extent provided by state law, promulgate and enforce rules respecting electric utility reliability which do not impair authority actually exercised by the Commission under this Section."

Thank you for affording me an opportunity to comment on this proposed legislation. As I testified before your Subcommittee, the failure of the Con Ed system on July 13 and 14, 1977, is, to my mind, strong evidence of the need for Federal legislative action in the areas covered by these comments.

Very truly yours,

Norman M. Clapp

Mr. DINGELL. The Chair recognizes Mr. Kitzmiller.

Mr. KITZMILLER. Thank you very much, Mr. Clapp.

I also want to thank you for all the help you have given us. We would be absolutely nowhere in our investigation without the cooperation you and others have given us.

I would like to go back to the problem of getting interconnections that are necessary established.

In your view, an extended interconnection with the PJM is, if not vital, at least terribly important to the Con Ed system?

Mr. CLAPP. Indeed it is.

Mr. KITZMILLER. Would your view change if you knew that there was another interconnection coming down from the north along that same northern corridor?

Mr. CLAPP. Very frankly, the point I made in my statement that ConEd is placing much of its reliance upon those northern interconnections is one of major concern to me. Those interconnections are geographically vulnerable as well as electrically vulnerable.

Mr. KITZMILLER. So in effect the location of an intertie is almost as important, or in some cases as important, as the existence of the intertie?

Mr. CLAPP. Indeed if a storm strikes where you have all of your key interconnections, you wish you had one off at the edge where the storm doesn't strike.

Mr. KITZMILLER. Let me then move to another area. You said that Con Edison had indicated that it didn't want to go to the FPC to ask for help in the Linden-Goethals tie because it was afraid of the delay that would be encountered in litigation, first in the process before FPC and then the delay that might result in litigation if that decision was contested. We have had a lot of experience with delays in actions before the FPC, so that is an understandable fear.

On the other hand, we have another question which raises an issue of delay, the institutional delay of the utility industry itself, and that seems to me to be the phase angle regulator. We just received from the FPC, much too soon to give it to you, a chronological history of the phase angle regulatory problem at Hudson-Farragut, so I am not going to ask you to comment specifically on that; but do you know of any reason that it should take over 1 year to replace a phase angle regulator? Are you looking into that?

Mr. CLAPP. We are looking into that and we have in fact asked that question of Con Edison officials. I think I should let them speak for themselves. They have told us that they had proceeded and were proceeding as rapidly as they could to get a new regulator put in, rather than repairing the one that they had there before which had had previous trouble.

Mr. KITZMILLER. The phase angle regulator had failed four times before, the particular phase angle regulator that we are talking about now, and as I remember the testimony before your commission it was indicated that such repeated failure is highly unusual.

Mr. CLAPP. It is certainly very unfortunate and it is hardly satisfactory.

Mr. KITZMILLER. But each time it failed before ConEd repaired it and put it back on line?

Mr. CLAPP. Yes.

Mr. KITZMILLER. Do you know how long that took? Do you have any idea?

Mr. CLAPP. I don't have that information with me, and I don't recall exactly.

Mr. KITZMILLER. The reason that I am asking is, it is my understanding that Con Edison has now ordered two phase angle regulators in order to have a spare phase angle regulator should this one malfunction.

Mr. CLAPP. That is correct.

Mr. KITZMILLER. Do you know why they decided not to fix this one again? Have they said why?

Mr. CLAPP. They testified before us that they felt that it was just a design that had proved itself unreliable, so they were seeking for a new design.

Mr. KITZMILLER. Have you inquired of them why they didn't repair this one so they would have a working station while they ordered another one, which would seem to me to leave them with the option of a new one in place and a repaired one for backup. Have you asked them that?

Mr. CLAPP. I believe that question was not asked in just those words.

Mr. KITZMILLER. Will you be asking? What I am trying to get at is, is the regulatory delay any worse than the company delay?

Mr. CLAPP. Certainly the delay in getting the Hudson-Farragut back is a problem all around. As I recall the testimony of the company officials, they had tried to get this repaired—I forget the exact number—but you say four. That sounds about right; and that had not prevented the last fault, so the had decided to go to a new manufacturer and get a new design regulator.

As to what their answer would be to the question that you have just asked, I have no idea. I suppose they hesitated to throw good money after bad, but that would be a question that they would have to answer.

Mr. DINGELL. How were they throwing good money after bad in bringing this Hudson-Farragut tie into good working order?

Mr. CLAPP. Again, I shouldn't testify for the officials of the company, because they are able to speak for themselves and far better informed on their own thought processes than I am; but they did testify that they regarded the history of that particular regulator as completely unsatisfactory, and that was the reason that they had not tried to repair it again.

Mr. DINGELL. Can you give us any idea of how long the Hudson-Farragut tie was out of effective functioning?

Mr. CLAPP. I think it was out since September 1976.

Mr. DINGELL. September 4, 1976?

Mr. CLAPP. Yes.

Mr. DINGELL. Approximately 1 year prior to the time of the unfortunate events in question?

Mr. CLAPP. Yes, sir.

Mr. DINGELL. Did this have a significant effect on the reliability of the system?

Mr. CLAPP. It certainly had a critical effect on the reliability of the system on July 13. Up until that time it apparently caused them no serious problem.

Mr. DINGELL. It was unimportant as long as everything went well?

Mr. CLAPP. Exactly.

Mr. DINGELL. Is the particular scenario that occurred on the night of the big blackout the only scenario in which this particular tie would have any importance?

Mr. CLAPP. This is a technical question which I presume some systems engineer should answer, but generally speaking there are various combinations in which a given intertie can become a critical factor, so I would say the answer to your question is no, it is not the only conceivable combination of circumstances in which that intertie would be a critical factor.

Mr. DINGELL. It was an important source of electrical energy and part of the system which happened to have a shortage?

Mr. CLAPP. It has a transfer capability, normal rating, of 400 megawatts, which is a sizable piece of power.

Mr. DINGELL. Very good.

Mr. Kitzmiller?

Mr. KITZMILLER. In fact, illustrative of that point, it was critical just like over 2 weeks later when a similar event and, I understand, a more serious event, occurred which ConEd survived. In this latter case that same intertie played a role in creating a tense situation that would not have occurred otherwise?

Mr. CLAPP. Mr. Kitzmiller, before we leave this question, we have asked Con Edison for its files on the history of their attempts to get that intertie back into service, and the decision that relates to whether they repair the old regulator or get a new one. We have not had a chance to examine those files, but we have requested them of the Con Edison Company.

Mr. KITZMILLER. I appreciate that. I guess we probably should not belabor a decision which you don't have enough information to make, but we certainly would look forward to hearing from you at a subsequent date when you come back on this.

Let me go back then to the Linden-Goethals tie and I think to the related tie that is to come into Farragut from the north and west.

Con Edison says that it was afraid to go to the FPC because of the delay of litigation but ConEd wasn't the only person who could have gone to the FPC to ask that that be resolved.

As I read the law—I don't have it here in front of me—the Public Service Commission also has standing to go into the FPC to ask for action. I guess you are in a delicate position regarding the Public Service Commission?

Mr. CLAPP. No, not really. My responsibility is to the Governor and I am free to examine the Public Service Commission's actions just as well as the company's actions.

Mr. KITZMILLER. Then let me ask you, do you have any idea why the Public Service Commission failed to take this action? And if you don't have any idea, will that be a part of your inquiry?

Mr. CLAPP. I think definitely we will be inquiring as to that come November when we get into this grid problem.

Mr. DINGELL. When you get the answer to that question, I think we would like to have it from you, and if our staff could remain in

contact with you so we could get that information, I think it would be of value to us here.

Mr. CLAPP. We certainly would be happy to share any of our records, Mr. Chairman, that would be helpful to you.

Mr. DINGELL. I want the record to show you have been enormously helpful and kind already, and we are grateful.

Mr. CLAPP. Thank you, sir.

Mr. KITZMILLER. One other question. Do you know of any instance in which a private utility as against a municipal or cooperative has used this particular section 202(b) of the Federal Power Act? We will ask the FPC about that.

Mr. CLAPP. I recall many instances in which the availability of interconnections was a problem, but I don't recall any that qualifies under your question.

Mr. KITZMILLER. Do you know of any case in which a public service commission has ever implemented, used, that particular section of the act?

Mr. CLAPP. I don't believe I can cite any.

Mr. KITZMILLER. So that in effect in terms of addressing the problem that is of concern to us here today, the problem of assuring adequate interconnections and resolving disputes where the industry, voluntarily or not, is not able to, that section 202(b) has been pretty much of a bust. It just hasn't produced what it had to produce?

Mr. CLAPP. I think that is a fair assesment of it.

Mr. KITZMILLER. I would like to turn now to what is really going to be the last of the things in this area. I am very much interested in the role of the power pool. We will have an explanation later from the power pool itself of their operations, but because of some scheduling problems this morning witnesses have been reversed, so I am going to take this quesion a little out of order, if you will bear with me.

What role does the power pool play in helping to assure interconnections between States? Are you aware of any active role that it plays?

Mr. CLAPP. I am sure that the power pools play a role in the reliability councils and reliability councils do cover more than one State in terms of fanning and coordinating, to use the official language. Here, of course, we have a situation in which there is a seam between reliability councils as well as a seam between power pools and also a seam between States, which complicates the coordinating problem a good deal.

But in answer to your question, I think it would probably be described as a voluntary planning process in which the needs of the respective pools are considered and some conclusions are reached as to what sort of interconnections would be desirable. Then I guess it would be up to the individual companies to bring that to pass.

Mr. DINGELL. To try and summarize what you have said, membership in power pools is voluntary; is that correct?

Mr. CLAPP. It is a contractual relationship.

Mr. DINGELL. That is right, and it is not enforced or supervised by any Government agency?

Mr. CLAPP. I think—at least I have always considered when I was on a State commission—that the jurisdiction of a State commission over the utilities within its jurisdiction could be stretched to cover its contractual relationships with other utilities affecting the reliability of service.

Mr. DINGELL. I would hope so, but I must confess in the case of ConEd we have some small curiosity. To go further, membership in the power pools is not enforced by any State or Federal agency, is it?

Mr. CLAPP. Not to my knowledge.

Mr. DINGELL. And the content of the agreements among the participating members of the several power pools is not subject either to review or taxation or mandate by any State or Federal agency, is it?

Mr. CLAPP. So far as the State agency is concerned, again I say I think the State agency has to reach the contents of any such agreement through its jurisdiction over the contracting utility and I think if a jurisdictional utility were to make an agreement with another utility as a part of a pool arrangement that the State commission felt would jeopardize the reliability and otherwise its functioning in the public interest, that it would have some recourse against that kind of a contractual relationship.

Mr. DINGELL. Are you aware of any instance where that recourse has been exercised?

Mr. CLAPP. I don't recall offhand, but I would think that even if it hadn't been exercised that it would be something that the individual utility would be very much aware of and would certainly have a precautionary effect.

Mr. DINGELL. But in terms of affirmative action to require either joining of a particular utility or the establishment of the necessary terms to assure reliability within those pools, I believe you are unaware of any action by a State agency or a Federal agency to take the necessary steps to assure that result?

Mr. CLAPP. Mr. Chairman, I hesitate to answer that categorically, but it is my impression that there have been instances in which the Federal Power Commission has ordered interconnection.

Mr. DINGELL. If any come to mind and you would like to suggest them to us, we would find it useful for the record.

Mr. CLAPP. One that comes to mind which I am not sure of but I think might bear investigating is the Gainsville case.

Mr. DINGELL. I have to go and vote. I am going to ask my good friend, Mr. Ottinger, to preside.

Mr. KITZMILLER. I think we are coming to the end of this line of inquiry but I want to pursue this just a little further.

Are you aware of the agreement between the PJM system and the New York Power Pool system, I think, modified as of June 17, 1974?

I will tell you what it is. It is this most recent agreement governing the interchange of power.

In 1974, would you have described the Goethals interconnection or in fact any other interconnection with PJM, new interconnection, as being important to the ConEd Co?

Mr. CLAPP. Based upon my evaluation of the situation today, I would say that 3 years ago it couldn't have been much different.

Mr. KITZMILLER. I thought that would be the answer.

The reason I raised that is that I noticed that in the covering letter filing the contract, filing the agreement with the Federal Power Commission, the pool agrees "No new facilities will be installed or modified in connection with instituting this agreement." In other words, it seems to me you have the pool not taking any kind of an aggressive action would help to develop this interconnection, but in fact acquiescing to the potentially unresolvable situation between the companies that are members of the two pools.

Mr. CLAPP. Yes; I would read that language as indicating that this is up to the companies involved.

Mr. KITZMILLER. Pursuing this now to the end, it would seem that in terms of interties, interconnections between systems, the power pools play no positive role. The State commissions have not chosen to utilize existing legal mechanisms under the Federal Power Act, and the power companies for their own reasons have not.

Mr. CLAPP. I think your description is accurate so far as this particular situation is concerned. I would have some hesitancy in extending that to all power pools. I think there is some variety of behavior among power pools and some of the power pools may be more active and aggressive in terms of developing interconnections than others.

Mr. KITZMILLER. One final thing. The Federal Power Commission submitted to the chairman of the committee late yesterday afternoon a list of all of the recommendations that were made after the 1965 blackout with a brief explanation of the extent to which they have been complied with.

Would you be willing to review those recommendations, and comment on the extent to which your commission finds that they have been complied with, at such time as your record is sufficient to support that?

Mr. CLAPP. We would be happy to. My only hesitancy in responding at this particular time is that these involve technical questions, some of which we have gone into, some of which we still are going to go into, and until our report is put together, I think it would be premature for me to render any judgment in response to those questions.

Mr. KITZMILLER. That is all that I have.

Mr. OTTINGER [presiding]. I would like, at the outset, to thank our committee chairman in absentia for having these hearings. I think they are very important, not only to our area, but also to the country and the overall arrangements that are made to assure reliability of power anyplace.

You conclude in your statement, Mr. Clapp, on page 8:

> Although we do not yet know the full story of the ConEd-New Jersey Public Service Electric & Gas negotiations, what we do know certainly raises the question of whether or not the public interest in the adequacy and reliability of major bulk power interconnections can be left safely to the mercy of the voluntary negotiations between individual utilities preoccupied primarily, if not solely, by our own self interests.

I assume that indicates, along with your next question, which raises too, the question of whether the power of the Federal Power

Commission, now the Federal Energy Regulatory Commission, can deal with this sufficiently in the law.

You think there ought to be additional legal authorities as to connections at least between States.

Mr. CLAPP. I certainly do. I think there needs to be a mechanism by which situations of this kind can be addressed firmly and quickly and effectively. I think it is not entirely to be left to the Federal authority, but State authorities have definite limitations upon them, which means that someone has to step in and back up the line.

Mr. OTTINGER. Do you want to follow that up?

Mr. KITZMILLER. May I, just a second?

That raises another question. The legislation that is proposed now by the House would give the Federal Power Commission authority to require the establishment of power pools, regional pools. I presume that interconnection cannot be really effective without the creation of power pools to manage the interconnections. That, therefore, would seem to me to lead to the next observation, that power pools themselves will be regulated if the FPC requires their regulation. In your view, is that a desirable feature?

Mr. CLAPP. Oh, yes.

Mr. KITZMILLER. Do you feel that it is not possible in many cases for the State regulatory agencies to regulate power pools, even if they wanted to, even if they had the authority? It would be extremely difficult for a three-State power pool to be regulated by anyone.

Mr. CLAPP. It would be——

Mr. KITZMILLER. An impossibility.

Mr. CLAPP [continuing]. A jigsaw puzzle.

Mr. KITZMILLER. Thank you.

Mr. OTTINGER. I was a little concerned by the ad lib at the end of your statement that isn't contained in your written statement, and that is your expression of concern about new power supply, the length of the regulatory process in permitting new supplies to go on the line, and whereas that may be a concern in the abstract, I would like to establish very clearly that it didn't affect the current situation with respect to the ConEd blackout.

I would like to get on the record, if I could, the situation as it did occur on July 13.

Do you have, are you able to give us here now, or would you want to supply the amount of power which would have been available to the ConEd system had the interconnections been adequate?

Mr. CLAPP. If the Hudson-Farragut tie had been in service, that has a normal transfer capacity of 400 megawatts, and if the Linden-Goethals tie were operating at 345, it would have had a similar capacity. That, I think would have made all the difference in the world in the final minutes of that hour on July 13.

Mr. OTTINGER. What in fact was the supply and demand situation on the ConEd system, and the shortage before the lightning struck?

Mr. CLAPP. I can't give you those figures from memory. Of course ConEd attempted to bring on some reserve generation beginning about 8:45. The response was slow. They did not get it all up to the standards that their reserve ratings, 10-minute reserve capability

and 30-minute reserve capability, had previously indicated would be possible.

The load on the system, as I indicated in my statement at the beginning of the hour, was I believe 5,800 megawatts. I think about 3,000 of that was being generated internally within the ConEd system.

I can't say—I would be glad to supply for the record—about what the load was. Before the final breakup, it was not a great deal less than that 5,800 megawatts at the outset. It runs in my mind it was 200 or 300 megawatts less.

Mr. OTTINGER. The thing I would like to establish, and I think if you supply the figures it will establish, there was no shortage of power, of production equipment in the ConEd system, and it was available to the ConEd system if the interties had been adequate, probably even if the interties hadn't been adequate, if the reserve generation had been available, and if the gas turbines had in fact been manned. It could have come in and the ConEd system could have been saved with that alone.

Whatever the problems nationwide with supply of power, what it may or may not be, that wasn't the problem here on the night of July 13. Do you agree to that?

Mr. CLAPP. You start out by saying you want to make clear that it was not regulatory lag that was at fault in the inadequacy——

Mr. OTTINGER. With respect to the supply of power.

Mr. CLAPP. In the final breakdown of the system, and I agree that it was not regulatory action that limited either the Linden-Goethals tie or put the Hudson-Farragut tie out of service.

As to whether those ties are important in the reliability of the system, I would certainly say that they are not only important, they are critically important. They are essential, and that they should have greater capacity than they have.

Now you mentioned the fact that possibly the ties would have been adequate if the generation had come on line sooner than it did, or more fully than it did, and as I said, the adequacy of the ties would have been a moot question in this instance if a number of things had happened that didn't happen. And one of the problems was the delay and failure of bringing this reserve on fast enough and to the full extent that it was presumably available.

Mr. OTTINGER. The thing—I may have misunderstood you at the end of your statement—is that you expressed some concern about bringing on new generation plants in this whole regulatory process in approving new generation plants. There was no need for additional generation capacity.

Mr. CLAPP. My reference, of course, was directed toward the answer that the ConEd officials gave to us as to why they had not invoked assistance from the Federal Power Commission, and it relates in this instance strictly to transmission interconnection, not to additional generation. But I do think that this uneasiness about the length of time that it takes to get regulatory decisions is not just a feeling of this particular utility. I sense it all through the country.

Mr. KITZMILLER. There was another interconnection that played a very important role in the events that evening, and that was the Jamaica intertie. It invokes a very peculiar story. Do you happen

to know why the power pool thought that it went earlier than it did?

In the transcript it is quite clear that Mr. Kennedy is under the impression that the Jamaica intertie was out at about 8:58—8:57 or 8:58—when in fact it didn't go out until 9:19. Do you know why he thought that?

Mr. CLAPP. My recollection of the facts is that this was a point when the flow was reversing, and the gage hit zero on the reversal, and he read that and he thought the tie had opened.

Mr. KITZMILLER. So in fact he made the same mistake in regard to Jamaica that the ConEd system operator made in regard to 93.

Mr. CLAPP. It was a misreading of the situation.

Mr. KITZMILLER. Misreading the dial, but I really wasn't addressing that. It was just an interesting point.

What troubles me is that there appear to be very serious problems with the interconnection between Norwalk and Northport. Under whose regulatory authority was that line built?

Mr. CLAPP. I can't answer that question.

Mr. KITZMILLER. The reason I asked is that it is apparent, as the system is going down, that both the pool operator and the Lilco system operator are vastly more concerned with preserving the Norwalk-Northport intertie than they are with the ConEd intertie, to the extent that they didn't even tell the ConEd operator they were going to cut it out. He found it out when the power stopped flowing, and this is an interstate connection. It is a connection that seems to fall somehow between the cracks, and I wondered who was responsible for approving the design that had it lie across a barge, that had it dragged over by a 9-ton anchor. There would seem to me to be elements that we ought to have some review somewhere when a line is put in and when a line is repaired

Mr. CLAPP. The recounting of the difficulties that had been experienced in putting that line back into service is just a tale of horrors. I can't say. I would imagine that both the Connecticut and the New York Commissions had jurisdiction over pieces of that line. So there was probably double jurisdiction so far as the States are concerned.

As to the construction problems and maintenance problems under the water, I would guess that this is an area where there is probably no effective regulatory oversight.

Mr. KITZMILLER. Under the proposed legislation that is now before the House, now before the Senate from the House, there would be such jurisdiction. It would be vested in the Federal Regulatory Commission.

I want to thank you very much from my point of view. I am sorry to have kept you so long. I appreciate your help to the staff. It has been just enormous.

Mr. CLAPP. I want to express my appreciation to the committee. We are happy to cooperate with this committee in every way that we can, and we appreciate the cooperation we have had from the committee and its staff.

Mr. OTTINGER. I want to thank you very much for being here with us, and I trust that you will supply the committee with any further findings as you make them so that we may have the

benefit of any additional information that you may discover in the course of your investigation.

Mr. CLAPP. I would say in response, we certainly would be happy to do that, Mr. Ottinger. As a means of seeing that that gets done, I would suggest that the staff keep in touch with us, and as our record unfolds, if there is anything in it that they feel would be of interest and of help to this committee, that they simply make the request and we will be happy to respond.

Mr. KITZMILLER. Mr. Chairman, I would like to make one other observation.

We are indebted to the commission for the visual display here, which is the only diagram we have of what actually happened.

Mr. OTTINGER. It is almost as easy to read as what the system operator has to deal with when he is trying to figure out what is happening. We went down to the ConEd board room, and it is just a Rube Goldberg operation. I trust that is one of the things which might not be within the Federal jurisdiction is something the State will take a look into, because that has got to be a very difficult situation for a system operator in any kind of an emergency to be able to tell what really is going on, even with the corrections that have been made since the blackout.

Mr. CLAPP. We have been giving a good deal of attention to this, Mr. Ottinger, and a number of recommendations have been made by a number of interested agencies.

Mr. OTTINGER. ConEd had a study made in 1973, which we have not been able to get hold of. I believe it was done by Boeing.

Have you been able to get your hands on that?

Mr. CLAPP. Is this the management audit?

Mr. KITZMILLER. No, this was specifically a study of the control center, which was made available to Arthur Little as a part of their management study in 1975, I think, and apparently from what we have heard, it recognized many of the weaknesses of the ConEd control center, and made very strong recommendations regarding it, and we are trying to get a copy of it, to see how strong and what they were, and to what extent they were implemented.

Mr. CLAPP. That is one of the documents we requested.

Mr. KITZMILLER. You haven't gotten it yet? Let us know.

Mr. CLAPP. The deadline hasn't arrived.

Mr. OTTINGER. We are quite anxious to see that. We had rather hoped that ConEd would supply that to us voluntarily. I assume the chairman, if it is not supplied voluntarily, will take action to get it. It would be easier and simpler if we could just have it supplied to the committee.

Thank you very much again.

Mr. CLAPP. Thank you.

Mr. OTTINGER. The committee will now hear from Mr. Ira M. Millstein, chairman of the special commission of inquiry into energy failures, I take it that is New York City, 2 Lafayette Street, New York, NY.

Mr. Millstein, it is very good to have you before us indeed. I know you have been conducting very exhaustive inquiries into this same matter and we are very pleased indeed that you could be with us this morning and we will be glad to hear from you.

You may read your statement in full or summarize from it as you prefer. The statement will appear in full in the record.

STATEMENT OF IRA M. MILLSTEIN, CHAIRMAN, SPECIAL COMMISSION OF INQUIRY INTO ENERGY FAILURES, NEW YORK, N.Y., ACCOMPANIED BY CAROLYN K. BRANCATO, PH. D., STAFF DIRECTOR

Mr. MILLSTEIN. I appreciate the opportunity of being here.

Rather than reading my statement in full, I would like to submit it for the record, and I would like to use whatever time we have available, to summarize where we are in the hearings.

I think, based on what I heard of the questioning this morning, we have a number of answers for you, if you care to pursue them. And in addition to that, I think we are in the middle of our hearings, and I didn't have a chance to bring up to date what happened yesterday in our hearings. I think that too is relevant.

I am accompanied today by Dr. Carolyn Brancato, who is the staff director of our commission, and is extremely knowledgeable, based on years and years of experience in the utility and energy field. I am sure whatever I can't answer, Dr. Brancato can.

Mr. OTTINGER. We are pleased to have Dr. Brancato with us as well.

Mr. MILLSTEIN. As you know, our commission was formed, almost immediately after the blackout, by the mayor and city council, and our charge was a dual one. It was not only to find out what ConEd did or didn't do during the course of the evening of July 13, but it was to pursue the question of the regulators, to what extent did the Federal Power Commission and the Public Service Commission have any responsibilities in the area, and to what extent were those responsibilities discharged.

We have been collecting a massive amount of information, and we decided to have our first public hearing late in August. That public hearing concerned the night of July 13. At that public hearing, we developed a record of the events which were highly publicized, and that transcript we have made available to your staff. I hope it becomes part of this record. I think it will demonstrate a good deal of information concerning the night of July 13.

I would like to talk about that night a little bit in context with the regulators, which to us bears heavily on the question of reliability and what the Federal Power Commission had to do with all of that.

As you recall, at those hearings we demonstrated quite clearly that the system operator didn't perform as effectively as he might have. I want to make it very clear that at no time were we interested in looking for or finding scapegoats for those events. We are simply trying to find out what the facts are; what the management had to do with it; and the regulators had to do with it. The system operator did not function very well that night and did not promptly shed load. You all know the story of the New York Power Pool heatedly insisting that load be shed; it wasn't shed and we explored the reasons.

The principal thing we found out about the system operator, however, was that he hadn't been trained, and this concerned us a good deal.

Yesterday at our hearing, our general counsel prepared a searching analysis of the reports by the Federal Power Commission in 1965 and 1967. I would like to hand it up to you and make it part of this record.

Mr. DINGELL. I think it would be most useful, and without objections, we will insert it in the record. I think it is most helpful.

Mr. MILLSTEIN. With respect to the training of the control center personnel, I would direct your attention to the very first page of this study. This exhibit demonstrates what the Federal Power Commission recommended in 1965 and 1967.

Mr. OTTINGER. Do you have an extra copy?

Mr. MILLSTEIN. There are lots of them.

Mr. DINGELL. While we address ourselves to that, I think that the transcript that you have offered for the purposes of the record would be most valuable.

Without objection, it will appear in the record at the appropriate point, and we thank you for that cooperation.

Mr. MILLSTEIN. Thank you, Mr. Chairman.

If you take a look at the very first page of this exhibit you will find a statement by the Federal Power Commission in December 1965 and again in July 1967 commenting upon and making a recommendation concerning the training of system personnel, and as you will see, they said: "Thorough programs and schedules for operator training and retraining should be vigorously administered."

That was in 1965 and 1967.

Now take a look at what the Public Service Commission says in 1977, which is right on top of it. It says "ConEd should institute a formal training program for system operators." This is 12 years later.

Mr. DINGELL. And it had not been done in the interim period?

Mr. MILLSTEIN. No.

Now look at what the Federal Power Commission says in August 1977 after studying the blackout: "It is essential that all utilities upgrade their training programs for operating personnel."

And look at what ConEd says in August 1977, right at the bottom of the page when it starts talking about itself: "Expand the training of system operators," and so on.

Mr. DINGELL. Religion came late in that instance, did it not?

Mr. MILLSTEIN. It came late. And the question I have is: Where was the Federal Power Commission, and where was the Public Service Commission for the 12 years intervening between the blackout of 1965 and the blackout of 1977?

This is not an esoteric question, because to us in New York it was the key. Had that operator been trained in shedding load, we would not have had a total system collapse. That apparently was demonstrated a couple of weeks ago.

Mr. DINGELL. Isn't that subject to a couple of other caveats, provided that, A, he had had the training; B, he had had the authority; C, he had had the equipment; and, D, he had had other equipment which made the equipment that he was immediately relying upon work to carry out the necessary changes in systems structure?

Mr. MILLSTEIN. There is a lot of truth to that, Mr. Chairman. I am emphasizing here only one point. I can emphasize every other point that you made as being part of the recommendations which the Federal Power Commission made in 1965.

Mr. DINGELL. All of these were points made in 1965.

Mr. MILLSTEIN. Yes.

Mr. MURPHY. Mr. Chairman, would you yield at this point?

Mr. DINGELL. I don't have the floor, but I will yield briefly.

Mr. MURPHY. Here we have a public service commission, the Federal Power Commission, Federal Power Commission, and ConEd all pointing fingers at each other. We are going back to 1965 when this committee had some strong recommendations on interconnections and interties, and then we are supposed to train certain people in certain areas. I don't think we can put our finger on ConEd alone, because at the time of this blackout, I think about 38 percent of ConEd's system was spinning at the time, and that the power moving through and in New York City was not in the hands of ConEd. It is in the hands of the central power dispatcher that is purchasing power theoretically from the most efficient costwise source that feeds that area.

Here we are only spinning 38 percent. We don't have the reserve spinning or operating in case of a blackout, and from our investigations of this committee, you can train people to shed power from now until doomsday, but unless the instrumentation that sheds it is properly operating, and is properly being utilized, not just by ConEd, but by people in this entire system, I think we had better start drawing together what the problem is and not pointing a finger at ConEd. I don't absolve them.

Mr. DINGELL. The Chair thanks the gentleman.

We are not pointing a finger at anybody. We are just trying to find out what happened, and we intend to go into the whole of this matter fairly, find out where the facts lie, and whether new legislation is needed, whether the energy legislation passed by the House recently is a vehicle to accomplish our end, or whether there need to be changes made in conference, or whether we need to make changes elsewhere at a time later to see to it that these things go on.

Mr. MURPHY. I recommended changes to the gentleman during those hearings which were rejected.

Mr. DINGELL. I will be delighted to receive the gentleman's recommendations at any time as he well knows and I reserve to myself the right to accept or reject and I am sure the gentleman understands the committee is a strong-willed group of men who reject recommendations even of its chairman, despite their great worth.

I don't think that the gentleman can anticipate that the regulators who appear before us are always right either.

We thank the gentleman.

Mr. Millstein, if you will go forward, we would appreciate it.

Mr. MILLSTEIN. I certainly don't want to be construed as pointing the finger at anybody.

But I think it is very important for the committee, Mr. Congressman, to try to take this problem in pieces, because if you try to deal with it all at once, it gets confused. The principal thing I have

learned since I began these investigations is that I had better deal with one problem at a time or I am not going to understand any of it.

My own efforts have been to try to take the things that happened on the night of July 13 individually and see whether anybody ever said anything about them.

The first thing I pointed to was the question of training people in the control room. Nothing was exclusively the cause of what happened, and heaven only knows, plenty of other utilities make the same mistakes, but we have to try to focus on one problem at a time.

Now in the area of training people in the control room, my point was that the Federal Power Commission recommended in 1965 that they be trained. They were not. And now it is 1977, and the Federal Power Commission is again recommending that people be trained. My question is: Is that enough? Don't we want to back up the jawboning a little bit with something that could compel training if a utility doesn't do it voluntarily, because the public service commission, State of New York, didn't do anything either.

I just point this out.

Next step, the control center with which you are all familiar. It was not a clearly displayed control center. I haven't seen anybody else's so I can only talk about ConEd. But in 1965 the Federal Power Commission wrote a paragraph or two of recommendations saying clear up the control center. It is a peculiar place, and it has got to be cleared up.

In 1977 the Public Service Commission comes forward and says this control center has got to be cleared up. It is confusing.

My question is this: Where were the two regulatory agencies that were supposed to see that this got done? There is no mystery about it. Everybody seems to concede that the man wasn't properly trained, and the control center wasn't properly displayed.

Now we have two regulators, not one. One claims that it doesn't have the power to do anything about it. That is the FPC, and that is why nothing happened for 12 years; and then we will have the Public Service Commission before us tomorrow. We are going to ask them those very questions, namely, what happened to this recommendation, and what happened to the control reocmmendation?

This exhibit speaks for itself. It deals with almost every question that was involved in the failure: Improved performance of operating reserves; improved relay and switching equipment, et cetera. Recommendations were made but not followed.

You have all heard about circuit breakers that didn't close and so on. Again our question was: Where were the regulators during that period of time?

SYSTEM CONTINGENCY PLANNING

Recommendations were made, and again the Public Service Commission speaks in 1977 as if it had never heard of the earlier recommendations. Where were they during this entire period of time?

You can go on.

Lightning protection, the original cause of the blackout according to ConEd. Recommendations made by the FPC in 1965 and 1967 about added protection. Again the Public Service Commission in 1977 saying it should analyze performance of the overhead transmission lines.

Load shedding, the very event that occurred that night or didn't occur that night—again in 1965 and 1967 definite recommendations as to what was to be done on load shedding, and again in 1977, an indication by the Public Service Commission that they didn't hear the first one.

I think the point is made, and I think you will find this exhibit extremely useful in considering what you really haven't asked me to talk about today, about the reliability provision, 545.

Mr. DINGELL. Excuse me. You are also suggesting, though, that we inquire of the two regulatory bodies in question what they have done.

Mr. MILLSTEIN. Yes, sir.

Mr. DINGELL. You are going to be making that inquiry, and we will try to make a like inquiry at the appropriate time to find out what they have done.

Just for the benefit of my good friend from New York, we intend to inquire of everybody until we find out what the facts are. I want him to do that. We are not going to be lighthanded in dealing with the New York State Regulatory Board or——

Mr. OTTINGER. Or the Consolidated Edison Co. I don't think you have to absolve them of failure to appease my friend from New York. Where blame belongs to them, it seems to me, they have got to shoulder that as well.

Mr. MILLSTEIN. Of course. In my own view, in running this investigation, I am interested in all three, because together they make up the unit that supplies the consumers of the State of New York with their power.

Mr. OTTINGER. There is another concern, if I may, and that is the power pool, and the powers which it may or may not have, and the actions that it took or failed to take.

Mr. DINGELL. Mr. Ottinger makes a good point and that is one of our concerns too. That is, what can the power pool do and what does it in fact do and what authorities does it have, what authorities does it exercise and how?

Mr. MILLSTEIN. I think these are all terribly relevant and, if my experience is any guide, the way to do it is a little bit at a time. Study each piece or you won't get it done. As far as I am concerned, it is a marvelous summary of the first series of hearings that we had, because each of the points in there is a point that was involved in the blackout. Each of the points was discussed somehow by the Federal Power Commission in 1965. My answer yesterday from the Federal people I think was interesting. I had the former General Counsel, Mr. Journey, of the Federal Power Commission, and Mr. Curtis, kindly come up and testify and help us. Both agreed that the Federal Power Commission did not have the authority to carry through on the 1965 and 1967 recommendations, and that was it in a nutshell.

Sections 202(a), 202(b), and 207 were inadequate for those purposes, and they both, I believe, referred to the Federal authority's

ability as "jawboning," but not backed up a whole lot in the area of reliability.

The second part of the hearing was devoted to restoration, to the question of once the system went down, why didn't it come back? What took so long to come back?

Obviously we couldn't spend a good deal of time on every single event that occurred.

We had some lovely charts with explosions on them, and so on, and I won't bore you with the details, because there was one thing that did happen in attempting restoration, which again comes back to the point in which I am primarily interested, namely, the regulators, and where were they?

That has to do with the fact that one needs to pump oil into cables in order to have electricity to flow in those cables when they go underground, and of course most of the New York City system is underground. When it hits Yonkers and comes south, it goes underground promptly for a whole variety of reasons, and I don't question the wisdom of that at all.

However, once it goes underground, those pipes have to be cooled with oil, and there must be pumps to put oil through those pipes. Now unfortunately, when the system went down, it was discovered that the pumps, to pump the oil to get those cables cooled, were hooked up to the system. When the system was down, the pumps wouldn't run. And one of the principal problems that the ConEd people had was taking portable equipment around from point to point to get the pumps going so that the oil would flow so that they could get reenergized. And to us it was amazing that these auxiliary, these inexpensive auxiliary pumps, were not powered by anything which was outside the system, but were powered by electricity from inside the system. So if you couldn't energize the system, you couldn't energize the pumps, and it was sort of like a self-defeating mechanism. It just wouldn't go.

Mr. KITZMILLER. Mr. Millstein, may I ask one question there?

Mr. MILLSTEIN. Surely.

Mr. KITZMILLER. This was one single isolated occurrence of something they hadn't thought of. Are you familiar with any previous experience that Con Edison might have had with the same situation of having a vital oil system hooked up to its own system?

Mr. MILLSTEIN. Yes, that was on the generators. They learned that experience in 1965. You also need oil to go into the generators in order to get them going, and also to slow them down.

Now in 1965 they discovered that that too was hooked up to the system, and they promptly moved to put in auxiliary equipment for the generators so that with a slowdown, the auxiliary equipment goes on immediately and keeps the oil flowing in the generators. But they didn't do that in the pipes. It wasn't that experience which impressed us so much, because someone can fail to add one and one and come up with two. That is a human failing.

What did occur to us, however, was did the Federal Power Commission say anything in 1965 and 1967 about these oil systems? And, yes, they did. I quote from the report of the Federal Power Commission back in 1965:

> Individual systems have specific emergency power needs that may be peculiar to these systems, but which are just as important in providing for emergency situa-

tions. For example, the Commonwealth Edison Co. has provided small emergency generators to supply the cooling oil pumps required for circulation of oil in the underground pipe type cable system in Chicago.

When I asked the witness from ConEd yesterday whether he had ever seen this, he said no. I asked him whether he was aware of it. He said no. He was aware of other recommendations or observations, but not aware of what the Federal Power Commission said.

We wrote Commonwealth Edison and asked them about it and they said yes, this had been installed years ago. At today's prices, it is about $25,000 per unit installed. We thought they needed about 10 of them. ConEd has now put in 18 of them. It was a very modest investment, but both our expert and the expert from ConEd agreed that probably 5 hours could have been saved had these units been on line.

We did not get into the question of how much damage could have been avoided.I just don't know the answer to that. Anybody in New York who lived through that day knew that those hours, each one was precious.

As the day moved on and there was uncertainty about what to do the following night, and discussion led to the National Guard, et cetera, you knew that if at 9 or 10 in the morning we had the power on rather than 5 the next afternoon, it might have made a significant difference.

In any event, they all agreed that had these pumps been hooked up to auxiliary units, as the Federal Power Commission suggested they should in 1965, we would have saved at least 5 hours. That is a conservative estimate.

Now again it is a little thing, but it is an important point in the whole restoration process and the one we focused on. My question is: If the Federal Power Commission knew that auxiliaries ought to be in existence, and ConEd didn't do it, why didn't the FPC say something to somebody? If the Public Service Commission was aware that these auxiliary units were significant, and the investment was minimal, why didn't the PSC do something? I mean $500,000, assuming that is what it is, is really not a whole lot in the life of Consolidated Edison, considering the public relations programs and ads they have.

My view is that I am as upset with the regulators as I am with anybody else. There was a 12-year interval when everybody knew about this.

I would say that the results of our hearings have placed whatever blame there should be quite equally on everybody—ConEd, its management, the Public Service Commission, the Federal Power Commission. This was an event which did not have to occur.

One other point, and then I will move on to the specific matters in which you are interested, and that is, make no mistake about it, we are not dreamers on our commission in New York. We do not say there is any such thing as a 100-percent service. Nobody can afford that. We are not urging the expenditure of billions of dollars to avoid any possibility of a blackout at any time. We are not, and nobody is silly enough to do that, nor do we believe that things will never break down. They always will. Things are always going to break down.

However, what we do believe is that with a little more care and foresight on the part of the regulators and the company, some events can be avoided. And when you learn about the July 13 blackout, you have got to conclude that it didn't have to happen. It didn't have to happen, and when 8 to 12 million people are inconvenienced, and that word is an obvious joke, an understatement, to the extent they were on the night of July 13 by things that didn't have to happen, then our commission, this committee, your committee, really have to dig in and find answers.

This event shouldn't happen again, and I don't yet know where the answer is. But when agencies who are dedicated to regulate utilities don't pay attention to reliability and don't pay attention to their own recommendations, and don't do anything about their own recommendations, then something is wrong with the system.

I would like to leave that aspect of reliability of section 545 in your hands. I just don't know enough about whether it is possible to have a section 545 without getting into the public-private power fight and into pooling and wheeling, all of which things I do not want to get into. But if there were a way to have a modest section 545, with some authority at the Federal level to back up the "jawboning," if necessary, my guess would be that it would never have to be used.

My guess would be that the utilities and State commissions would move, just because there was a Federal presence, but I repeat, I don't know enough about it. I don't know whether it is feasible, and I can't make a recommendation.

I point out to you only the history, and the history is that Federal recommendations standing by themselves were not observed.

Moving along on the question of interconnects, I really don't have a whole lot to add to what Commissioner Clapp spelled out. He quite carefully pointed out the interconnects that could have been or should be considered.

I would like to make a point, and that is, as I said in my statement, I don't have a good deal of faith in the current interconnect authority which the Federal Power Commission has. The reason being that I don't believe that a utility wants to come to the Federal Power Comission and ask for help in coercing another utility into an interconnect. That just sounds like something that isn't going to happen.

I don't have data. I don't have statistics. I don't have vignettes for you. All I know is that it hasn't happened. Utilities, private utilities, have not come to the Federal Power Commission and asked for coercive authority. I have got to believe that it just isn't what one would anticipate a private utility would do.

Also, as far as power commissions, utility commissions coming to the Federal Power Comission and asking for authority to interconnect, I don't have a lot of confidence in that happening, because again there is a "turf" question. Public utility commissions have their own jurisdiction in their States, and my belief is that if a public service commission in a State had to come to the Federal Government for help, it would be an admission of weakness. I don't think they are going to do it. You ought to know, too, that we mailed questionnaires to all the State utility commissions in the

United States, and 24 out of 25 responses so far have answered that they have never initiated such an FPC action.

Dr. Brancato tells me that the 25th was action on behalf of a municipal, not a private utility.

Mr. DINGELL. That is the *Otter Tail* case.

Mr. MILLSTEIN. So we just don't have either private utilties coming to the Federal Government or utility commissions coming to the Federal Government about private utility interconnects. It has not happened.

Our limited suggestion for added legislation would concern those cases where the pattern of cooperation between two private utilities does not resolve a particularly intractable dispute about an interstate connection impacting on system reliability. What our commission is concerned about is system reliability, and what we have focused upon is interconnects to assure system reliability.

Where two systems can't get together, that is where we think there ought to be a Federal presence. In those cases we don't believe the welfare of a service area should be left exclusively in the hands of voluntary application for Federal help by one utility or a State commission.

If a utility or a State commission for policy or political reasons doesn't want a Federal presence, this should not prejudice by delay of interstate connections the welfare of the service area. Therefore we think it is reasonable for a Federal agency to be given the ability to act on its own regarding interstate interconnects impacting on system reliability. There is such a potentially difficult situation developing which affects New York City, and that is, as Mr. Clapp pointed out this morning, the proposed 345 kV transmission line from Ramapo in Rockland County in New York to Hudson in New Jersey.

I have a very simplified map attached to my testimony which shows how a hookup from Ramapo down to Hudson could provide an alternative route south for energy from anywhere.

In other words, if Ramapo is hooked up to Hudson, we not only open up an alternative for the west, to PJM, but we open up an alternative route south from the north. If Millwood closes down again, and that entire track down from Millwood to Yonkers closes, there ought to be another way down to the city.

The Ramapo, the 345 kV line from Ramapo down the Hudson is an alternative, and it opens up alternate possibilities for reliability, north and west.

That line, as you were told, is under discussion between P.S.E. & G. and ConEd. What we learned in interviewing the parties involved is that the engineers for both decided early on in December 1975 that such a line was essential. They jointly recommended that work on the tie be initiated immediately in order that it be in service by 1980.

They were not only public service company engineers. Those are the engineers for both P.S.E. & G. and ConEd. They took a look at it and said, yes, that line should be in place by 1980.

ConEd would have needed this tie-in in 1980 in order to cover the contingency of loss of the Buchanan-Millwood right of way in terms of 1980 loads and inputs. The engineering recommendations for a Ramapo-Farragut line were required by the reliability criteria es-

tablished by the Northeast Power Coordinating Council, the voluntary regional council with oversight responsibility.

Mr. DINGELL. Which, by the way, has no power to enforce its recommendations.

Mr. MILLSTEIN. Precisely. But all I was saying is that all the working people, the knowledgeable working people, from the reliability council to the engineers for both companies said do it now, and start building.

Mr. OTTINGER. Is the Ramapo-Farragut line the same as what we have described as the Hudson-Farragut line?

Mr. MILLSTEIN. No, one goes across the Hudson. Look up on the map up there. You see Ramapo all the way to the left. Ramapo is off there all the way to the left. Drop a 345 kV line down to where that red area says Hudson. That is the 345 kV line we are talking about.

Mr. OTTINGER. If the Hudson-Farragut line had been in operation——

Mr. MILLSTEIN. That night?

Mr. OTTINGER. That night.

Mr. MILLSTEIN. The situation would have been very much improved.

Mr. OTTINGER. Or the Linden?

Mr. MILLSTEIN. Or the Linden tie, it would have been very much improved. You asked appropriate questions of Mr. Clapp, why wasn't it, and I have nothing much to add to that. What I am talking about is why we might need a Federal presence for that line. What happened was the managements and the lawyers took over from the engineers, and at that point negotiations began, and since December 1975, no agreement has been reached on that line. We understand that negotiations are proceeding. However, in talking to both groups, the finger is being pointed one to the other as to why progress isn't being made. There seems to be a question of who will benefit most from the proposed tie, and obviously who pays for it.

ConEd and P.S.E. & G. do not seem to be in agreement as to who pays for the tie. Now that argument could go on for a long time because it is going to cost $120 million.

Mr. OTTINGER. That is the same problem that is holding up the Hudson-Farragut and Linden-Goethals line.

Mr. MILLSTEIN. No; I think the other line is not a question of who pays for it.

Ms. BRANCATO. The Hudson-Farragut line is in place. There is one in place and one proposed. The one in place has been out of service since September 1976 due to a failure of the phase angle regulator.

Mr. OTTINGER. Right.

Ms. BRANCATO. And that was the 400 megawatt line that Mr. Clapp referred to. The second one is proposed in order to meet reliability criteria, and construction should have begun on that, but it has been delayed.

Mr. OTTINGER. The same kind of a failure in negotiations between the parties as I understand it.

Mr. KITZMILLER. I think I can clarify that. I think what you are referring to is the original proposal to upgrade the Linden-Goethals

line which is now apparently inactive as a result of the inability of the two parties to agree on the price, the same problem that now persists with the Ramapo-Farragut line. He is speaking of the Linden-Goethals originally proposed to upgraded some time around 1967, I think.

Ms. BRANCATO. Right.

Mr. KITZMILLER. And that went on just as your Ramapo-Farragut discussion has gone on.

Ms. BRANCATO. Yes.

Mr. KITZMILLER. And the fact is now, we were informed by one ConEd official, that the proposal is effectively dead because they didn't arrive at a decision, and because they had no way of having the Federal Government referee.

Mr. MILLSTEIN. That is where we are, and based on certainly the Ramapo situation, which we do know pretty well, we are concerned that, down the road if there isn't somebody around to push, we may never get that 345 kV line in. Therefore it is our view that the simple existence of a Federal power to initiate interconnects on its own will speed up voluntary negotiations between utilities on reliability interconnects.

It has been my experience in private practice as an antitrust lawyer that where there is a Federal presence that can do something, people move along a little better. I would suspect that if there were a Federal presence in the interconnect area, it would not have to be used a whole lot.

My feeling is, and it is only a feeling, that as a power, a residual power, it would lie there. I think the utilities would move along in reaching agreements where they had to, rather than submit themselves to these terribly long hearings, et cetera.

Mr. DINGELL. Sort of like a shotgun behind the door.

Mr. MILLSTEIN. It doesn't hurt when the Indians are around.

Mr. MURPHY. In 1965 PJM would provide 15 seconds of power to the New York grid, and then cut it loose. One of the recommendations of this committee in 1967 was to improve that situation, and obviously there has been no coordination between the two, but Mr. Millstein says you didn't need PJM and you didn't need Long Island Lighting because you had enough capacity in New York to handle its problem.

Now if we are only spinning 38 percent, why didn't more capacity be brought on line immediately?

Mr. MILLSTEIN. Congressman, if the committee wants the explanation, Dr. Brancato is going to be our first witness tomorrow, and while I hate to give away all the exciting testimony that she has, she is prepared to answer that question in some detail.

Mr. MURPHY. I think it is——

Mr. DINGELL. Why don't you comfort my good friend from New York, Mr. Murphy, by answering the question?

Ms. BRANCATO. I think there are two valid points to be made here.

One is that Con Edison clearly had sufficient capacity in isolation to meet the demand on the system. The load at the time was 5,868 megawatts, and the installed city capacity was close to 7,896 megawatts. So should Con Edison have been able to get on line 74 percent of the capacity that it had in the city, we would have been

fine. There would have been no blackout. That would have been all that was needed to sustain the system.

I think, however, the point is that the system should not be really looked at in isolation as such, because it is not economic to run many of these facilities in the city during offpeak periods, and you do expect a fair measure of coordination interstate in this case as well as from the north, to bring power in for economy reasons. So the fact that they had sufficient power to meet the demand was significant that they were not able to.

In that case then, you must rely on interconnections, and particularly in a geographically vulnerable spot, losing the five northern lines put then significant pressure to the west. That would be the principal reason for looking to the west as a measure of backup reliability.

The first Hudson-Farragut line was built in order to meet the NPCC criteria for a contingency loss, of the right of way from Buchanan to Millwood, which is exactly what happened. So that the system was built to provide for that loss. The interconnect, however, was out of service because of the phase angle regulator problem, these are management problems of a complex nature. Nevertheless it is necessary to then provide backup.

Mr. MURPHY. What about startup time for this nonspinning?

Mr. MILLSTEIN. It should have been within 10 minutes.

Ms. BRANCATO. They claim, Con Edison reported sufficient startup capacity to meet power pool requirements and so on, but it clearly did not have it.

Mr. MILLSTEIN. You have heard the stories about the men being sent home at 8 o'clock at night, so that the gas turbines just couldn't get started. Also there was an impression in some quarters that you could start all of those gas turbines from the headquarters of ConEd, and you couldn't. You could only start them in the field, and the people weren't in the field.

Mr. KITZMILLER. That raises a very interesting question. I was going to ask anyway because it does affect how the two system operators, both the pool and ConEd, reacted in their treatment of interties. Apparently both system operators believed that there was this adequate generating capacity available. Neither of them had been informed that there wasn't. That speaks then to a regulatory issue that really goes beyond ConEd. Let me trace it, and then I would like to ask you some questions about it.

When ConEd put in the turbines, they were, in part for peaking power. They were also in part for emergency power.

At the time they put them in, they connected them up automatically. The turbines to Gowanus were connected to an office building nearby. All of the rest of the nonsatellite turbines were connected automatically to the ConEd energy control center, and the 252 megawatt capacity of the satellites was, in effect, also manned 24 hours a day because it was located at existing generating stations.

At some point Con Edison elected to disconnect those automatic starting devices, but they also at the same time put in a management schedule, a supervisory schedule, that meant that, I think, all but 800 megawatts of the 2,000 megawatts was effectively off-line after 8 o'clock every night in the week, and on Saturday and

Sunday, and that all of it but the satellite stations was off after 11 p.m., so that you were left with only 252 megawatts for emergency purposes after 11 p.m.

As a part of its agreement with the power pool, Con Edison is required to tell them of any major changes in their generating capacity. Now, the first that the power pool knew of the change in that operation, apparently, was that night at about 8:45; is that correct, as far as you know?

Mr. MILLSTEIN. I believe that that is the subject matter of tomorrow's examination at the Public Service Commission. We have already had private hearings on that subject and this is what we are going to discuss with Mr. Stuzin and Mr. Schiff tomorrow. We have to ask them what they did about the fact, or why they didn't know that these units had been disconnected. We don't understand that.

Mr. DINGELL. Would you see to it that that transcript is made available to us?

Mr. MILLSTEIN. Yes. I don't know why they didn't act.

Mr. KITZMILLER. Are you aware of the agreement——-

Mr. MILLSTEIN. To keep the power pool advised?

Mr. KITZMILLER. Yes.

Mr. MILLSTEIN. Yes.

Mr. OTTINGER. Are you going to have the power pool before you tomorrow?

Mr. MILLSTEIN. We have had and we can have further private examination of the power pool. Tomorrow we are really focusing on the Public Service Commission.

Mr. OTTINGER. But you didn't ask this of the power pool?

Mr. MILLSTEIN. At that time, no.

Mr. KITZMILLER. Then it would appear that the ConEd violated that agreement?

Mr. MILLSTEIN. I must say it does, but I don't have the answer.

Mr. KITZMILLER. What sanctions are there for a company that violates the agreement?

Mr. MILLSTEIN. I have been told that the sanctions are breach of contract.

Mr. KITZMILLER. Has that been raised, do you know?

Mr. MILLSTEIN. No.

Mr. KITZMILLER. What would the force of the agreement be?

Mr. MILLSTEIN. I don't know.

Mr. DINGELL. Each would then have to go to court, litigate the question, establish the contract had been breached, and then secure either damages or, given the particular set of circumstances, some kind of equitable relief injunction, possibly mandamus——

Mr. MILLSTEIN. I find it difficult to understand.

Mr. KITZMILLER. Then by leaving this decision to the voluntary power pool, you have in effect abrogated regulatory authority?

Mr. MILLSTEIN. That is my view.

Mr. KITZMILLER. And there is another regulatory crack; is that correct?

Mr. MILLSTEIN. That is my view. I really am going to pursue the Public Service Commission very vigorously tomorrow because I don't understand how that happened.

I have another question for the Public Service Commission, if you want to top yours. What about the phase angle regulator that was out for 1 year and was critical to performance? That line was found by the coordinating council to be critical to New York City.

Mr. DINGELL. Which one do you refer to?

Mr. MILLSTEIN. The Hudson-Farragut line which was totally down, because the phase angle regulator went out in September 1976 and stayed out. That is no little thing. That is an interconnect that the company itself acknowledged was critical to the company in the event of an emergency situation and which the coordinating council had said was critical.

Ms. BRANCATO. The NPCC, Northern Power Coordinating Council, sets up contingency standards for various loss of right-of-way and the Hudson-Farragut line, the first one that has been installed—which was down because of failure of the phase angle regulator—was out. However, it had been built, we understand, to meet the contingency criteria established by the reliability councils in order to safely operate the system.

With importing so much power from the north, the system had to be safely operated only with the knowledge that you could import power from the east, and you couldn't.

Mr. MILLSTEIN. We asked that question of the Public Service Commission people at a private hearing and the indication we had as to what our answer will be tomorrow is that this was a management prerogative, namely, dealing with the manufacturer and deciding whether to order a new unit. Incidentally, the question which I believe you asked, Congressman, was they were having a lot of trouble with that phase angle regulator for quite a period of time preceding September 1976, and why did they put up with it for such a long time? I don't know.

To call that a management prerogative, to me—again, I may not understand the regulatory process—but it seems to me that the Public Service Commission of the State has some answers to give as well.

Mr. KITZMILLER. Have you asked about the impact of the absence of that phase angle regulator on the contingency arrangements with the pool?

Mr. MILLSTEIN. That is what Dr. Brancato was talking about.

Mr. KITZMILLER. You are talking about contingency?

Mr. MILLSTEIN. Yes.

Ms. BRANCATO. The reliability criteria by and large would be established by the coordinating council and those were not being met. Once the phase angle regulator was out, then the system was not, we understand, being operated in conformance with the reliability criteria established by the regional council.

Mr. DINGELL. What is, again, the effect of the reliability criteria which is established by regional council?

Ms. BRANCATO. The criteria are established so that one will not operate a system in a certain configuration unless you are sure you have backup power from somewhere else.

Mr. MILLSTEIN. And legally it is a recommendation.

Mr. DINGELL. Recommendation, but without force and effect of law?

Mr. MILLSTEIN. That is my understanding.

Mr. DINGELL. These regional power pools then are not governmental agencies but are private organizations composed of utilities themselves?

Mr. MILLSTEIN. Yes.

Mr. DINGELL. And they have only the authority to either, let's say, (a) cut off the offending participants or (b) to go into court and sue them; is that right?

Mr. MILLSTEIN. No, not the coordinating councils.

Ms. BRANCATO. The coordinating councils are the first tier. You have the National Electric Reliability Council, which is the nationwide reliability voluntary group, and then you have nine regional councils for different areas of the country. They essentially do the planning for the utilities as a group. The utilities do it. They are obviously members. Then you have the pools essentially underneath in schematic form, underneath the coordinating councils, because they are the more operative ends of the spectrum.

Mr. MILLSTEIN. But our understanding of the reliability council is they recommend and they are—my understanding is—not contractual to the extent that the power pool is a contractual arrangement.

Mr. OTTINGER. There is one other problem I trust you are looking into, and Mr. Kitzmiller maybe can get more detail on it. I understand there is a huge concentration of power there, coming down from the north, and there is a problem with the disconnect facilities they call bus, coming down, that when you knock out Indian Point the system is so set up that the connection back to Indian Point has to be done manually.

Mr. MILLSTEIN. There are several problems that we see. Here, obviously, we are getting into the era of the much more expert engineers, but it appears that when lightning strikes the Millwood area, Indian Point goes down when that happens. We have been trying to find out why the system is designed that way, not successfully so far, but this is, I think, what Mr. Clapp was saying when he said there is a design problem.

Mr. OTTINGER. That whole power coming down from the north is automatically knocked out in that process. It has to be reestablished manually?

Mr. MILLSTEIN. In defense of ConEd, we cannot keep on hollering at ConEd. They have some problems of their own up there. We residents of New York and Westchester have seen to it that that corridor is kept narrow.

With all due respect to ConEd, I think they would be delighted to have five corridors coming down, and they can't. We don't let them have it.

This is sort of like wanting your cake and eating it too. We would all love the most reliable system as long as it runs through somebody else's backyard. ConEd has a serious problem with the Westchester situation because people up there don't want another corridor. That is why we are looking to the Ramapo situation, but, again, in fairness to the two utilities, the people in New Jersey are not enthusiastic about building a 345 kV line through New Jersey to be of assistance to New York.

Mr. OTTINGER. I am talking about now, the regulations that exist, the arrangements that exist with respect to the existing

system. Granted it may be very useful to have another intertie, but the interties that they have——

Mr. MILLSTEIN. This is not functioning well.

Mr. OTTINGER. So that they don't function properly in the event there is an outage?

Mr. MILLSTEIN. That appears to be correct. That is what our engineers tell us.

Mr. MURPHY. Mr. Millstein, I am happy we started this colloquy around the question of reserve. Mr. Clapp very clearly brought out on page 4 of his statement the inadequate response that bringing on reserve generation and, of course, you do on pages 6 and 7, but I understand that ConEd for decades has been trying to plan a system so that they could bring on reserve at very short periods of time, that they tried for about 15 years to build a pump hydro plant at Cornwall, were never able to do that, that could have met a reserve of contingency in much less than the 10-minute period, that perhaps a gas start-up on existing facilities would have happened.

Would you address yourself to their long-range planning where they were thwarted and how that type of opposition created the conditions of that blackout?

Mr. MILLSTEIN. Well, first of all, I am not really expert enough to do that. Dr. Brancato has lived through all of that, but I would like to give you my very uninformed observations.

When I discovered that they did have operating reserves with gas turbines but couldn't get them on, at that point I was no longer terribly concerned with history. Our job was to investigate the July 13 blackout. ConEd had operating reserves which should have been able to get on line within a short enough period to save the situation.

Mr. DINGELL. Can you give us some appreciation of what was the level? I believe it was 5,000 megawatts were used, and there is a total capacity of 8 million?

Mr. MILLSTEIN. We have the exact numbers here.

Ms. BRANCATO. The system demand immediately prior to the first lighting disturbance was 5,868 megawatts. The demand is off peak. The total on that evening of installed capacity within the city, not outside the city, not at Indian Point, but solely within the city, was 7,896 megawatts. So had they been able to raise only 74 percent of all they had in the city that night, that would have been sufficient to cover the load.

In fact, all they could raise was 43 percent.

Mr. MILLSTEIN. So they couldn't meet the demand, but not because they didn't have it. They couldn't get it turned on.

Mr. DINGELL. Can you give us some reason why?

Mr. MILLSTEIN. The stations were unmanned in some cases. These gas turbines are located at various locations all around the city. They did not start automatically from the control room although at one time apparently they did start automatically from the control room. At some point in history they were all disconnected, and that is what Mr. Kitzmiller and I were talking about, trying to find out why.

We will find out, I hope, tomorrow.

Ms. BRANCATO. Those that were manned had a phenomenal outage record, as they came on line, we obtained the logs of this particular group of equipment. Those that were called for that were manned had an extremely poor performance record. Something on the order of between 80 and 90 percent of those that were manned that were called did not respond because of equipment failure, and that, it seems to us, to clearly go back to ConEd's own preventive maintenance programs and the testing that it does, presumably to insure that equipment actually functions when it is called to function. So the argument of building new plants, whether they are upstate, Cornwall——

Mr. MURPHY. Staten Island.

Ms. BRANCATO. Staten Island is not really relevant here, because they had every bit that they needed. They simply just couldn't get it to work.

Mr. MURPHY. That FPC report clearly indicates that an 800 megawatt unit, 775 unit and a 601 megawatt unit, were out of service during that period.

Mr. DINGELL. Can the gentleman tell me why they were out of service?

Mr. MURPHY. It is undoubtedly in the report, but this was not a one night——

Mr. DINGELL. We have all that power and it is out of service, won't come on, and unmanned. I am not sure the gentleman wishes to defend this company with his statements. It strikes me that he is denouncing them more vigorously than anybody else at the table here.

Mr. MURPHY. We are not in the process of denouncing or defending anyone. I am in the process of trying to find out how to stop blackouts; but then you had a 1,000 megawatt unit which was the largest but was never returned to the line?

Mr. MILLSTEIN. That is Indian Point 3; that is because of the design problem up there. Is that what they are talking about?

Mr. MURPHY. Let's get the FPC and go over their report.

Mr. DINGELL. We are going to have them up. I appreciate the gentleman wanting to help because I am sure he wants to get this situation rectified as much as the rest of us do, and also see to it when we finally finish this hearing we have extracted from it the basis for further perfections, as required, to the legislation on which we are going to conference with the Senate very shortly.

Mr. MURPHY. I will give you an amendment for that conference, if you would like.

Mr. DINGELL. I am always interested in the gentleman's counsel. We are going to ask for just about everybody in sight to give us help.

Mr. OTTINGER. I would like to point out, if I could, if we had had Storm King during this period, two things: one hit presumably would have been on the line that was out, transmitting power, but, second, at that time of night they would have been pumping water up the mountain. That is what the equipment was designed to do, pump up and use the existing capacity during the night and use the power for peak periods.

Mr. MURPHY. Their operation would have been a function of the power pool. You don't know what situation would exist there.

Mr. OTTINGER. Even if it had been connected separately, it would have been available to be useful.

Mr. DINGELL. The Chair does observe we are going to have some testimony precisely on this point, so I think rather than our discussing it with limited information and knowledge, we would be better served to wait until we get some experts here.

Mr. Kitzmiller?

Mr. KITZMILLER. I am now dealing with the intertie question only. It is the finding of your study that the southern and western connections, interconnections, whether they be Goethals or Farragut, are vitally important to the security of the Con Edison system?

Ms. BRANCATO. Yes.

Mr. KITZMILLER. It is also the finding of your study that another north-south connection running through Westchester, running through the Westchester corridor, is less valuable because it is more vulnerable, because it is in that narrow corridor area?

Mr. MILLSTEIN. Yes, sir. I think everybody would agree that putting another line in the same corridor is not going to improve things a whole lot. It is a very vulnerable corridor. That is why we are looking over toward Ramapo.

[Testimony resumes of p. 66.]

[Mr. Millstein's prepared statement and the summary of recommendations follow:]

SPECIAL COMMISSION OF INQUIRY INTO ENERGY FAILURES
2 LAFAYETTE STREET/ NEW YORK, N.Y. 10007/ (212) 566-6331

STATEMENT OF IRA M. MILLSTEIN, CHAIRMAN
SPECIAL COMMISSION OF INQUIRY INTO ENERGY FAILURES
CITY OF NEW YORK
BEFORE THE HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON ENERGY AND POWER
OF THE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE
OCTOBER 13, 1977

Commission

IRA M. MILLSTEIN
Chairman

PAUL J. CURRAN
Commissioner

SAMUEL R. PIERCE, JR.
Commissioner

JONATHAN L. ROSNER
General Counsel

CAROLYN K. BRANCATO, Ph.D.
Staff Director

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE,

NEW YORK CITY'S SPECIAL COMMISSION OF INQUIRY INTO ENERGY FAILURES WAS FORMED AFTER THE DEVASTATING JULY 13TH BLACKOUT ON THE CONSOLIDATED EDISON SYSTEM. THE SOCIAL AND ECONOMIC COSTS OF THIS EVENT HAVE YET TO BE TOTALED. PROPERTY DAMAGE WAS SEVERE. HERBERT BIENSTOCK, REGIONAL COMMISSIONER OF THE U.S. DEPARTMENT OF LABOR'S BUREAU OF LABOR STATISTICS, ESTIMATED THAT NEW YORK CITY WORKERS LOST ABOUT $5 MILLION IN WAGES ALONE BECAUSE OF THE BLACKOUT. IN ADDITION, THERE WERE OBVIOUS LOSSES TO THE CITY IN FOREGONE REVENUES FROM SALES, INCOME, AND PROPERTY TAXES. OF PERHAPS MOST SIGNIFICANCE WERE THE PSYCHOLOGICAL AND SECONDARY ECONOMIC EFFECTS - THE SIGHT OF A GIANT CITY CRIPPLED, WITHOUT WARNING, FOR 24 HOURS THROUGH LOSS OF ELECTRICITY. CONFUSION AND SOME FEAR WERE ENGENDERED BECAUSE OUR UTILITY COULD NOT STATE WITH CLARITY WHEN POWER WOULD BE RESTORED -

UP TO ALMOST DUSK OF THE FOLLOWING EVENING. AND ALL OF THIS WITH NATIONAL MEDIA COVERAGE. HOW MANY INDIVIDUAL AND BUSINESS RESIDENTS FINALLY GAVE UP ON THE CITY; HOW MANY DECIDED NOT TO LOCATE IN THE CITY? AND HOW ABOUT THE EFFECT ON THE MORALE OF A CITY STRUGGLING TO EMERGE FROM A FISCAL CRISIS? THESE ARE REAL, BUT INCALCULABLE, COSTS. TO USE AN OLD SAW: YOU HAD TO BE THERE!

OUR MISSION, AFTER OUR COMMISSION'S CREATION BY MAYOR BEAME AND THE CITY COUNCIL, WAS TO INVESTIGATE THE BLACKOUT INCIDENT NOT ONLY FROM THE PERSPECTIVE OF CON EDISON SYSTEM OPERATIONS THAT EVENING, BUT ALSO IN TERMS OF EVALUATING OVERALL LONG TERM SYSTEM PLANNING AND RELIABILITY. WE READILY PERCEIVED THAT THE REGULATORY FRAMEWORK WITHIN WHICH CON EDISON OPERATES WOULD HAVE TO BE REVIEWED TO ASCERTAIN WHETHER IT TOO INCLUDED A MEASURE OF ADEQUATE PLANNING AND COORDINATION SUFFICIENT TO INSURE RELIABILITY.

OUR INITIAL SET OF PUBLIC HEARINGS WERE HELD ON AUGUST 30 - 31 AND CONCERNED THE ACTIONS TAKEN BY CON ED AND NEW YORK POWER POOL SYSTEM OPERATIONS PERSONNEL IMMEDIATELY PRIOR TO THE SYSTEM FAILURE AND THE INDIVIDUAL OR CORPORATE RESPONSIBILITY FOR THOSE ACTIONS. WE OFFER A TRANSCRIPT OF THESE HEARINGS FOR YOUR RECORD.

WE ARE PRESENTLY QUITE LITERALLY IN THE MIDST OF OUR SECOND AND FINAL HEARINGS WHICH RELATE TO SYSTEM RESTORATION

EFFORTS, JURISDICTION OF THE FEDERAL ENERGY REGULATORY COMMISSION AND THE NEW YORK PUBLIC SERVICE COMMISSION TO PREVENT SYSTEM FAILURES, AND THE FINANCIAL IMPACT ON RATEPAYERS OF SYSTEM FAILURES. WHEN TRANSCRIPTS ARE AVAILABLE, THEY TOO WILL BE FORWARDED TO YOUR COMMITTEE.

YOUR CHAIRMAN HAS SPECIFICALLY REQUESTED THAT I ADDRESS MYSELF TO THE ROLE PLAYED BY INTERCONNECTIONS BETWEEN SYSTEMS IN HELPING TO MAINTAIN RELIABLE ELECTRIC SERVICE. CONSIDERING THAT OUR COMMISSION HAS YET TO COMPLETE ITS INVESTIGATION AND MAKE ITS FINAL REPORT AND RECOMMENDATIONS, WE OFFER A NUMBER OF PRELIMINARY OBSERVATIONS EMANATING FROM OUR OWN HEARINGS AND RESEARCH TO DATE WHICH MAY BE RELEVANT TO YOUR CONSIDERATION OF PROPOSED LEGISLATION SECTION 541 OF H.R. 8444.

THERE WAS NO SUBSTANTIAL DISAGREEMENT AT OUR AUGUST HEARINGS THAT A TOTAL SYSTEM COLLAPSE COULD HAVE BEEN AVOIDED IF, SOMETIME BETWEEN THE FIRST DISTURBANCE AND SHORTLY AFTER 9:00 P.M., THE CON EDISON SYSTEM OPERATOR HAD DISCONNECTED CUSTOMERS OR "SHED LOAD". THE DISPUTE BETWEEN CON ED AND THE POWER POOL OVER THE LANGUAGE OF COMMUNICATION BY THE POWER POOL DISPATCHER IS MORE WORTHY OF HAGGLING LAWYERS THAN OF PRACTICAL OPERATORS WORKING AGAINST TIME WITH THE WELFARE OF MILLIONS OF PEOPLE AT STAKE. WHETHER THE POWER POOL OPERATOR "ORDERED" OR "REQUESTED" CON ED TO SHED LOAD - THE FACT IS THE POWER POOL'S STATEMENT WAS QUITE CLEAR - "YOU GOT TO SHED LOAD IMMEDIATELY

OR YOU'RE GOING TO GO RIGHT DOWN THE PIPE WITH EVERYTHING". CON ED'S OWN OPERATING PROCEDURE E 60-6 STATES THAT IT SHALL DISCONNECT LOAD IN LESS DENSELY POPULATED AREAS "AS NECESSARY AND/OR AS REQUESTED" BY THE NEW YORK POWER POOL DISPATCHER.

QUESTIONS OF MISCONSTRUED COMMUNICATIONS CANNOT OBLITERATE THE FACT THAT THE OPERATORS DID NOT FUNCTION EFFECTIVELY DURING THE EMERGENCY. AMONG OTHER THINGS: WHEN THE CON ED SYSTEM OPERATOR FINALLY ATTEMPTED TO SHED LOAD, HE EITHER OPERATED THE EQUIPMENT IMPROPERLY OR IT MALFUNCTIONED; THE POWER DISPATCHER SIGNALLED FOR SOME BUT NOT ALL VITAL IN-CITY GAS TURBINE EQUIPMENT AND ONLY A FRACTION OF THE GENERATION HE ASKED FOR GOT ON LINE BEFORE SYSTEM COLLAPSE; THE GROUP INFORMATION PERSON WHOSE DUTY IT WAS TO NOTIFY THE POLICE AND OTHER EMERGENCY SERVICE PERSONNEL MADE HIS FIRST PHONE ALERT SIX MINUTES AFTER THE SYSTEM WENT DOWN.

DESPITE THIS RATHER CLEAR HISTORY OF JULY 13TH, WE HAVE REPEATEDLY STATED THAT WE ARE NOT LOOKING FOR INDIVIDUAL SCAPEGOATS. IT APPEARS THAT THE CON ED MANAGEMENT HAD NEVER PROVIDED THESE MEN WHO OCCUPY SUCH CRITICAL POSITIONS WITH ADEQUATE PREPARATION TO DEAL WITH EMERGENCIES. IN ADDITION, IT APPEARS THAT MANAGEMENT HAD NOT TAKEN SUFFICIENT STEPS TO UPGRADE THE FACILITIES IN THE EMERGENCY CONTROL ROOM - THE HEART OF SYSTEM OPERATIONS - DESPITE ITS OWN CONSULTING STUDY IN 1973 AND A CRITICAL MANAGEMENT AUDIT IN 1975 WARNING

OF THESE VERY DEFICIENCIES. THE GENERATING EQUIPMENT WITH WHICH THE MEN WERE PROVIDED APPEARS TO HAVE SEVERELY MALFUNCTIONED WHEN CALLED UPON TO SAVE THE SYSTEM.

FINALLY, AN IMPORTANT INTERCONNECTION WHICH HAD BEEN BUILT TO THE WEST - THE HUDSON/FARRAGUT INTERTIE TO THE PENNSYLVANIA-NEW JERSEY-MARYLAND SYSTEM - HAD BEEN OUT OF SERVICE SINCE SEPTEMBER 1976.

ONE MIGHT THUS BRUSH ASIDE JULY 13TH AS BEING THE RESULT OF LIGHTNING, POORLY FUNCTIONING INDIVIDUALS, EQUIPMENT FAILURES, ETC. - AND CLOSE THE BOOK WITH AN EXHORTATION TO CON ED TO UPGRADE ITS OPERATIONS. WE WOULD BE THE FIRST TO ADMIT THAT ONE SHOULD PUT ONE'S OWN HOUSE IN ORDER BEFORE REQUESTING HELP FROM OTHERS - OR MORE REGULATION. OUR COMMISSION WILL HAVE "SELF-HELP" RECOMMENDATIONS. ULTIMATELY CON ED ITSELF MUST BE RESPONSIBLE FOR MANY OF THE IMPROVEMENTS AND CHANGES WHICH SEEM TO ALL SO CLEARLY REQUIRED. REGULATION CANNOT SUBSTITUTE FOR ALERT AND EFFICIENT MANAGEMENT.

HOWEVER, IN THE CASE OF OUR NATIONAL BULK POWER SYSTEM AS IT EXISTS TODAY, THE NEIGHBORS ARE INCREASINGLY IMPORTANT AND THERE OUGHT TO BE SOMEONE AROUND TO RESOLVE DISPUTES OVER THE HEIGHT OF THE FENCE.

PUTTING TO ONE SIDE THE DEBATE OVER A "NATIONAL GRID" - ABOUT WHICH WE DO NOT HAVE THE EXPERTISE TO ENTER - THERE SEEMS TO BE NO ARGUMENT OVER THE WISDOM OF STRONG INTERCONNECTIONS BETWEEN NEIGHBORING UTILITIES FOR ECONOMIC REASONS AND FOR

SYSTEM RELIABILITY FOR LONGER PERIODS AND IN EMERGENCIES.

INCREASING THE DEGREE OF TRANSMISSION CAPABILITY AND EXCHANGE AMONG NEIGHBORING UTILITIES CAN PRODUCE SAVINGS IN SEVERAL CATEGORIES. OPERATING COSTS MAY BE HELD TO A MINIMUM THROUGH A PROGRAM TO SELECT FOR DISPATCH THE POWER FROM THOSE GENERATORS CAPABLE OF PRODUCING IT MOST CHEAPLY, ASSUMING THE REQUISITE TRANSMISSION CAPACITY FOR ALL INTENDED PURPOSES. VARIATIONS IN DEMAND ACCORDING TO THE TIME OF DAY AND SEASON OF THE YEAR MAY BE UTILIZED TO SAVE GENERATING CAPACITY EXPANSION BY USING THE PEAK CAPACITY IN ONE AREA TO SUPPLY SOME PART OF THE PEAK DEMAND IN ANOTHER. RESERVE CAPACITY MUST OF COURSE BE MAINTAINED IN CASE PEAK DEMAND HAS BEEN UNDERESTIMATED, IN PERIODS OF MAINTENANCE AND IN THE EVENT OF GENERATOR OR SYSTEM OUTAGE. BUT RESERVE CAPACITY COSTS TO MEET A GIVEN STANDARD OF RELIABILITY ARE ALSO REDUCED BY COORDINATION. EVEN WITHOUT DIVERSITY OF SEASONAL PEAKS, INTERCONNECTIONS CAN REDUCE CAPITAL INVESTMENT AND INCREASE RELIABILITY BECAUSE THERE IS DIVERSITY OF GENERATOR OUTAGES AND MAINTENANCE ON VARIOUS SYSTEMS.

BEYOND THESE POTENTIAL OVERALL ECONOMIC BENEFITS, INTERCONNECTIONS SHOULD BE AVAILABLE TO ASSIST IN A SYSTEM OUTAGE. IT IS THIS TYPE OF INTERCONNECTION DESIGNED TO ASSURE RELIABILITY OF SERVICE THAT MOST CONCERNS OUR COMMISSION.

CON EDISON HAD IN-CITY CAPACITY MORE THAN SUFFICIENT TO MEET THE JULY 13TH EVENING LOAD OF 5,868 MEGAWATTS. THEREFORE,

EVEN AFTER IT LOST ALL FIVE LINES FROM THE NORTH, IT WOULD HAVE HAD NO NEED TO IMPORT POWER FROM THE LILCO OR PJM SYSTEMS HAD IT BEEN ABLE TO BRING ON LINE A REASONABLE PERCENTAGE OF ITS OWN GENERATING PLANT. THIS WOULD, HOWEVER, NOT HAVE BEEN THE CASE HAD THE DISTURBANCE AND LOSS OF NORTHERN LINES OCCURRED DURING A CON ED PEAK PERIOD. TO THEN MAINTAIN THE SYSTEM IN ISOLATION WOULD REQUIRE THE AVAILABILITY OF EVERY OUNCE OF GENERATION - WHICH READY AVAILABILITY IS NOT LIKELY IN ANY SYSTEM. GIVEN THE ADVANCES IN SYSTEM INTER-CONNECTIONS MADE DURING THE LAST 10 YEARS, THERE SHOULD REALLY BE NO REASON TO DISCUSS HOW THE SYSTEM MIGHT OPERATE IN ISOLATION - THE INTERCONNECTIONS FOR ECONOMIC AND RELIABILITY REASONS SHOULD HAVE BEEN STRONG AND IN PLACE. THEY WERE NOT.

THE FEDERAL POWER COMMISSION HAS IN THE PAST PURSUED A POLICY OF ENCOURAGING VOLUNTARY ACTION ON THE ISSUE OF TRANS-MISSION INTERCONNECTIONS. THE LIMITED MANDATORY POWERS WHICH THE FEDERAL ENERGY REGULATORY COMMISSION DOES POSSESS TO REQUIRE INTERCONNECTIONS ARE FOUND IN SECTIONS 202 AND 207 OF THE FEDERAL POWER ACT. FIRST, SECTION 202 (c) PERMITS THE FPC TO ORDER INTERCONNECTIONS TO BE BUILT WHEN AN EMERGENCY EXISTS. SECOND, UNDER SECTIONS 202 (b) AND 207, THE FPC CAN ORDER AN INTER-CONNECTION TO BE BUILT AND CAN ALLOCATE THE COST OF THE CONSTRUCTION IF ITS INTERVENTION IS REQUESTED BY AN ELECTRIC UTILITY OR BY A STATE PUBLIC UTILITY COMMISSION.

AS NOTED, THE FPC - AND ITS SUCCESSOR AGENCY - IS LIMITED

IN DOING ALL THAT CAN BE DONE TO INSURE RELIABLE ELECTRIC SUPPLY FOR CRITICAL POPULATION CENTERS SUCH AS NEW YORK CITY. SECTION 202 (c)'S EMERGENCY AUTHORITY DOES NOT EXPLICITLY GRANT THE FPC THE CAPABILITY TO PREVENT EMERGENCIES. A STRICT INTERPRETATION OF THE STATUTE LIMITS THE FPC TO REACTING TO EMERGENCIES AFTER THEY HAVE BEGUN. THE ABILITY TO RESOLVE A DISPUTE CONCERNING AN INTERCONNECTION WHICH MIGHT BE INSTALLED TO PREVENT AN EMERGENCY IN THE FUTURE IS NOT EXPLICITLY GRANTED. UP TO NOW THE FPC HAS NOT BEEN EXPANSIVE IN INTERPRETING ITS OWN POWERS.

NOR IS SECTION 202 (b) A RELIABLE TOOL TO COMPEL INTERCONNECTIONS. WE WOULD ASSUME THAT A UTILITY WOULD NOT NORMALLY REQUEST THE FPC TO INTERVENE AGAINST ANOTHER UTILITY WITH WHOM IT WANTS TO INTERCONNECT. LET US CONSIDER THE HYPOTHETICAL CASE OF TWO UTILITIES, THE FIRST OF WHICH WANTS TO CONSTRUCT A NEW TRANSMISSION LINE TO THE SECOND. THE SECOND COMPANY SETS A PRICE HIGHER THAN THAT WHICH THE FIRST BELIEVES IS FAIR AND EQUITABLE. EVEN SO, THE PRICE OF THE INTERCONNECTION WILL BE LESS THAN ALTERNATIVE TRANSMISSION ROUTES AVAILABLE TO THE FIRST UTILITY. NEGOTIATIONS DRAG ON INCONCLUSIVELY.

FOR THE FIRST UTILITY, IT IS A NO-WIN SITUATION. IF IT DOES NOT MEET THE TERMS OF THE SECOND COMPANY, ITS CUSTOMERS WILL NOT GET THE POWER THEY NEED. IF IT DOES PAY THE PRICE, THE COST OF THE NEEDED POWER WILL BE HIGHER THAN IT CALCULATES IS JUSTIFIED. OR THE UTILITY CAN GO IT ALONE, BUT ALSO AT AN

INEFFICIENT COST, IN TERMS OF ECONOMY AND RELIABILITY.

WHILE THE SECTION 202 (b) REMEDY IS OPEN TO THE UTILITY FACING THIS DILEMMA, IN FACT WE DO NOT BELIEVE THE UTILITY WOULD NORMALLY SEEK THE HELP OF THE FPC, EXCEPT IN THE MOST AGGRAVATED CASES. WE BELIEVE THE REASON FOR THE UTILITY'S RESISTANCE TO THE SECTION 202(b) ROUTE IS THAT A CONTINUING BUSINESS RELATIONSHIP MIGHT BE PREJUDICED FOR THE FUTURE, ONCE ONE UTILITY TURNS TO THE FPC AS AN OUTSIDE THIRD PARTY TO FORCE A SETTLEMENT ON ANOTHER UTILITY. I MUST CONFESS NOT TO HAVE CITATIONS OR STATISTICS ON THIS POINT; THEY ARE HARD TO COME BY. BUT WHILE THIS DISCUSSION IS THUS BASED ON OPINION, WE BELIEVE THE REASONING IS SOUND.

SECTION 202 (b) HAS, OF COURSE, BEEN USEFUL IN THE PAST TO CITIES WHO HAVE ASKED THE FPC TO INTERVENE IN INTERCONNECTION DISPUTES. THE OTTER TAIL POWER COMPANY SITUATION A FEW YEARS AGO ILLUSTRATES THIS.

ELBOW LAKE, MINNESOTA, FORMED ITS OWN MUNICIPAL POWER SUPPLY COMPANY AND PULLED OUT OF THE OTTER TAIL TRANSMISSION SYSTEM. WHEN ELBOW LAKE WANTED TO RECONNECT WITH OTTER TAIL, OTTER TAIL REFUSED. ELBOW LAKE APPLIED TO THE FPC FOR HELP AND UNDER §§ 202(b) THE FPC ORDERED OTTER TAIL TO LET ELBOW LAKE TAP INTO ITS TRANSMISSION LINES.

ELBOW LAKE IS A MUNICIPAL, NOT A PRIVATELY OWNED UTILITY, AND THIS WE BELIEVE EXPLAINS ITS WILLINGNESS TO USE SECTION 202 (b). UNDER SECTIONS 202 (b) AND 207 OF THE FEDERAL POWER

ACT, A STATE UTILITY COMMISSION COULD, ON ITS OWN VOLITION, PETITION THE FPC TO RESOLVE A DISPUTE AND ORDER AN INTER-CONNECTION BETWEEN TWO UTILITIES WHEN "IN THE PUBLIC INTEREST" AND PROVIDED THAT TO DO SO WOULD NOT IMPAIR A PUBLIC UTILITY'S ABILITY TO RENDER ADEQUATE SERVICE TO ITS CUSTOMERS. HOWEVER, TO DATE, THE NEW YORK COMMISSION HAS NEVER INTERCEDED IN SUCH A CASE. FURTHERMORE, WE HAVE MAILED QUESTIONNAIRES TO ALL THE STATE UTILITY COMMISSIONS IN THE U.S., AND TWENTY-FOUR OUT OF TWENTY-FIVE RESPONDENTS SO FAR HAVE ANSWERED THAT THEY HAVE NEVER INITIATED SUCH AN FPC ACTION. WE BELIEVE THAT THIS EVIDENCE IS INDICATIVE OF THE FACT THAT A STATE COMMISSION MAY BE DISINCLINED TO CALL FOR FEDERAL HELP BOTH FOR POLICY AND POLITICAL REASONS. THE STATE COMMISSION MAY SEE SUCH A CALL FOR HELP AS AN INCURSION ON ITS PREROGATIVES AND A SIGN OF WEAKNESS.

I SHOULD NOTE THAT IN OUR OPINION, FOR MOST UTILITIES AROUND THE NATION, THE EXPERIENCE HAS BEEN THAT ADJACENT UTILITIES DO COOPERATE REASONABLY.

HENCE OUR LIMITED SUGGESTION FOR ADDED LEGISLATION WOULD CONCERN THOSE UNUSUAL CASES WHERE THE PATTERN OF COOPERATION DOES NOT RESOLVE A PARTICULARLY INTRACTABLE DISPUTE ABOUT AN INTERSTATE INTERCONNECTION IMPACTING ON SYSTEM RELIABILITY. IN THOSE CASES WE DO NOT BELIEVE THE WELFARE OF A SERVICE AREA SHOULD BE LEFT EXCLUSIVELY IN THE HANDS OF VOLUNTARY

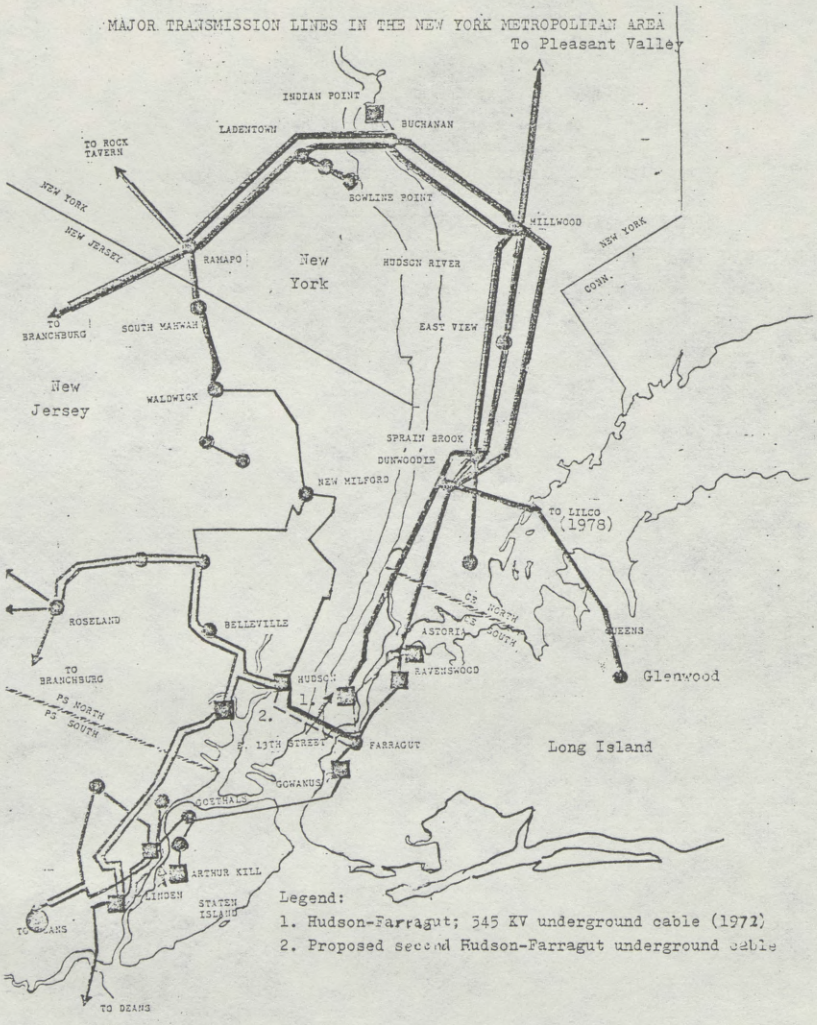
APPLICATION FOR FEDERAL HELP BY ONE UTILITY OR A STATE COMMISSION. IF A UTILITY OR A STATE COMMISSION FOR POLICY OR POLITICAL REASONS DOESN'T WANT A FEDERAL PRESENCE, THIS SHOULD NOT PREJUDICE, BY DELAY OF INTERSTATE INTERCONNECTS, THE WELFARE OF THE SERVICE AREA. THEREFORE, WE THINK IT IS REASONABLE FOR THE NEW FEDERAL ENERGY AGENCY TO BE GIVEN THE ABILITY TO ACT ON ITS OWN REGARDING INTERSTATE INTERCONNECTS IMPACTING ON SYSTEM RELIABILITY.

THERE IS SUCH A POTENTIALLY DIFFICULT SITUATION DEVELOPING WHICH AFFECTS NEW YORK CITY. THE PROPOSED 345 KV TRANSMISSION LINE FROM RAMAPO IN ROCKLAND COUNTY NEW YORK TO HUDSON IN NEW JERSEY AND THEN UNDER THE HUDSON RIVER TO FARRAGUT IN NEW YORK CITY WAS STUDIED JOINTLY BY PUBLIC SERVICE ELECTRIC AND GAS IN NEW JERSEY AND BY CON EDISON PLANNING ENGINEERS. IN DECEMBER 1975, THESE ENGINEERS JOINTLY RECOMMENDED THAT WORK ON THE TIE BE INITIATED IMMEDIATELY IN ORDER THAT IT BE IN SERVICE BY 1980. CON EDISON WOULD HAVE NEEDED THIS TIE IN 1980 IN ORDER TO COVER THE CONTINGENCY OF LOSS OF THE BUCHANAN-MILLWOOD RIGHT OF WAY IN TERMS OF 1980 LOADS AND IMPORTS. MOREOVER, THE ENGINEERING RECOMMENDATIONS FOR A RAMAPO/FARRAGUT LINE WERE REQUIRED BY THE RELIABILITY CRITERIA ESTABLISHED BY THE NORTHEAST POWER COORDINATING COUNCIL - THE VOLUNTARY REGIONAL COUNCIL WITH OVERSIGHT RESPONSIBILITY. COST OF THE RAMAPO-FARRAGUT TIE WAS ESTIMATED AT ABOUT $120 MILLION. WORK ON THE PSE&G SIDE HAD TO BEGIN BY SPRING OF 1976 IN ORDER TO MEET THE 1980 TARGET. AT THAT POINT APPARENTLY THE

MANAGEMENTS AND LAWYERS TOOK OVER, NEGOTIATIONS BEGAN, AND TO DATE NO AGREEMENT BETWEEN THE UTILITIES FOR THE LINE HAS BEEN REACHED.

WE UNDERSTAND THAT NEGOTIATIONS ARE PROCEEDING; HOWEVER, THERE APPEARS TO BE SOME CONTRADICTORY EVIDENCE AS TO WHO WILL BENEFIT MOST FROM THE PROPOSED TIE - CON EDISON OR PSE&G. THUS THE DELAY SEEMS TO BE BASED ON QUESTIONS OF WHO PAYS. RECENT DISCUSSIONS WITH CON EDISON ENGINEERS INDICATE THAT BECAUSE OF SLIPPAGE IN LOAD GROWTH FORECASTS, THE TIE MIGHT NOT BE NEEDED UNTIL 1983. NOTWITHSTANDING, THE SITUATION IS ONE WHICH POINTS DIRECTLY TO THE NEED TO HAVE SOME MECHANISM FOR RESOLVING DISPUTES WHEN TWO UTILITIES DON'T SEEM TO BE ABLE TO REACH AGREEMENT.

INDEED, IT IS MY VIEW THAT THE SIMPLE EXISTENCE OF A FEDERAL POWER TO INITIATE, ON ITS OWN, INTERCONNECTS WILL SPEED UP VOLUNTARY NEGOTIATIONS BETWEEN UTILITIES ON RELIABILITY INTERCONNECTS. I WOULD GUESS THAT THE POWER WILL NOT HAVE FREQUENTLY TO BE USED.


MAJOR TRANSMISSION LINES IN THE NEW YORK METROPOLITAN AREA
To Pleasant Valley
INDIAN POINT
BUCHANAN
LADENTOWN
TO ROCK TAVERN
BOWLINE POINT
HILLWOOD
NEW YORK
NEW JERSEY
RAMAPO
New York
HUDSON RIVER
NEW YORK
CONN.
TO BRANCHBURG
SOUTH MAHWAH
EAST VIEW
New Jersey
WALDWICK
SPRAIN BROOK
DUNWOODIE
NEW MILFORD
TO LILCO (1978)
ROSELAND
BELLEVILLE
ASTORIA
QUEENS
TO BRANCHBURG
HUDSON
RAVENSWOOD
Glenwood
PS NORTH
PS SOUTH
1.
2.
E. 13TH STREET
FARRAGUT
Long Island
GOWANUS
GOETHALS
ARTHUR KILL
LINDEN
STATEN ISLAND
TO DEANS
Legend:
1. Hudson-Farragut; 345 KV underground cable (1972)
2. Proposed second Hudson-Farragut underground cable

RECOMMENDATIONS CONCERNING RELIABILITY*

A Summary of the Recommendations in the
New York State Public Service Commission
Staff Task Force Second Report, September 15, 1977
and
Earlier Recommendations By Other Bodies

SPECIAL COMMISSION OF INQUIRY INTO ENERGY FAILURES
The City of New York

RECOMMENDATIONS CONCERNING RELIABILITY

Training of Control Center Personnel

Public Service Commission - September 15, 1977*

"We recommend that . . . Con Edison should institute a formal training program for system operators, power dispatchers, and district operators [Recommendation (7)] . . . Con Edison make a study on the benefit of, having a simulator to train its people in the Energy Control Center [Recommendation (8)] . . . Con Edison institute a program where its system operators receive annual physical and psychological examinations [Recommendation (9)] . . . before Con Edison allows a person to become a system operator, they must go through a program of training and testing [Recommendation (10)] . . . the [New York Power Pool] and its member companies set up a certification committee to determine . . . if certification is necessary, and if it is, what constitutes certification of a system operator [Recommendation (11)] . . . Con Edison train its system operators in the proper use of load shedding so that this vital tool to save the system is used correctly when necessary [Recommendation (12)]."

Federal Power Commission - December 6, 1965 & July 1967*

"Power interruptions may be caused by . . . insufficient training of operators [and] neglect of emergency procedures [July 1967 Report, Vol. I @ P. 42[. . . 10. We recommend an industrywide as well as a utility-by-utility study of the adequacy of . . . operating procedures in the dispatching and control centers [December 6, 1965 Report @ P. 44] . . . 23. Thorough programs and schedules for operator training and retraining should be vigorously administered. Many operators become highly skilled in handling day-to-day problems of system operation, including commonly occurring system disturbances, but more attention should be devoted to rehearsing procedures for meeting severe disturbances from a wide variety of potential contingencies. New technical skills are required in monitoring modern power systems. [July 1967 Report, Vol I @ P. 92]."

Federal Power Commission - August 4, 1977*

"Con Edison's internal emergency procedures and training of personnel to cope with emergency situations evidently have to be reassessed. Serious questions remain as to the adequacy of manpower at the Control Center at times of emergency, management's standing instructions to its operators, and the soundness of judgment by the Company's personnel . . . [I]t is essential that all utilities . . . (4) Upgrade the training programs for operating personnel as well as the written and oral instructions for dealing with emergency situations. [Staff Report @ PP. 5, 75]."

Consolidated Edison Company of New York, Inc. - August 24, 1977*

"[T]he Board [of Review] has made the following recommendations, all of which are being acted upon: . . .
2. Expand the training of System Operators. For the short range, the training procedures should emphasize

manual load-shedding criteria and procedures; for the long range, determine the feasibility of constructing a simulator of the Con Edison Power System to train System Operators. [Second Phase Report @ P. 21]."

Improvement of the Control Center*

Public Service Commission - September 15, 1977*

"The Con Edison Energy Control Center is not equipped to present the System Operator a clear picture of the complex generation and transmission system. His ability to respond to system emergencies is thus impaired . . . [He is] forced to make important decisions . . . with only limited information, and that information without clarity of display . . . [L]ine loading indicators . . . have scales that may confuse the System Operator . . . . We recommend that Con Edison should proceed expeditiously with improvements, both near term and long term, to the Energy Control Center [Recommendation (4)] . . . additional staffing at Energy Control Center until planned improvements are made [Recommendation (5)] . . . that all scales on line loading indicators should exceed the [Short Time Emergency] rating so that the System Operators will know when the STE rating of a line is exceeded [Recommendation (25)] . . . study the feasibility of installing an events recorder and data logger at the Control Center [Recommendation (26)]."

Federal Power Commission - December 6, 1965 & July 1967*

"15. System control centers should be equipped with display and recording equipment which provide the operator at all times with as clear a picture of system conditions as possible. [July 1967 Report, Vol. I @ P. 91] . . . . 3. Adequate instrumentation at all system control and dispatching centers, plants and substations. In general, instrumentation should be adequate to display and, where necessary, record such information as may be essential to the reliable operation of the system and analysis of its performance. . . . . Important in any consideration of instrumentation and data display is that only data immediately essential and within the ready comprehension of operating personnel be presented. Otherwise, proliferation of data display will tend to create confusion and detract from reliability. . . . Automatic logging and selection of data for display purposes can be assisted by on-line computers of the type now in operation on numerous systems for purposes of load control and economic dispatch." July 1967 Report, Vol. II @ P. 22]."

[Note: See also, "Consolidated Edison Company of New York, Inc. Energy Control Center Long Range Plan, Final Report, September 4, 1974" by Boeing Electronics Division of The Boeing Company; "Con Edison - Management and Operations Study for the New York Public Service Commission, January 1975", Volume II @ PP. 25-26. Both Reports are referenced in "Notes" at "**".].

Consolidated Edison Company of New York, Inc. - August 24, 1977*

"Based on the investigations made to date, it is recommended that the following actions be initiated: . . . 2. Provide additional indicators to the System Operator of changes in transmission line status. 3. Review the Procurement Specification for the System Operations Computer Control System to determine the technical adequacy of the system described therein to provide the System Operator with the information and computational capability required for the safe and reliable operation of the electric system. The review should include an evaluation of the proposed . . . system with respect to the recommendation for the transmission system contained in the earlier study by Boeing [Second Phase Report @ P. 67]"**

Improved Performance of Operating Reserves

Public Service Commission - September 15, 1977*

"Con Edison did not correctly report the unavailability of a large part of its gas turbine capacity . . . and the steam generating plants did not respond as expected. . . . The performance of the gas turbines was disappointing. They showed little of the flexibility; quick start characteristics and load pickup that is expected. . . . [W]e recommend that . . . the New York Power Pool should strengthen the reporting requirements whereby the member companies inform the NYPP of the correct status of generation at all times and the NYPP should routinely audit generating units to determine their operating reserve capability and require utilities to demonstrate that they can quickly pick up load [Recommendation (18)] . . . remote start capability must be added for some of the aircraft type gas turbines and [Con Edison] should study the desirability of installing remote capability on all gas turbines [Recommendation (19)] . . . that Con Edison and the [New York Power Pool] must study the role of gas turbines in the operating reserve allocation and in meeting system emergencies [Recommendation (20)]"

Federal Power Commission - December 6, 1965 & July 1967*

"We make the recommendations set out below on the basis of our study to date. . . . 9. Our preliminary investigation makes clear that the type and distribution of generating reserves available may be as important as the amount, insofar as emergency use is concerned. The utilities . . . must make a more sophisticated evaluation of the time factor involved in the utilization of spinning reserves in order to determine the responsiveness of the components of the total spinning reserves to emergency demands. . . . . We recommend that the factor of quick responsiveness in the event of emergency should be given due consideration in the evaluation of alternative generating projects. [December 6, 1965 Report @ P. 44] . . . Generating capacity reserve requirements for a given system need to be predicated on a careful appraisal of its load projections, its requirements for scheduled and emergency maintenance, its ability to receive emergency capacity support through interconnections . . . Adequate generating capacity reserves constitute one of the basic prerequisites for a reliable bulk power supply. Their

determination, therefore, deserves most careful and comprehensive study and analysis. In this regard, it should be emphasized that the measure of adequacy in generation reserve requirements among systems should not be judged on a percentage of load basis. Reserve requirements will differ among systems depending on the seasonal characteristics of their loads and their ability to carry out necessary generating unit maintenance during periods of reduced demand. [July 1967 Report, Vol. II @ PP. 13-14] . . . When evaluating spinning reserve, it is important to take into account the condition of all generating units since their response times . . . will vary from time to time depending upon their mechanical condition, for example, the status of their auxiliaries . . . Performance tests should continue to be carried out . . . to ascertain and keep current data on generating unit and system response to load change. [Id. @ PP. 21 - 22]".

Federal Power Commission - August 4, 1977*

"Other indications of Con Edison's inability to provide reliable service are apparent from the fact that . . . Con Edison failed to put into operation all of its idle combustion turbine units . . . [B]ased on our preliminary study made to date we recommend that the following actions should be immediately taken by Con Edison: . . . (4) Automate all small combustion turbine units for quick start-up by remote control, and until that can be accomplished, all such units should be manned full-time. Unmanned and inoperative generating units have little or no value in preserving system operability under conditions of extreme emergency . . . (8) It is obvious that had Con Edison more spinning reserve on its own system at the time of the outage and had it been generating more of its own power requirements . . . it may have been able to withstand the initial disturbances. Con Edison must reassess, in conjunction with the other members of NYPP and the New York Public Service Commission, the existing provisions of the Pool Agreement and directives of the New York Public Service Commission in order to provide for a greater degree of local area security generation [Staff Report @ PP. 3-5]".

Consolidated Edison Company of New York, Inc. - August 24, 1977*

"[T]he Board [of Review] now recommends that the following measures be initiated promptly: . . . 3. Perform monthly fast load pick-up tests on all base load generating units to assure 10 minute reserve availability 4. Install Fast Load Pick-Up and Maximum Generation alarms at all Gas Turbine sites. 5. Perform monthly fast-load pick-up tests on aircraft gas turbine units at all sites including the electric generating station satellite gas turbines. 6. Report the temporary unavailability of machines . . . at all gas turbine sites and modify the reserve figures accordingly [Second Phase Report @ PP. 21-22]".

Improvement of Relay & Switching Equipment

Public Service Commission - September 15, 1977*

"We recommend that Con Edison make new studies of the relative advantages of a breaker and a half switch-

ing arrangement at Buchanan and also at Pleasant Valley, which is currently separated into two different buses. [Recommendation (17)] . . . . Con Edison must completely reevaluate its policy about reclosing and relay settings. [Recommendation (24)]."

Federal Power Commission - December 6, 1965 & July 1967*

"6. The power failure [of November 9, 1965] demonstrated the importance of close and frequent checks of relay settings controlling major facilities. The companies concerned should make a check immediately and establish procedures for frequent reviews in the light of changing circumstances. [December 6, 1965 Report @ P. 44] . . . . 9. Special attention should be paid to transmission line routing, and to switching arrangements at generating stations and at principal interconnections in the transmission network to provide maximum reliability in emergencies. . . The economic growth of the industry will of necessity require the concentration of large amounts of power at generating centers and the movement of large blocks of power on transmission rights-of-way. Particular care should be taken to avoid excessive concentration of critical circuits, which would expose the system unnecessarily to large loss of capability. . . . 20. Plans should be made and to the extent feasible, tested for the quick isolation of generating units to maintain them in operation if collapse of system power is imminent. . . . . Switching procedures must be carefully planned to isolate appropriate units quickly in an emergency. [July 1967 Report, Vol. I @ PP. 90-92]. . . . 7. Substation switching arrangements should be utilized which avoid excessive concentration of critical circuits, thereby exposing the system to a serious loss of transmission capability should such a substation be partially or totally interrupted. Switching arrangements should also permit the effective maintenance of equipment, such as circuit breakers, without subjecting the system to unnecessary risk. 8. Relay schemes should be employed which minimize complexity and present the required protection with the least hazard in the event of faulty operation or testing errors. The relay system itself . . . should not constitute a limiting factor. Adequate protection should be provided to safeguard against the failure of circuit breakers to operate properly. [July 1967 Report, Vol. II @ P. 14]."

Federal Power Commission - August 4, 1977*

"9. Because of the apparent failure of equipment protecting major facilities, Con Edison must reassess the adequacy of such protective equipment and revise its procedures to test it more. [Staff Report @ P. 6]."

Consolidated Edison Company of New York, Inc. - August 24, 1977*

"[I]t is recommended that the following measures be initiated promptly: 1. Expand the scope for testing protective relay equipment to insure that it includes provisions for verifying that the protective relay system is functioning properly as a system. 2. Review operating performance tests after maintenance work is completed to assure that these tests adequately simulate actual operating conditions. 3. As a temporary measure, bypass the supervisory control circuit synchronizing check relays at 345 Kv substations to permit manual closing in an emergency regardless of phase angle. Also reset the automatic reclosure synchronizing check relays at Buchanan to 40°. . . . The automatic reclosing arrangements should be reviewed to determine whether the temporary changes should be made permanent and whether other changes should be made to increase the probability of reclosing lines without other adverse effects. [Second Phase Report @ P. 39]."

System Contingency Planning

Public Service Commission - September 15, 1977*

"Since the UPNY-Con Edison ties are utilized for the dual purpose of transferring its own northern generation, as well as firm, economy and emergency power interchange . . . [and] [t]he disturbance of July 13 resulted in stresses upon the [Con Edison] system in excess of that assumed in the [New York Power Pool] criteria . . . [w]e recommend that . . . a study should be conducted by the [New York Power Pool] and Con Edison to determine if the Con Edison transmission system should be designed using more than a single contingency [Recommendation (1)] . . . the [New York Power Pool] and Con Edison undertake a system to show the effects of multiple contingencies and to establish a guide of what steps, including load shedding, should be taken to prevent widespread disruption [Recommendation (3)]. . . . a study should be conducted by Con Edison to determine this sufficiency [of the current north-south power transfer capability based on New York Power Pool planning criteria]. [Recommendation (2)]."

Federal Power Commission - December 6, 1965 & July 1967*

"5. The stability studies carried out by the systems in the CANUSE area . . . did not postulate an emergency of the proportions which occurred. Additional stability studies are urgently required based upon the more stringent assumptions as to credible incidents which have now been shown to be necessary . . . [December 6, 1965 Report @ P. 44] . . . Immediately following the failure of November 9 [1965], the Commission initiated a series of intensive studies of the Northeast transmission network to determine its ability to respond to severe faults and losses in either load or generation . . . Most of the cases tested are characterized as 'double contingencies,' since they combine the occurrence of a severe incident with the prior or simultaneous occurrence of another serious incident . . . The test results indicated both stable and unstable conditions . . . Various groups in the Northeast have sponsored several

independent studies by consulting firms . . . The consultant examined the effects of severe disturbances involving loss of lines or generating units on system stability. For many of the cases, it was concluded that system separation was a possibility. Even so, there is some question about whether the criteria for assumed disturbances were sufficiently severe. [July 1967 Report, Vol. I @ PP. 15-16] . . . Transmission must be recognized as the principal medium for achieving reliability, both within a system and through coordination among systems . . . Cascading power failures are usually the result of insufficient capability within the links of a system or group of systems to withstand the demands placed upon them by reason of disturbances . . . [T]ransmission has the multiple functions of energy transportation and system integration . . . the need not only to dispatch generation economically, but also to handle emergency flows . . . This requires maintaining at all times margins of transmission capability above scheduled transmission line flows so as to tolerate such power swings. . . . New and existing interconnections should be examined critically to determine whether the system has adequate capacity to remain in operation under a wide variety of assumed serious emergencies. [Id. @ P. 44]. . . System performance should be determined for a wide variety of contingencies and steps taken in system design and operation so as to assure that no major system interruption . . . will result. Typical contingencies include . . . the outage of all transmission circuits on any one common right-of-way . . . the outage of an entire transmission substation [July 1967 Report, Vol. II @ P. 14]."

Federal Power Commission - August 4, 1977*

"The Commission should initiate a review of recent stability studies of the New York Power Pool with particular reference to assumptions as to credible incidents. . . Examine the adequacy of contingency planning, including capability to withstand individual and multiple equipment failures under various conditions . . . each [reliability] council should reexamine the reliability criteria it has promulgated for the purpose of assuring that the experience of the Con Ed System is taken fully into account. In particular, contingency planning should be reexamined to determine whether the list of credible incidents should be expanded to reflect the Con Edison experience . . . [A]ll utilities [should] (2) Review the transmission capability into major load centers to determine the vulnerability of such load centers to a single or multiple transmission outage. [Staff Report @ PP. 75-78]."

Consolidated Edison Company of New York, Inc. - August 24, 1977*

"The Board of Review's Third Phase Report will include . . . appropriate recommendations concerning: 1. The design of the present system to determine its adequacy with relation to state, regional and national design criteria. 2. The adequacy of transmission planning criteria relative to the geography and weather conditions on the system. [Second Phase Report @ PP. 67-68]."

Provide Lightning Protection

Public Service Commission - September 15, 1977*

"We recommend that . . . Con Edison should analyze the lightning performance of its overhead transmission lines, especially its double circuit tower lines [Recommendation (21)] . . . [Since] [l]ightning protection at the Buchanan substation . . . does not exist . . . Con Edison should study the desirability of installing lightning masts or shield wires at the Buchanan substation and the major substations [Recommendation (22)]."

Federal Power Commission - December 6, 1965 & July 1967*

"In order that a longer term review could be made of the nature and magnitude of interruptions which have occurred on power systems in the United States, information was assembled from various sources on interruptions which have occurred since 1954. . . . Fifty-three percent of the failures were due to storms . . . In the category of weather-interruptions, lightning is a frequent offender. . . . If a flashover occurs, permanent interruptions are avoided in most instances by the automatic fast opening and reclosing of circuit breakers. . . . Further protection is provided at substations by lightning arrestors which divert lightning surges before they reach vital and vulnerable terminal equipment. [July 1967 Report, Vol. I @ pp. 26-27] . . . Key challenges confronting reliability of bulk power supply can be grouped under the following elements . . . (h) Use of equipment specially designed to withstand adverse environmental conditions in areas where they frequently occur. [Id. @ P. 42] . . . Substation switching arrangements should be utilized which avoid excessive concentration of critical circuits thereby exposing the system to a serious loss of transmission capability should such a substation be partially or totally interrupted. [July 1967 Report, Vol. II @ P. 14]."

Federal Power Commission - August 4, 1977*

"Because of the apparent failure of equipment protecting major facilities, Con Edison must reassess the adequacy of such protective equipment and revise its procedures to test it more. [Staff Report @ P. 6] [I]t is essential that all utilities . . . take the following actions as promptly as possible: . . . (6) Reassess design and operability of protection and control equipment, including lightning arresters [sic] . . . [Id. @75]."

Consolidated Edison Company of New York, Inc. - August 24, 1977*

"The Board of Review's Third Phase Report will include . . . appropriate recommendations concerning: . . . 8. The design of individual transmission lines to determine whether improvements in lightning protection are required. This will include a study of past lightning performance and a determination of whether specific design changes can reduce the probability of lightning outages in the future. [Second Phase Report @ PP. 67-68]."

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Load Shedding

Public Service Commission - September 15, 1977*

"[I]mplementation [of manual load shedding] was impeded by confusion on the part of the System Operator or possible malfunction of the remote control equipment. . . . It may be that a predominantly cable system such as Con Edison's cannot depend upon automatic load shedding as the 'last line of defense' without additional measure to insure that this load shedding will . . . prevent a system shutdown. . . . . We recommend that the entire manual load shedding scheme be reevaluated by Con Edison to determine what steps are necessary so that load can be shed faster than the present system allows. [Recommendatiqn (13)] . . . . [W]e recommend that Con Edison evaluate its reliance on automatic load shedding. [Recommendation (14)]."

[Note: Responding to a request from the Public Service Commission dated November 13, 1967 for a "summary of progress made . . . to date . . . since but not before the black-out of November 9, 1965", Consolidated Edison Company of New York, Inc. advised that "[e]quipment is being installed to allow the System Operator to reduce voltage manually in two steps more rapidly then the present supervisory control system provides. . . . . In conjunction with the automatic load dropping equipment being installed, see Item 2.2b, facilities are being provided to permit the System Operator to disconnect this same load. . . . The equipment will provide for the selection of area and for the restoration of the shed areas. At present, the System Operator has the ability to disconnect almost all system load via the existing supervisory systems. The new system will permit faster operation and better selectivity."

Federal Power Commission - December 6, 1965 & July 1967*

"The Company (Consolidated Edison] has placed in effect a system of load shedding through automatic voltage reduction which will be applied in two steps by the action of underfrequency relays. . . . In addition, the Company has agreed to the automatic and manual load shedding procedures adopted by the Northeast Power Coordinating Council. . . . The operating program now in effect relies entirely on the judgment of the system operator to shed loads manually if automatic voltage reduction is insufficient. This places an excessive responsibility on individuals to take timely and correct action under emergency stress, and unnecessarily subjects the city's power supply to significant risk. Although skilled operators have been able to bring systems through critical subnormal frequency situations without interrupting loads, the margin between success and failure can be very narrow. [July 1967 Report, Vol. I @ PP. 13-14]. . . . It is important that load be shed rapidly enough to prevent a frequency reduction below about 58.0-58.5 cycles. Otherwise, system recovery, unless it has large hydroelectric resources, is likely to be unduly prolonged, inviting further decline and possible collapse of system power. . . . Load shedding may not be effective, and in fact can be hazardous, if not coordinated by systems which are closely interconnected . . . . A

change in frequency follows area isolation almost immediately [and] [u]nless arrangements are provided for automatic control, there is little likelihood of satisfactory load reductions . . . . Each system, area and region should carefully study its load shedding program to avoid the possibility of overloading inadequate internal ties . . . . Such contingencies may require special consideration in the application of automatic underfrequency relays until adequate transmission can be built. [Id. @ P. 50] . . . . Utilities should work closely with state commissions . . . in setting up their programs of load shedding. (Id. @ P. 51] . . . . [I]t is important that systems adopt coordinated programs of load shedding . . . . The effect of these programs should be carefully checked for a variety of unusual loading conditions during an assumed severe disturbance. [Id. @ P. 92]. . . . . Load shedding may be done manually . . . or automatically . . . . In either case, the amount and location of load to be interrupted to meet an emergency situation must be analyzed before the fact in order to judge its effectiveness and to assess its impact on transmission line loadings. [July 1967 Report, Vol. II @ P. 15]

Federal Power Commission - August 4, 1977*

"(5) Since the existing load shedding procedures and the related equipment failed to fulfill their intended mission, Con Edison must reassess and revise its emergency procedures and upgrade the ability of its system to shed load quaickly and to the degree necessary to maintain the integrity of its system. (6) Con Edison's internal emergency procedures and training of personnel to cope with emergency situations evidently have to be reassessed. Serious questions remain as to the adequacy of manpower at the Control Center at times of emergency, management's standing instructions to its operators, and the soundness of judgment exercised by the Company's personnel as to the actions that could have been taken, that moght have enabled the system to withstand the initial disturbance. [Stadd Report @ P. 5].

Consolidated Edison Company of New York, Inc., August 24, 1977*

"2. Expand the training of System Operators. For the short range, the training procedures should emphasize manual load-shedding criteria and procedures . . . . [Second Phase Report @ P. 67] . . . . The Board of Review's Third Phase Report will include . . . appropriate recommendations concerning: . . . 3. The failure of the system to remain stable after it was separated from the neighboring utility systems and after the automatic load shedding had operated. 4. The implementation and effectiveness of manual voltage reduction and load shedding to relieve emergency conditions on tie lines. [Id. @ PP. 67-68]."

Providing Emergency Information to Public Authorities

Public Service Commission - September 15, 1977*

"The Central Information Group . . . 'is responsible for the acquisition of pertinent information relating

to system conditions and disseminating this information . . . where appropriate to Federal, State and municipal authorities.' Document E-60-6 [sic] spells out in detail when and who should be notified during different steps of an emergency. Con Edison's CIG on July 13 did not properly carry out its function since it did not notify any Federal, State or municipal authorities during the emergency. [Second Report @ P. III-10] . . . . [W]e recommend that Con Edison should immediately implement a program to ensure that the Central Information Group is able to carry out its important function correctly. [Recommendation (16)]."

Federal Power Commission - December 6, 1965 & July 1967*

"Utilities should work closely with state and other appropriate governmental authorities in setting up their programs of load shedding, and in establishing suitable procedures for informing the public or parties who may be affected. These measures, properly accomplished, should be helpful in protecting utilities from individuals who press claims for damage because of actions for the public good. [July 1967 Report, Vol. I @ P. 51]."

Consolidated Edison Company of New York, Inc. - August 24, 1977*

"[T]he Board [of Review] now recommends that the following measures be initiated promptly: . . . 10. Assign the responsibility for insuring that proper notifications are made by the Central Information Group to the newly established watch position of Senior District Operator. [Second Phase Report @ PP. 21-22]."

Relations With New York Power Pool

Public Service Commission - September 15, 1977*

"The New York Power Pool ordered the Con Edison System Operator to shed load. He did not! The procedures already exist that require a member company to shed load when the NYPP requests load shedding. . . . [W]e recommend that definitive terminology be set up so that it is always clear when a request to shed load by the NYPP has been made. [Recommendation (6)]."

[Note: The Public Service Commission Second Report dated September 15, 1977 observed, inter alia: "It is clear from the System Operator's actions on July 13 that he did not want to shed load even though he received instructions to so from the NYPP." Id. @ P. III-12]

"Discussions with the New York Power Pool indicate that the Pool operators have been instructed not to exceed short time emergency ratings (STE) of any transmission facilities. The STE ratings were exceeded during the course of events on July 13. The actions of the Con Edison System Operator indicate that STE ratings are not regarded as inviolable by Con Edison as they are by the New York Power Pool. . . . [W]e

recommend that this apparent inconsistency should be eliminated. [Recommendation (15)]."

[Note: The Public Service Commission Report dated September 15, 1977 observed inter alia: "The NYPP transmission planning criteria requires that bulk power transmission systems should be designed to meet specified normal and emergency operating conditions. . . . For normal power transfers, no facility will be loaded beyond its normal rating in the pre-disturbance condition. No facility will be loaded beyond its long term emergency (LTE) rating following the loss of a single circuit or double circuit transmission facility or a generating unit. . . . For emergency power transfers, no facility will be loaded beyond its long time emergency rating in its pre-disturbance condition. No facility will be loaded beyond its short time emergency rating in the post-disturbance condition." Id. @ PP. I-8 - I-9.]

Federal Power Commission - December 6, 1965 & July 1967*

"The principal requisites for an area or regional coordination effort designed to assure maximum reliability may be summarized as follows: . . . 3. The establishment of effective organizations and procedures to implement the necessary coordination among planning, engineering and operating personnel of the participating utilities, with assigned responsibility to review, adjudge, report upon and effectuate utility plans and practices within the area affecting bulk power system reliability. [July 1967 Report, Vol. II @ P. 6]

Consolidated Edison Company of New York, Inc. - August 24, 1977*

"[T]he Board [of Review] now recommends that the following measures be initiated promptly: . . . 9. Improve communications among NYPP member systems and the NYPP Control Center, especially at times of system emergencies. [Second Phase Report @ PP. 21-22]."

RECOMMENDATIONS CONCERNING RELIABILITY - Notes

* References marked with an asterisk (*) are to the following sources:

Public Service Commission - September 15, 1977	"Second Report-The Events Leading to the Consolidated Edison Company Blackout of July 13, 1977: Staff Task Force of New York Public Service Commission dated September 15, 1977"
Federal Power Commission - December 6, 1965 & July 1967	"Northeast Power Failure November 9, & 10, 1965-A Report to the President: Federal Power Commission dated December 6, 1965"
	"Prevention of Power Failures (An Analysis & Recommendations Pertaining to the Northeast Power Failure and Reliability of U. S. Power Systems-A Report to the President Federal Power Commission dated July 1967"
Federal Power Commission - August 4, 1977	"Federal Power Commission Staff Report on July 13-14, 1977 Electric Disturbance on the Consolidated Edison Company of New York, Inc. System: Federal Power Commission dated August 4, 1977"
Consolidated Edison Company of New York, Inc. - August 24, 1977	"Second Phase Report-System Blackout and System Restoration, July 13-14, 1977: Board of Review dated August 24, 1977"

** Reference with two asterisks (**) on Page 3 is to "Consolidated Edison Company of New York, Inc. Energy Control Center Long Range Plan" prepared by Boeing Electronics Division of The Boeing Company, Final Report dated September 4, 1974. That Report was reviewed and commented upon to the New York State Public Service Commission in "Con Edison-Management and Operations Study for the New York State Public Service Commission" prepared by Arthur D. Little, Inc., as a management audit (see Public Service Law §66(19)) and submitted in January 1975. In that Report to the Public Service Commission it was observed:

"In essence, they [Arthur D. Little, Inc.] reported that the Energy Control Center . . . signalling aplaratus is old . . . and some of it is unreliable . . . . Con Edison's consultant reported that the state-of-the-art in communications, display and control, had advanced considerably beyond that available to Con Edison when it was built [in 1962]. . . . Con Edison management . . . are concerned that these problems . . . have brought about a slow deterioration in the ability of the Energy Control System operators to respond to the extremely wide range of energy [sic] situations which can occur. . . . [T]he ability of system operators to handle emergency situations cannot be quantified; however, to date no customer service interruptions have been traceable to problems of the kind being discussed here." Con Edison-Management and Operations Study, supra at P. 25.

Mr. DINGELL. The Chair will recognize my colleagues for questions.

The Chair will recognize, first, for 5 minutes, the gentleman from New York, Mr. Ottinger, since he was first on the scene. After that we will recognize my good friend, Mr. Murphy.

Mr. OTTINGER. Thank you, Mr. Chairman.

I would just like to say, I think you have made a very valuable contribution to us, and that this report that you handed up today, the summary of recommendations, that compares the announcement of the Federal Power Commission and Public Service Commission in 1965 and 1977, is available, and your action in that interim is going to be of interest to us in pursuing this.

I would just hope that you would keep us advised as your investigation unfolds because we will have to deal with the Federal Power questions that concern us, the power of the Federal Power Commission or its successor now, the Federal Energy Regulatory Commission, to be able to step in and do something about these reliability systems.

Now, you indicated in your statement a little bit earlier that you were inclined to restrict the Federal authority to situations in which the private companies in two different States could not reach an agreement.

Mr. MILLSTEIN. Right.

Mr. OTTINGER. And to be able to step in and require that action be taken, I assume, set a fair price if the companies do not——

Mr. MILLSTEIN. Cannot do it.

Mr. OTTINGER [continuing]. Arrive at such an agreement. I wonder whether that doesn't have to go further because in making that kind of a determination you may affect the customers in one of the other systems. Let's say we require the ability to supply power from the New Jersey system and then in the event that was called upon, you might create a shortage in some of the New Jersey communities. I wonder if we don't have to, in that kind of situation, to be able to require additional either interties or generating facilities within the State systems to be able to back up the interconnection that we are ordering?

Mr. MILLSTEIN. Yes, I understand very well your question.

My problem is this: I understand, first of all, that any intertie would have to be in the public interest. There has to be a standard. I don't obviously mean that the Federal Government could come in and just say, "Do it." There has to be a public interest standard. There has to be a reimbursement standard. There has to be a cost of service standard. There would have to be hearings, clearly, and they will be quite complicated hearings.

Now, the reason I restricted my suggestion to reliability interties is that I did not want to enter into the economic intertie debate. I recognize that if you go into the economic intertie debate you wind up arguing about a national grid; and I don't want to do that, because that is not the area that our Commission is interested in.

So I was trying to shrink back the power to intertie to just what concerns us, and it seems to be minimal, namely, an intertie for reliability purposes, not for the purposes of buying power cheaper from New Jersey. If it should be decided that strengthening the Ramapo connection, for example, is really necessary from the

public interest of the city of New York to keep it alive in an emergency situation, that is the kind of situation I am talking about, not necessarily to buy power cheaper.

It seems to me, Congressman, that if we limit it to a reliability standard you will have less of the problems of determining about new generating stations in the neighboring State and so on. Whereas if you get into the economic intertie business, then you really are putting the Federal Government in the business of telling people in New Jersey to build power stations to help out New York at a cheaper price.

So I just have a very modest suggestion, that maybe it would make it less politically unacceptable if the committee were to consider interties for reliability purposes where the public interest indicates that such an intertie is necessary for the welfare of the given community, regardless of the cost.

Mr. OTTINGER. While I favor the economic interties, I think the two are severable.

Mr. MILLSTEIN. Yes.

Mr. OTTINGER. What I was addressing myself to was the reliability intertie and the need perhaps to go beyond the mere requirement of the intertie in order to be able to make the reliability standard effective.

Mr. MILLSTEIN. Congressman, I understand you. I think you are right.

Dr. Brancato, do you agree? It may be necessary in determining—I don't want to be simplistic, but it may be necessary, Congressman, in order to make a reliability intertie to require some building someplace. That is why hearings have to be provided for and there has to be a standard. Although I do think if you limit the intertie to reliability you are less likely to get into compelling a major building program in a neighboring State.

Dr. Brancato?

Ms. BRANCATO. I think that is probably true. From our point of view, it is to maintain system reliability that these ties are so critical, so the overall economic argument does diffuse, I think, the argument for reliability.

Mr. DINGELL. Don't we have a twofold problem? One is the question of intertie for reliability, but we also have the problem which goes to, really, the reliability of the system itself?

Mr. MILLSTEIN. Right.

Mr. DINGELL. On the other hand, you have the reliability of the system because the system is really the sum of all of the equipment plus the electrical current that it generates, that flows through it; right?

Mr. MILLSTEIN. Yes.

Mr. DINGELL. So we have to have some mechanism of assuring here in the case we are inquiring that we get both, one, reliability of the system as a whole, but, two, component reliability of the sundry parts of the system. Is that right?

Mr. MILLSTEIN. Congressman, that is why I gave you my exhibit 6, because I believe that where the Federal Power Commission had made recommendations but could only "jawbone" in the very area that you are talking about, namely, reliability of the components of the system itself, which is like training people, the control room,

reserves, et cetera, you might want to consider a Federal presence there.

Mr. DINGELL. It goes right down to the question of a switch that might or might not work, or some kind of a safety mechanism that might or might not work as well as generating equipment or pumps that don't pump oil to cool lines or that don't pump oil to cool bearings, so you get square bearings when the system goes down.

Mr. MILLSTEIN. Or a phase angle regulator.

Mr. DINGELL. Yes.

Mr. MILLSTEIN. But there again I was trying to be careful because I don't want to make a recommendation that gets off into another imbroglio. I have read the testimony of the utilities and I don't know the answer to it, which is that you have all these hundreds of utilities around the country with different problems and systems with different problems. Do you really want to inject a Federal presence into all these multitudinous reliability questions which vary all over the country?

Now, that generates a lot of heat and debate and it seemed to me—and, again, I am being parochial; I am talking about my city—but that is what you invited me to come down and talk about—parochially, what we are interested in is reliability interconnects.

Mr. OTTINGER. In the city situation, it would have been very useful if the Federal Power Commission could not only resolve disputes with respect to the intertie but also could establish standards of reliability with respect to the control room, the pumps and so forth.

Mr. MILLSTEIN. My only question is, to do that without setting up a cumbersome Federal administration which looks into everything all over the country, it is a big question.

Mr. DINGELL. The time of the gentleman has expired. The Chair recognizes the gentleman from New York, Mr. Murphy.

Mr. MURPHY. Thank you, Mr. Chairman.

I certainly appreciate the opportunity to welcome my fellow New Yorker and to congratulate him on the work he has done. Dr. Brancato, I assume is also a New Yorker?

Ms. BRANCATO. Yes, indeed.

Mr. MURPHY. This is not the first time we have been down this trail. I was on the 1965 committee with the then chairman, Walter Rogers, and we went through the system pretty carefully and closely, made some very strong recommendations.

Obviously, we lost about 12 hours somewhere over the years. We were able to get the system back in 15 hours in 1965. What did it take? About 26 hours this time? Somewhere thereabouts. Probably the vast difference between the two blackouts was that the interconnection broke at Green Point and kept Staten Island on line, and this time the system worked like it should have, and the Linden interconnection actually was in proper working order.

Perhaps we should have left that connection alone for the benefit of those people. We have proposed in our energy legislation, or I have—unfortunately, it was rejected by the committee—a proposal that we permit a region or State to have more power in the charting of its energy destiny, particularly in these fields.

As you know—and I think as you have expressed—when we get into the private power picture we are dealing in a very delicate private enterprise area. Our State has traditionally had public power as well as private power competing systems. It worked well through the 1930's, 1940's, 1950's, 1960's, to 1965 anyway, and then we had these blackouts.

We know that today it is not just loss of power that causes such serious problems but it is the problem within the society that generates from that loss of power; so that we cannot in effect tolerate an outage of any period of time in certain areas of our city.

I am going to be listening to you and Dr. Brancato and the other experts here in the short time ahead. I thought that this situation was so critical that I wrote to the President about it in August and to date have not gotten a satisfactory response as to what the Federal Government is doing, because of the critical nature of what happened in New York at that time, that it is more than power and it is more than a power outage; and it is definitely the role of the Federal Government to take a stronger position, and if the Congress is the branch that has to make the rules in that role, it will be taken care of.

I certainly hope that we will have an understanding from our colleagues in other parts of the country outside the city limits to understand what the problem within the city limits are, and that we can't tolerate blackouts or outages for any substantial period of time.

I certainly appreciate your testimony and statements.

Mr. DINGELL. Before the Chair recognizes counsel for further questions, it would help us much, Mr. Millstein, after your very able presentation and careful study, if you and the professor would take a look at sections 541 through 545 and following of our bill, copies of which will be made available to you, and make suggestions to us regarding how you feel those might be of assistance in meeting the problems which beset you in New York in recent times.

We have tried to provide authority in there to the Federal Power Commission, over interties, over wheeling, over interconnections, displacement and interchange, and also over reliability, and your comments to enable us to perhaps find them would be much appreciated, because we have to go to conference on this matter very shortly, and we may be able to perfect them in the light of your rather unhappy recent experience.

Mr. MILLSTEIN. We will.

Mr. DINGELL. We want you to know how grateful we are. You have given us immensely helpful testimony.

Mr. MILLSTEIN. We thank the committee for its interest. You are very helpful to the city.

Mr. DINGELL. You observe the strong interest not only on behalf of members of the staff but my colleagues who come from New York.

Mr. MILLSTEIN. Thank you very much.

Mr. DINGELL. Our next witness is Mr. John R. Vogel, Jr., Executive Director of the New York Power Pool, 3890 Carman Road, Schenectady, N.Y.

Mr. Vogel, we are delighted you are with us. If you will come forward, identify yourself and any associates you wish to have at the witness table with you, we will be delighted to receive your testimony.

STATEMENT OF JOHN R. VOGEL, JR., EXECUTIVE DIRECTOR, NEW YORK POWER POOL, ACCOMPANIED BY LEON A. ALLEN, JR., COUNSEL; ROLLAND A. MERRILL, JR., OPERATING MANAGER; AND WILLIAM J. BALET, PLANNING MANAGER

Mr. DINGELL. You may have any of your associates with you at the table, if it be your wish.

Mr. OTTINGER. Mr. Chairman, may I ask one question?

I am not sure what the answer is, but does LeBoeuf, Lamb, Leiby & MacRae represent ConEd?

Mr. ALLEN. We have from time to time.

Mr. DINGELL. Are you representing them here today, sir?

Mr. ALLEN. No, sir; I am not.

Mr. DINGELL. You don't feel any conflict between your responsibility in appearing here as counsel? I assume you are appearing here as attorney for the New York Power Pool; is that correct?

Mr. ALLEN. I am, sir.

Mr. DINGELL. You don't feel any conflict between your responsibilities?

Mr. ALLEN. I do not represent Consolidated Edison in this proceeding.

Mr. DINGELL. I am sorry; you can carry forward with that responsibility.

Mr. Vogel, you may consider yourself recognized for your statement.

Mr. VOGEL. At your pleasure I will be happy to read my statement into the record.

Mr. DINGELL. Would you like to summarize your statement? That may be the best way for us to proceed, and we will insert, without objection, your full statement into the record.

Mr. VOGEL. Thank you, sir.

My statement outlines the organization of the New York Power Pool. Again, the pool was formed to operate the integrated bulk power supply system within New York as well as to provide detailed planning, and, of course, currently, environmental matters, and coordinate these activities among all of the pool member systems.

The organization of the pool consists of an executive committee, which is represented by a member from each of our eight member systems, the chief executive officer with an alternate and other principal officers of the company, substantially all of the standing committees are represented at pretty much the vice president level within the eight-member systems.

I would like to turn briefly to the events of July 13.

During this time, several minutes prior to the disturbance, the members, the pool member systems, were collectively importing approximately 632 megawatts of power from New England, 798 megawatts from Ontario, and collectively delivering 210 megawatts to PJM interconnection. It was designed to permit the import of up

to 1,200 megawatts from New England, 960 from Ontario, and the export of 2,225 megawatts to the New York-Pennsylvania companies. Thus, the system, and this is just immediately prior to the blackout, was operating well within the prescribed limits, and these transfers would be expected under the load and weather conditions that we had in effect at that point in time.

As the system disturbance, which initiated at 8:37 p.m. progressed, the pool's interconnection with Ontario and the New England Pool remained in normal service. However, the ability to import power through the interconnections with New Jersey became affected, although this effect was not recognized until after the second lightning stroke. Following the second lightning stroke at 8:55 p.m. the interconnection between Public Service Electric & Gas from Branchburg, N.J., to Con Edison via Ramapo and Millwood, was effectively interrupted by the loss of all circuits between Ramapo and Millwood.

This, coupled with the loss of generation in the Con Edison system and the opening of a Millwood-Pleasant Valley 345 kV line, resulted in excessive power flows on the New England/Long Island interconnection, a submarine cable between Norwalk Harbor, Connecticut, and Northport, Long Island, as well as the New Jersey/Con Edison interconnection via Staten Island known as Linden-Goethals.

This situation was aggravated by the interruption of the high capacity 345-kV overhead line between Con Edison and Niagara Mohawk at 9:19 p.m. The Long Island Lighting Co. operator opened the Long Island-Con Edison tie known as Jamaica-Valley Stream at 9:22 p.m. to prevent damage to both that circuit and the New England/Long Island interconnection, which at that point in time were overloaded.

The interconnection between Consolidated Edison and New Jersey via Staten Island remained in an overloaded condition until 9:29 p.m., when it opened because of damage to a phase angle regulator in the circuit. This left the Con Edison system isolated.

With the exception of the Linden-Goethals interconnection, which had been damaged and tripped out of service, and the Jamaica-Valley Stream interconnection, which was opened manually, the Con Edison substations which formed the points of interconnection with neighboring systems and pools remained in service. During this period the other members of the New York Power Pools as well as neighbor organization systems in New England-Pennsylvania-New Jersey stood ready to provide service as required by Con Edison to begin the restoration of power. The Jamaica-Valley Stream tie was energized from Valley Stream at 11:26 p.m.

I would like to point out that committees have been formed by the New York Power to investigate the details associated with the activities of the night of July 13, and these investigations have been under way for some time, but they have at this point in time not been completed.

Leaving the events of July 13, I will now discuss the methods by which the members of the New York Power Pool plan and operate the New York State bulk power system on an integrated and coordinated basis with the other systems in the North American

power grid. As I have stated, the member systems of the New York Power Pool are all members of the Northeast Power Coordinating Council (NPCC). NPCC is one of the nine regional reliability councils in the Nation; it includes the utilities in New York, New England, and the neighboring Canadian Provinces of Ontario and New Brunswick.

The New York Power Pool has numerous interconnections at various voltage levels, including 3 to Ontario, 8 to New England and 10 to the Mid-Atlantic Area Council, the regional reliability council to the south, which is PJM. In addition, the power authority of the State of New York is constructing a 765 kV interconnection to Hydro Quebec to transmit hydroelectric power from Quebec down to New York.

The members of NPCC, including the New York Power Pool members, design their systems according to the NPCC "Basic Criteria for the Design and Operation of Interconnected Power Systems." This set of criteria is on file with the Federal Energy Regulatory Commission and the New York State Public Service Commission.

The member systems of the New York Power Pool, as members of the Northeast Power Coordinating Council, are participants in an agreement between NPCC and the Mid-Atlantic Area Council (MAAC) dated December 15, 1968, and an agreement between NPCC and the East Central Area Reliability coordination agreement (ECAR) dated August 1, 1969, both filed with the Federal Energy Regulatory Commission under Order 445. In addition, ECAR has a similar agreement with the utilities in Virginia and the Carolinas.

These agreements provide for constant review of bulk power system reliability. Technical studies are prepared regularly, in which the NYPP members participate through NPCC, which discuss the reliability of the existing system and planned systems as they are projected to be up to 10 years in the future. When system limitations are discovered these are referred to the pools and utilities involved for review. Through this mechanism a review of the integration and adequacy of the bulk power systems of 19 States and 2 Canadian Provinces regularly takes place.

In addition to their participation in planning through NPCC, the member systems of the New York Power Pool have pool-to-pool agreements with NePOOL, the PJM systems, and Ontario Hydro. These agreements provide for regular review of the operating procedures and bulk power system planning through committee structure and in somewhat more detail than the interregional agreements. Through these channels the New York Power Pool insures that its present interconnection capability is adequate and that future increases in interconnection capability will be timely, reliable, and economical.

Federal and State regulatory authorities have played and continue to play an active role in reviewing the plans of the member systems of the New York Power Pool. As a part of NPCC and NYPP bulk power system expansion plans are filed annually with the Federal Energy Regulatory Commission in accordance with docket R–362, order 383–4.

The member systems of the New York Power Pool are required by New York State law to file annually with the New York State Public Service Commission (PSC) a report on their bulk power system expansion plans for a 15-year period.

The bulk power system plan is set forth in a document approximately 680 pages in length, which discusses such issues as rate of load growth, economics of various levels of installed generating reserve, fuels for future generation facilities, and the adequacy of the bulk power transmission system, including interconnections with neighboring systems. This plan is then the subject of public hearings, which typically consist of 1 day of hearings with the full Commission present followed by extended hearings before an administrative law judge.

Following the close of the hearing the Public Service Commission issues an opinion in which the plan is reviewed and the Commission may order modifications in subsequent annual reports. These modifications range from changes in assumptions used in load forecasting, to request for presentation of additional data, to suggestions as to the level of installed reserve which is appropriate to use for planning purposes.

New York State also has laws relating to the certification of generation and bulk power transmission facilities. In order to construct thermal generation rated at 50 MW or larger within the State, a certificate of environmental compatibility and public need must be obtained from the New York State Siting Board under article VIII of the Public Service Law.

To obtain such a certificate it is necessary to present a case establishing the need for the proposed generating facility, examining alternate sites for the proposed facility, and minimizing any adverse environmental impact. Hearings are conducted before two administrative law judges; one representing the Public Service Commission and the other representing the New York State Department of Environmental Conservation. There is participation in the hearing by various State agencies including the department of environmental conservation, county and local governments and various intervenor groups.

Article VIII became effective in 1972. To date, there have been no certificates issued under this procedure. However, hearings on one application have been completed, a preliminary decision has been issued, and the siting board is presently considering the application. It is hoped that certification will be approved at an early date.

The certification of bulk power transmission facilities including interconnections is subject to the jurisdiction of the Public Service Commission under article VII of the Public Service Law. In order to construct a transmission line of 125 kV or more extending 1 mile or more, or of 100–125 kV extending more than 10 miles, other than underground lines in a city, a utility must obtain a certificate of environmental compatibility and public need.

The utility submits an application to the PSC, which then schedules public hearings before an administrative law judge in which various agencies of Government and intervenor groups participate. During the hearings, need for the facility must be demonstrated and the environmental impact of various routes are analyzed. Fol-

lowing the public hearings the Commission may certify a specific route and type of construction which then permits the utility to construct the facility. A number of transmission facilities have been certified under article VII, which became effective in 1970.

In addition, nuclear generating capacity construction is subject to Nuclear Regulatory Commission jurisdiction, while hydro and pumped storage construction and the associated primary transmission facilities are subject to licensing by the Federal Energy Regulatory Commission.

If I may summarize the major points concerning planning of facilities: 1. The member systems of the New York Power Pool participate through the regional reliability council programs in an extensive coordinating effort designed to assure the maintenance of adequate interconnection capability.

2. New York State regulatory agencies are deeply involved in the planning process in New York State. They provide mechanisms for public input and regulatory review of the system long-range plan.

3. Statutory certification procedure exists for the siting of generation and transmission facilities, including interconnections. These proceedings examine the need for any major facility and its various environmental impacts.

I thank you. I will be very happy to respond to any questions that you have.

[Testimony resumes on p. 89.]

[Mr. Vogel's prepared statement follows:]

CONGRESS OF THE UNITED STATES
HOUSE OF REPRESENTATIVES

Subcommittee on Energy and Power
of the
Committee on Interstate and Foreign Commerce

October 13, 1977

STATEMENT OF JOHN R. VOGEL, JR.

My name is John R. Vogel, Jr., and I am Executive Director of the New York Power Pool. I am pleased to appear before the Subcommittee on behalf of the member systems of the New York Power Pool, and I hope I may be of some assistance in describing the operations and planning of the Pool.

The member systems of the New York Power Pool ("NYPP") operate an integrated bulk power system which interconnects with neighboring utilities and regional reliability councils. The system has direct ties with the New England Power Pool ("NEPOOL"), Ontario Hydro and the systems in Pennsylvania and New Jersey which are members of the Pennsylvania-New Jersey-Maryland Pool ("PJM") and which are part of the Mid Atlantic Area Council. The New York Power Pool's members are also members of the Northeast Power Coordinating Council, as are Ontario Hydro, the New Brunswick Electric Power Commission, and the members of the New England Power Pool. Indirectly the New York Power Pool is tied to the other six interconnected regional councils

operating east of the Rocky Mountains in the United States and portions of Canada.

I would like first to describe generally the planning and operating functions which take place under the New York Power Pool Agreement. The term "New York Power Pool" is a means of describing the cooperative activities of the eight member systems under the Pool Agreement. The eight members consist of the seven principal investor-owned electric utilities in the State, as well as the Power Authority of the State of New York. The currently effective Pool Agreement is that dated as of April 4, 1977. This is the latest in a series of agreements; the first was signed in 1966. The principal revisions in the April 4, 1977, Agreement from the immediately preceding agreement provide for the implementation of statewide economic dispatch, a computer-directed generator loading system of substantial sophistication.

The New York Power Pool Agreement creates the committees necessary to carry out the purposes of the Agreement, as well as to coordinate the activities of the member systems. Many of the activities take place at the New York Power Pool Control Center in Guilderland, New York, near Schenectady.

The objectives of the New York Power Pool are best stated in the following quotation from Page 1 of the currently effective Agreement, which states:

> "The parties desire to achieve optimum coordination in the planning and operation of their electrical systems and to provide a means whereby all parties may realize and share in the mutual benefits which can be obtained thereby."

All activities engaged in by the members under the Agreement are coordinated and directed through the committee structure. The Agreement provides for an Executive Committee, an Operating Committee, a Planning Committee, an Environmental Committee, and a Public Relations Committee. Additional committees and task forces are set up on an ad hoc basis as necessary to implement particular projects or areas of responsibility.

The Executive Committee is comprised of a senior officer of each party to the Agreement and, as an alternate, a second officer authorized to act on his behalf. The Executive Committee reviews and directs the activities of the other committees. As Executive Director I act as liaison between the Executive Committee and the other committees, have administrative responsibility for personnel assignment to the Control Center, and am subject to the direct supervision of the Executive Committee.

The Operating Committee is comprised of a senior executive responsible for electric system operations, plus an alternate, from each party to the Agreement. The Operating Committee directs the activities of the Operating Manager of the Pool and establishes rules and practices required to coordinate the operations of the bulk power supply systems of the parties so as to insure reliability of service and economic operation. The Operating Committee is also responsible for modifications to, maintenance, and operation of the physical facilities at the Control Center. The Operating Manager, under the direction of the Operating Committee, has direct supervision of the Operating functions performed at the Control Center. The Operating Manager is Rolland A. Merrill, Jr.

The Planning Committee is comprised of a senior executive responsible for electric system planning, and an alternate, from each party. It studies the need for additional generating and transmission facilities to best implement the purposes of the Agreement. In consultation with the Operating Committee, the Planning Committee reviews required system capability and recommends changes to the Executive Committee. The Planning Manager of the Pool, under the direction of the Planning Committee, supervises the electrical system planning work undertaken by the planning staff at the Control Center. The Planning Manager is William J. Balet.

The New York Power Pool Agreement also establishes an Environmental Committee and a Public Relations Committee which are comprised of senior executives and which direct Pool-wide activities in their respective areas of responsibility.

I will now turn to the events of July 13, 1977. At 8:30 PM on July 13, 1977, several minutes before the system disturbance started, the New York Power Pool members collectively were importing 632 megawatts (Mw) from New England and 798 Mw from Ontario, and were collectively delivering 210 Mw to PJM. The transmission system is designed to permit the import of up to 1,200 Mw from New England, 960 Mw from Ontario, the export of 2,225 Mw to New Jersey and Pennsylvania and thus was operating well within prescribed limits. Power flows of this magnitude and direction would be expected during hot, humid weather when the winter peaking utilities of Ontario and New England send power to the summer peaking areas of New York, New Jersey and Pennsylvania.

As the system disturbance which initiated at 8:37 PM progressed, the Pool's interconnections with Ontario and NEPOOL remained in normal service; however, the ability to import power through interconnections with New Jersey became affected, although not until after the second lightning stroke. Following the second lightning stroke at 8:55 PM

the interconnection between Public Service Electric & Gas from Branchburg, New Jersey to Con Edison via Ramapo and Millwood was effectively interrupted by the loss of all circuits between Ramapo and Millwood. This, coupled with the loss of generation in the Con Edison system and the opening of a Millwood-Pleasant Valley 345 kv line, resulted in excessive power flows on the New England/Long Island interconnection (a submarine cable between Norwalk Harbor, Connecticut, and Northport, Long Island), as well as the New Jersey/Con Edison interconnection via Staten Island known as Linden-Goethals. This situation was aggravated by the interruption of the high capacity 345-kv overhead line between Con Edison and Niagara Mohawk at 9:19 PM. The Long Island Lighting Company operator with the consent of the New York Power Pool operator opened the Long Island - Con Edison tie known as Jamaica - Valley Stream at 9:22 PM to prevent damage to both that circuit and the New England/Long Island interconnection. The interconnection between Consolidated Edison and New Jersey via Staten Island remained in an overloaded condition until 9:29 PM, when it opened because of damage to a phase angle regulator in the circuit. This left the Con Edison system isolated.

With the exception of the Linden-Goethals interconnection, which had been damaged and tripped out

of service, and the Jamaica-Valley Stream interconnection, which was opened manually, the Con Edison substations which formed the points of interconnection with neighboring systems and Pools remained in service. During this period the NYPP members stood ready to supply power to Con Edison to facilitate restoration of service. The Jamaica - Valley Stream tie was energized from Valley Stream at 11:26 PM.

As I have previously noted, the Operating Committee is responsible under the Agreement for modifications to, maintenance, and operation of the physical facilities at the Control Center. It is also responsible for the promulgation of rules and practices required to coordinate the operation of the members' bulk power supply systems.

In that capacity the Operating Committee was requested by Mr. T. J. Carlson, Chairman of the Executive Committee, to review the events of July 13-14, 1977, as they relate to Power Pool operations and procedures. The Chairman of the Operating Committee, Mr. John R. Gummersall, Jr., of Long Island Lighting Company, named David K. Laniak, of Rochester Gas and Electric Corporation, Vice Chairman of the Operating Committee, to chair a task force to undertake such a review. In addition to Mr. Laniak, the task force consists of Mr. J. F. Aldrich of Niagara Mohawk, Mr. A. N. Terreri of Consolidated Edison, Mr. W. H. Underwood of Long Island

Lighting, and Mr. Merrill, the Pool Operating Manager. Each of the individuals on the Task Force has many years of experience in the operation of bulk power supply systems. The Task Force has begun its review of the events of July 13-14 and has made an initial determination of the subjects for review. A scope of the review of each subject is in the process of preparation. Briefly, the areas of review by the Task Force include the following:

(1) Review the communications among NYPP member systems and the NYPP Control Center, especially at times of system emergencies, including the definition of appropriate terminology.

(2) Review the adequacy of electric system information available to the NYPP system dispatcher, those of NYPP member systems, and those of adjacent pools.

(3) Review the training of NYPP system dispatchers.

(4) Review NYPP operating procedures, including the interrelationships between NYPP system dispatchers and member systems.

(5) Review NYPP transmission voltage control actions and procedures during the restoration period following the July 13, 1977 outage.

(6) Review the actions of the NYPP dispatchers during the emergency.

Leaving the events of July 13, I will now discuss the methods by which the members of the New York Power Pool plan and operate the New York State bulk power system on an integrated and coordinated basis with the other systems in the North American power grid. As I have stated, the member systems of the New York Power Pool are all members of the Northeast Power Coordinating Council ("NPCC"). NPCC is one of the nine regional reliability councils in the nation; it includes the utilities in New York, New England and the neighboring Canadian provinces of Ontario and New Brunswick.

The New York Power Pool has numerous interconnections at various voltage levels, including three to Ontario, eight to New England and ten to the Mid-Atlantic Area Council, the regional reliability council to the south. In addition, the Power Authority of the State of New York is constructing a 765 kv interconnection to Hydro Quebec to transmit hydroelectric power to New York. The members of NPCC, including the New York Power Pool members, design their systems according to the NPCC "Basic Criteria for the Design and Operation of Interconnected Power Systems." This set of criteria is on file with the Federal Energy Regulatory Commission and the New York State Public Service Commission.

The member systems of the New York Power Pool, as members of the Northeast Power Coordinating Council, are participants in an agreement between NPCC and the Mid Atlantic Area Council ("MAAC") dated December 15, 1968, and an agreement between NPCC and the East Central Area Reliability Coordination Agreement ("ECAR") dated August 1, 1969, both filed with the Federal Energy Regulatory Commission under Order 445. In addition ECAR has a similar agreement with the utilities in Virginia and the Carolinas.

These agreements provide for constant review of bulk power system reliability. Technical studies are prepared regularly, in which the NYPP members participate through NPCC, which discuss the reliability of the existing system and planned systems as they are projected to be up to ten years in the future. When system limitations are discovered these are referred to the Pools and utilities involved for review. Through this mechanism a review of the integration and adequacy of the bulk power systems of 19 states and two Canadian provinces regularly takes place.

In addition to their participation in planning through NPCC, the member systems of the New York Power Pool have pool-to-pool agreements with NEPOOL, the PJM systems, and Ontario Hydro. These agreements provide for regular review of the operating procedures and bulk power system planning through committee structure and in somewhat more detail than the

interregional agreements. Through these channels the New York Power Pool insures that its present interconnection capability is adequate and that future increases in interconnection capability will be timely, reliable, and economical.

Federal and State regulatory authorities have played and continue to play an active role in reviewing the plans of the member systems of the New York Power Pool. As a part of NPCC the NYPP bulk power system expansion plans are filed annually with the Federal Energy Regulatory Commission in accordance with Docket R-362, Order 383-4.

The member systems of the New York Power Pool are required by New York State law to file annually with the New York State Public Service Commission ("PSC") a report on their bulk power system expansion plans for a 15-year period. The bulk power system plan is set forth in a document approximately 680 pages in length which discusses such issues as rate of load growth, economics of various levels of installed generating reserve, fuels for future generation facilities, and the adequacy of the bulk power transmission system, including interconnections with neighboring systems. This plan is then the subject of public hearings, which typically consist of one day of hearings with the full Commission present followed by extended hearings before an Administrative Law Judge. Following the close of the

hearing the Public Service Commission issues an Opinion in which the plan is reviewed and the Commission may order modifications in subsequent annual reports. These modifications range from changes in assumptions used in load forecasting, to requests for presentation of additional data, to suggestions as to the level of installed reserve which is appropriate to use for planning purposes.

New York State also has laws relating to the certification of generation and bulk power transmission facilities. In order to construct thermal generation rated at 50 Mw or larger within the State, a certificate of environmental compatibility and public need must be obtained from the New York State Siting Board under Article VIII of the Public Service Law. To obtain such a certificate it is necessary to present a case establishing the need for the proposed generating facility, examining alternate sites for the proposed facility, and minimizing any adverse environmental impact. Hearings are conducted before two administrative law judges; one representing the Public Service Commission and the other representing the New York State Department of Environmental Conservation. There is participation in the hearing by various state agencies including the Department of Environmental Conservation, county and local governments and various intervenor groups.

Article VIII became effective in 1972. To date, there have been no certificates issued under this procedure. However, hearings on one application have been completed, a preliminary decision has been issued, and the Siting Board is presently considering the application. It is hoped that certification will be approved at an early date.

The certification of bulk power transmission facilities including interconnections is subject to the jurisdiction of the Public Service Commission under Article VII of the Public Service Law. In order to construct a transmission line of 125 kv or more extending one mile or more, or of 100-125 kv extending more than ten miles (other than underground lines in a city), a utility must obtain a certificate of environmental compatability and public need. The utility submits an application to the PSC, which then schedules public hearings before an administrative law judge in which various agencies of government and intervenor groups participate. During the hearings, need for the facility must be demonstrated and the environmental impact of various routes are analyzed. Following the public hearings the Commission may certify a specific route and type of construction which then permits the utility to construct the facility. A number of transmission facilities have been certified under Article VII, which became effective in 1970.

In addition, nuclear generating capacity construction is subject to Nuclear Regulatory Commission

jurisdiction, while hydro and pumped storage construction and the associated primary transmission facilities are subject to licensing by the Federal Energy Regulatory Commission.

If I may summarize the major points concerning planning of facilities:

1) The member systems of the New York Power Pool participate through the regional reliability council programs in an extensive coordinating effort designed to assure the maintenance of adequate interconnection capability.
2) New York State regulatory agencies are deeply involved in the planning process in New York State. They provide mechanisms for public input and regulatory review of the system long-range plan.
3) Statutory certification procedure exists for the siting of generation and transmission facilities, including interconnections. These proceedings examine the need for any major facility and its various environmental impacts.

Mr. DINGELL. Thank you, sir.

The Chair will recognize counsel for purposes of questions.

Mr. KITZMILLER. Thank you, Mr. Vogel.

You indicated in your statement that the New York Power Pool undertakes to study and evaluate the need for interconnections with other pools.

Mr. VOGEL. That is correct.

Mr. KITZMILLER. Does the power pool assume that it has an affirmative responsibility to help develop interconnections with other pools, where their studies show that such interconnections are necessary or desirable for the reliable operation either of the pool or of a member of the pool?

Mr. VOGEL. The power pool coordinates continuing studies of interconnections with all of the neighboring systems in the broader area up through the MAAC–ECAR systems on pretty near a continuing basis, looking at both the short term and the long term picture as the need for interconnections develops, and the recommendations to proceed further is then passed to the utility companies involved.

Mr. KITZMILLER. You do not then have an affirmative responsibility to help to carry through to get these lines approved, an intertie approved?

Mr. VOGEL. I think we have a continuing responsibility to make certain that the system that we are planning and operating is meeting the reliability requirements, including analyzing whether or not the required transmission and adequate transmission does exist, and whether required new interconnections are constructed.

Mr. DINGELL. On that point, let me go back a little bit, if I may, please.

Your organization is a corporation or is it a creature of the State or Federal Government or is it a creature of multi-state compact or what?

Mr. VOGEL. It is a contractual arrangement among seven private utility corporations and the Power Authority of the State of New York.

Mr. DINGELL. Is it an association, a corporation, a partnership, or what?

Mr. VOGEL. None of those, I believe. I would defer that to counsel.

Mr. DINGELL. What is its legal entity?

Mr. ALLEN. I don't believe it has a separate legal entity apart from its constituent members, Mr. Chairman.

Mr. DINGELL. If I were going to sue you, how would I sue you? I haven't got any intention of this, but if I am going to sue you, would I sue you as a corporation, a partnership or would I sue your members?

Mr. ALLEN. I think that you would serve process on the eight individual members. There are no pool assets. The control center facility is owned by Niagara-Mohawk Power Corp. in whose service territory the facility exists. The employees of the organization are employees of the various member systems who are placed either on permanent basis or on loan to the control center operation, thus enabling them to retain seniority and opportunity for advancement within their own systems.

Mr. DINGELL. I think given the character of your organization that is probably humane. I am curious. Who owns the property that you folks use in carrying forward——

Mr. ALLEN. Niagara Mohawk Power Corp.

Mr. DINGELL. Do any of the other corporations or electric utilities own any facilities that you folks have?

Mr. ALLEN. The only facilities that you can describe as New York Power Pool facilities are those at the control center in Guilderland, N.Y., just outside of Albany.

Mr. DINGELL. What is this control center, buildings?

Mr. ALLEN. It is, sir. Mr. Kitzmiller advises it had the control center.

Mr. DINGELL. Large or small building? I did not sue, so you will have to help me.

Mr. VOGEL. It cost approximately $3 million to build, and has approximately a $2 million computer system installed. We are housing 94 people there at the present time.

Mr. DINGELL. You are working for your constituent members?

Mr. VOGEL. That is correct.

Mr. OTTINGER. Do you work for one of the utilities?

Mr. VOGEL. Yes, sir; I am on the payroll and have been of Central Hudson Gas & Electric Corp.

Mr. OTTINGER. Do you have offices outside of this computer control center?

Mr. VOGEL. The offices are in the building at the power control center which houses our planning staff, our environmental staff, our PR staff, in addition to our operating staff.

Mr. DINGELL. How is the functioning of the organization financed; by assessments upon the members?

Mr. VOGEL. That is correct; as executive director, I call for funds against a budget that is approved by the executive committee, and I call for funds quarterly, which are deposited in the New York Power Pool bank account in Syracuse, administered by the treasurer of Niagara Mohawk Power Corp. We approve invoices and invoices are paid by the accounting in the treasurer's office of the Niagara Mohawk with Power Pool funds.

Mr. DINGELL. What regulatory powers do you have to assure, for example, that reliability of systems or reliability of equipment is carried forward by your constituent members?

Mr. VOGEL. I think regulatory powers, per se, we do not have. We work pretty much under group conditions in which we police the activities of the member systems, and I think it has proved to their mutual benefit to perform all of the operating policies, for example, and our operating policies, and our major procedures are signed and agreed to by an officer of each of our pool member systems, so they become somewhat of a document in themselves.

Mr. OTTINGER. Would the chairman yield?

Mr. DINGELL. I will be glad to.

Mr. OTTINGER. On July 13 you issued an order, as I understand it, to Consolidated Edison to shed load. Under what authority can you do that?

Mr. VOGEL. Our authority for this was initiated back in the early 1970's, following the periods of a large number of voltage reductions in New York, at which time our dispatcher was given the

binding authority to declare that a major emergency did exist, and then proceed to direct load relief measures starting with a call for voltage reduction for general appeals to the public via radio, TV, appeals to industry by the member systems, and, of course, as far as calling for load disconnection as it may be required in order to correct the imbalance between load and generation.

Mr. DINGELL. Was this done in writing or was it done by telephone or how was this particular instruction given?

Mr. VOGEL. It was initiated initially with respect to the granting of the binding authority, was directed by the Public Service Commission to all of the members.

Mr. DINGELL. Binding authority? What binding authority? Binding authority to do what?

Mr. VOGEL. This is the terminology that appears in our operating policy that our dispatcher has the binding authority to declare that a major emergency exists, and to order, has the authority to order, the dispatchers of the eight member systems to proceed with those emergency actions required to correct the condition of energy and load balance.

Mr. DINGELL. In whose name does he act?

Mr. VOGEL. He acts as a senior pool dispatcher of the New York Power Pool.

Mr. DINGELL. Let's assume that the person that he issues these binding instructions to disregards them. What happens?

Mr. VOGEL. I think we have that situation now, through a misunderstanding, on whether or not the senior pool dispatcher's order was an official order or whether it was a suggestion at this particular point.

Mr. DINGELL. Referring to the situation on July 13?

Mr. VOGEL. That is correct.

Mr. DINGELL. Well, what was it?

Mr. ALLEN. Mr. Chairman——

Mr. DINGELL. What was it? Was it a binding order or what was it?

Mr. VOGEL. In the mind of the pool dispatcher we feel it was a binding order following an earlier discussion in the evening; I believe the first discussion approximately at 8:55 was more of a suggestion.

Mr. DINGELL. Wait a minute. There was a first discussion at 8:55, and between who and who?

Mr. VOGEL. This is between the senior pool dispatcher and the system operator of the Consolidated Edison system.

Mr. DINGELL. And what was that? That was a suggestion?

Mr. VOGEL. That was a suggestion by the senior pool dispatcher to the ConEdison system operator that he should start to take load relief measures.

Mr. DINGELL. And what did the ConEdison dispatcher do with that?

Mr. VOGEL. The ConEdison dispatcher at that point in time took no action.

Mr. DINGELL. Took no action? He disregarded the suggestion; is that right?

Mr. VOGEL. Disregarded to the extent that he did not proceed to disconnect load.

Mr. DINGELL. He did not, so, in effect, I guess he disregarded it, didn't he?

Mr. VOGEL. Yes.

Mr. DINGELL. So late that same evening your senior dispatcher—what was his name?

Mr. VOGEL. Senior pool dispatcher, William Kennedy.

Mr. DINGELL. What is his name?

Mr. VOGEL. William Kennedy.

Mr. DINGELL. So Mr. Kennedy then contacted ConEdison again, did he?

Mr. VOGEL. That is right.

Mr. Dingell. A second time. What time did that transpire?

Mr. VOGEL. Excuse me while I refer.

Mr. DINGELL. Let me observe I have got a copy of the second phase report system blackout and system restoration analysis of system separation which comes from ConEdison border review on August 24, 1977. I guess that is the document from which we are both working, isn't it, Mr. Vogel?

Mr. VOGEL. Yes; I guess this is a transcript.

Mr. DINGELL. I just wanted to be sure we were looking at the same document. We will have a hell of a time holding a conversation if you are talking from one and I am talking from another.

So there was a second transaction which transpired between these two good gentlemen?

Mr. VOGEL. It's at 20:59.

Mr. DINGELL. At 20:59. The first one was at 20:56:54 according to the document.

Mr. VOGEL. Yes.

Mr. DINGELL. And this language appears. It says:

"Bill, you had better shed some load unless you can get down below this thing because I can't pick up anything except from the north, see.

CESO. Yeah.

NYPPSPD. So you had better do something to get rid of that unless you get yourselves straightened out.

"CESO." I guess that means?

Mr. VOGEL. ConEdison system operator.

Mr. DINGELL. NYPPSPD means New York Power Pool special?

Mr. VOGEL. Senior pool dispatcher.

Mr. DINGELL. Senior pool dispatcher. So the CESO then says: "I am trying, I am trying." And NYPPSPD says, "OK, fine."

Mr. DINGELL. Then, the second discussion between those two good gentlemen occurred here at 20:59:15.

CESO. Yeah, Bill."

NYPPSPD. Bill, I hate to bother you, but you had better shed about 400 MW load or you are going to lose everything down there.

CESO. Bill, I am trying to.

NYPPSPD. You are trying to. All you have to do is hit the button to shed it, and then we will worry about it afterward, but you got to do something or they are going to open that Linden tie on you.

CESO. Yeah, right; yeah, fine.

Now, what happened after that? There were obviously some other discussions between these gentlemen.

Mr. VOGEL. That is correct. The discussions continued, except, I believe, the senior pool dispatcher in following discussions spoke with the power dispatcher at Consolidated Edison.

Mr. KITZMILLER. I think there is one more conversation between the two of them, it occurs at 21:05:08; I think that is the last one. The last time he speaks to him is 21:05.

Mr. DINGELL. At 21:05 CESO says, "Bill, I'm going to cut feeder 80—I've no way of deloading." What is that feeder?

Mr. VOGEL. Feeder 80 is a line from Millwood to Pleasant Valley, 345 kV line.

Mr. DINGELL. At this point they just lose 345 kV; right?

Mr. VOGEL. At this point in time there are two lines, 80 and 81 lines, that run from Millwood to Pleasant Valley, 345 kV.

Mr. DINGELL. 345 kV for the two?

Mr. VOGEL. This is the operating voltage of the line at 345 kV. One of the lines had tripped out. Line 81 had tripped, leaving one single line connection, and this was the sole connection between the ConEdison system and the north, being the Pleasant Valley substation, excluding the two underlying 138 kV lines.

Mr. DINGELL. The Chair is going to yield to counsel.

Mr. KITZMILLER. At this point, however, it is a misunderstanding, isn't it? The Con Edison system operator doesn't know that he has lost all his northern ties but one. He thinks still that he has 93?

Mr. VOGEL. Yes.

Mr. KITZMILLER. So his reactions are based at this point on the belief that although 81 is overloaded, if he can somehow juggle the generation up there he can force it to come down 93 and take it off line?

Mr. VOGEL. Yes.

Mr. KITZMILLER. But he does not find out to the contrary until about 9:30?

Mr. VOGEL. Right.

Mr. DINGELL. So at 21:05:08, "Bill, I'm going to cut feeder 80 to—I've no way of deloading it right now." The New York Power Pool senior dispatcher says, "Can't you shed load and relieve it—if you cut Feeder 80 on, then you are really going to be in trouble".

"CESO: I'll see what I can do."

The New York Power Pool senior dispatcher then says, "All right."

Mr. MURPHY. Why did they cut the 345? Why did the Pleasant Valley sub cut?

Mr. KITZMILLER. It wasn't cut, Mr. Murphy. It failed. It folded. It was struck by lightning, and the relay told the breaker to open.

Mr. MURPHY. They couldn't close it?

Mr. KITZMILLER. No. They should ask this.

Mr. DINGELL. I think I am getting into matters that really counsel ought to handle, but when these folks don't handle these matters rightly and properly, what recourse does the New York have? Can you sue them? Can the other members sue them? Do you all accept suits? It is pretty obvious to me you have a lot of angry New Yorkers that are going to sue somebody. Are they going to sue you or all of your constituent members, or are they going to sue ConEd, or are you going to sue ConEd? How do you make ConEd keep from drawing you good folks into this kind of a morass?

You had two shots at it. Back in the 1960's it happened. All kinds of recommendations were made. Either you folks didn't come forth with any recommendations or you did come forth with recom-

mendations and they were disregarded, or you made the wrong recommendations.

Now it has happened again and everybody is running around in this town, and I guess up there, too, pointing fingers back and forth; but what do you do when you get yourself in this kind of a box and how do you prevent yourself from getting in there? What authorities do you have?

Mr. VOGEL. We prevent getting into this kind of a box, I think, by training. We have no authority to sue. The pool couldn't sue one of its members. At least I don't believe so.

Mr. DINGELL. No; but the others in the pool could do so?

Mr. VOGEL. You have a situation here where the failure of this operator to act was affecting the Consolidated Edison system aside from overloads placed on neighboring systems in New Jersey and on Long Island and Connecticut. The main consequence of inaction at this point in time was related strictly to the Consolidated Edison system.

Mr. DINGELL. I am gathering Consolidated Edison or anybody else can snap their fingers under your nose and your only remedy is to shut them off. Am I correct, or incorrect? And then go to court later on.

Mr. VOGEL. We have no way from our control center of disconnecting load anyplace in the State.

Mr. DINGELL. You don't? You mean to say ConEd could have taken you all down? With a big enough overload you could have had a cascading blackout that would have been like the great northeast blackout a few years ago that shut everybody down from, I guess, New York up into God knows where, Canada, western New York, and Pennsylvania?

Mr. VOGEL. The action that we as a power pool can take is to direct the operation of other systems that might be affected and this is exactly what happened in connection with the Long Island tie in order to prevent damage to the Valley Stream tie and the ties to Connecticut. The Long Island system operator, pretty much in accord with our view, was the pool dispatcher, of opening the tie to protect the interconnections, and this action is available to any of the member systems, and appears in our operating procedures, requires action by another member system——

Mr. DINGELL. I am a great believer in power preparedness, but it strikes me that what you do here when you get in these binds is, you call them up and talk with them and nothing else happens. Then everybody prays. I am not sure that is the kind of a reliability you want.

I have great faith in the Lord but he apparently wasn't very much interested or else was occupied elsewhere when this took place last summer.

I am trying to figure out what do we do when we get into this situation. It appears you function on good will, but not much authority, and the Power Commission doesn't seem to do much, New York folks don't seem to do much, and ConEd doesn't seem to pay any heed to anybody's recommendation. We wind up with a hell of a mess here, with everybody wondering who is supposed to have seen that something got done.

The Chair will recognize first the gentleman from New York.

Mr. OTTINGER. Two points I think we are getting at: Do you have any authority at all to enforce your orders? Maybe you want your counsel to answer that.

Mr. VOGEL. We have authority which is related to our operating procedures which are signed by an officer of all the member systems.

Mr. OTTINGER. So it is an agreement by the companies, is that right, to observe the orders and it is not an enforceable agreement?

Mr. ALLEN. The question of enforcement, I don't think, has ever arisen, Mr. Ottinger. The theory as far as I understand it, and I haven't been in it since the inception of the power pool, was that the mutual cooperation was in the interest, the positive intent, of all members and that the instantaneous problems of system operation which must be dealt with in seconds don't lend themselves to structured answers, and yes, indeed, there is a measure, and I believe in all pools in the United States, to my knowledge, of relying on the good faith and the willingness to act on the part of the participants.

Mr. OTTINGER. Suppose one of the pool operators made a mistake—it can happen with anybody—and he issued an order to shed load that caused a considerable amount of damage? The pool is in no way liable for that error?

Mr. ALLEN. I can only say there are no pool assets; however, there are the assets of seven major electric utilities plus the Power Authority of the State of New York, and I am unable to project where plaintiff's action of that nature might follow.

Mr. OTTINGER. Do you think the only recourse would be to the individual who made the mistake?

Mr. ALLEN. I don't know, sir. The individual would be an employee of a major corporation. To what extent the laws of negligence or of contract would permit recovery, it is impossible for me to say.

Mr. OTTINGER. I have no further questions.

Mr. DINGELL. The Chair thanks the gentleman.

The Chair now recognizes the gentleman from New York, Mr. Murphy.

Mr. MURPHY. Thank you much, Mr. Chairman.

Of course, we had the recommendations from the 1967 committee. Stronger interconnections, I think, was tops on the list, and I think we did a little follow up and a lot of those recommendations were not implemented by the utilities and probably because there was an expense involved.

Did the New York Power Pool in effect incorporate the recommendations of the 1967 experiences and correct interconnections that were weak or otherwise not substantial?

Mr. VOGEL. The New York Power Pool was formed in July of 1966. Following the 1965 blackout, and we at that point in time commenced studies of the interconnections, and I think there were substantial interconnections added within New York during this period since 1965.

Mr. MURPHY. Why did that Pleasant Valley sub go out? Would any interconnection, regardless of its quality or size, have been affected that way?

Mr. VOGEL. Pleasant Valley substation as such remained energized. The four lines, two 345 kV, and two 138 kV lines, were out of service, out of Pleasant Valley.

Mr. MURPHY. By out of service what do you mean?

Mr. VOGEL. They had tripped out of service and remained out of service during the period we are talking about.

Mr. DINGELL. Would the gentleman yield?

You also had the Hudson-Farragut line which was out, and had been out for approximately 1 year because you had a phase angle regulator which had not been working and which wasn't going to be working or able to be repaired for about 6 months.

Now was there anything the power pool could do about that?

Mr. VOGEL. This was included in our reviews of reliability within the State and, I believe, looking at load levels and that sort of thing, was not a critical matter at that point in time.

Mr. DINGELL. It turned out to be mighty critical on the night of July 13, did it not?

Mr. VOGEL. Yes, sir, after a long string of very unusual circumstances; yes.

Mr. DINGELL. I thank the gentleman.

Mr. MURPHY. When did the 345 line get back in?

Mr. VOGEL. The two 345kV lines, I think, were reenergized the following morning.

Mr. MURPHY. Why did it take that long to reenergize?

Mr. VOGEL. I think that question is better directed to Consolidated Edison. The lines were patrolled and then energized the following morning.

Mr. MURPHY. You don't have any theory as to why they weren't energized within a half hour or an hour?

Mr. VOGEL. Attempts were made and the one line was reenergized, but the breaker at Pleasant Valley tripped and accordingly the line was left, as far as I know, deenergized.

Mr. MURPHY. How do you close a breaker?

Mr. VOGEL. A breaker can be closed either by a substation operator in the field or by supervisory control from a control center that has supervisory control of substation breakers.

Mr. MURPHY. When was that breaker closed?

Mr. VOGEL. I can check the actual items.

Line No. 81 from Millwood to Pleasant Valley was energized at 10:45 a.m. on July 14.

Mr. MURPHY. How, manually, automatically? How?

Mr. VOGEL. I am not certain. I assume it was done manually.

Mr. MURPHY. Why wasn't it done 12 hours sooner?

Mr. VOGEL. One of the lines was actually reclosed from Millwood and then the breaker at Pleasant Valley, I understand, closed and tripped back out, giving indication that there might be something wrong with the line. I am not really familiar with the details.

Mr. MURPHY. You think we ought to ask ConEd?

Mr. VOGEL. Yes.

Mr. MURPHY. The New York Power Pool with the recommendations and training that Mr. Millstein went through, the PSC, the FPC, they are talking about this training program. Have you ever gamed a blackout?

Mr. VOGEL. Not precisely in that we game, not taking a specific system and looking at a specific set of line or generation outages and arriving at a specific conclusion from that particular set of conditions.

We do game it from the standpoint of going through what actions have to be taken by dispatchers in New York and these are pretty much set forth in written instructions.

Mr. MURPHY. I am not talking about a set of instructions; I am talking about a formal training activity of gaming an outage in a part of the system and having everybody in that system react to that game as part of the training program.

Mr. VOGEL. In setting up our dispatching organization at the power pool, we spent 18 months with a group giving an extensive formal training program, including a college professor in a simplified electricity course, including a week on a network analyzer at the University of Syracuse which permits you to change different systems, conditions on the transmission and generating system, within a State and let the dispatchers get the reaction of what happens if this happens and that happens; but we have never simulated a blackout per se.

Mr. MURPHY. You haven't formally gotten everybody in this system to go through what they should do in case of a certain contingency?

Mr. VOGEL. No, sir.

Mr. MURPHY. That would almost seem to be a necessary training program if you were going to be in compliance with the regulatory agency's recommendation?

Mr. VOGEL. We are looking into——

Mr. MURPHY. You had 11 years to look into this.

Mr. VOGEL. I think our responsibility is training the senior pool dispatchers, at least the responsibility of the power pool per se, where the responsibility for training of the individual dispatchers and district operators is at the company level.

Mr. MURPHY. I think that is a very parochial view of the training mission. You don't just train individuals in places when they are part of a system and a system must operate and coordinate within itself?

Mr. VOGEL. That is true. We do bring dispatchers in from all the member systems approximately twice a year, reviewing new facilities that are placed in service, general operating conditions which are going to be anticipated in the coming summer, winter, and this sort of thing. This is done and has been done often, bringing the dispatchers all together at the power control center.

Mr. MURPHY. When we questioned people in 1965 to try to find out why they didn't react in certain ways, one of the key people, I guess, in Syracuse, watched the dial spin and when he was questioned—"What did you do?" he said he thought the instrument was wrong. He had never been exposed except to the big console, the computer, and everything working right, and then he hadn't been down—I guess it is on the west side at about what?—52d, 53d Street?

Mr. KITZMILLER. 126 West End Avenue, I think.

Mr. MURPHY. Yes, 128. He had never been down there to talk to the people in that control center, and I would think that the left

hand ought to know what the right hand is doing, and if you are in effect a New York power pool, you ought to talk to each other; you should game operations, and have a very cohesive training program that includes the very condition and contingency that causes the blackout.

Mr. VOGEL. We certainly do talk to one another and we do coordinate the training and we get the dispatchers together, so we know one another. We send dispatchers around to visit control centers throughout the State as well as Ontario, New England, and Pennsylvania, and this has been done. I think we have done a substantial amount of training and we do not have a simulator to simulate a blackout.

Mr. MURPHY. That colloquy that the chairman just referred to is a testament to the lack of communication in this system. Now, I think this probably happens in other parts of the country, but if it happens in Grand Rapids it doesn't have the same causal effect in the society as it does in Brooklyn, Queens, Manhattan, and the Bronx.

Mr. DINGELL. If the gentleman would yield

We have absolutely no assurance on the basis of knowledge or information to this minute that this isn't standard practice in the industry, to run these power pools in precisely this way with this exact level of reliability, training, communication, interchange of information, direction with regard to shutdown of lines, and all of the other things that go into it—maybe if the gentleman would permit—gentlemen, is this the way things are done in these power pools?

Mr. VOGEL. I would say yes.

Mr. DINGELL. This is generally the standard practice in the industry with regard to power pools?

Mr. VOGEL. I would think yes. I know of no power pool that has a simulator.

Mr. DINGELL. Does any power pool function any differently in terms of its authority to dictate to its members or to see to it that dispatchers in a subordinate place would function on the basis of urgent need and quick response?

Mr. VOGEL. I think there probably are great differences in authority of power pool dispatchers and there are differences in information available to the power pool control centers, but with respect to authority, I think the authority that we have in New York is spelled out more clearly than in other pools by virtue of this wording containing the binding authority reference.

Mr. DINGELL. I must say, if I were to be a dispatcher and have as much authority as you have outlined to us that yours had, I would be impressed that I could do literally nothing in terms of doing anything to prevent the kind of circumstances that took place here.

What ultimately prevented this thing going throughout the whole system was the fact that your dispatcher threw a lever and disconnected or caused a set of circumstances which disconnected ConEd from the rest of the system to which they were attached; isn't that the fact?

Mr. VOGEL. Indirectly, yes.

Mr. DINGELL. The Chair thanks you.

The Chair is going to recognize Mr. Kitzmiller.

Mr. KITZMILLER. In connection with the discussion that just went on, I want to find out about the relationships between the pool and ConEd in regard to so-called binding agreements.

Is Con Edison obliged to report to the pool emergency changes in the operation or availability of generating facilities, and more specifically, changes that affect the capability of the ConEd generating system to respond to emergencies?

Mr. VOGEL. Yes, sir. There are two areas involved in this information. In most cases we are getting the actual loadings on all the major generators within the Con Edison system that is put directly into our computer system. The Con Edison system operator has the responsibility to update the limits or limitations associated with any of these major generating units.

Mr. KITZMILLER. That is under your operating procedure No. 2–C, and several others?

Mr. VOGEL. It is tied really more to economic dispatch.

The other area I think you may have been referring to is the requirement to carry both a 10-minute and a 30-minute operating reserve and provide capacity within our own system to provide this reserve that can be made available as required in accordance with our operating policy.

Mr. KITZMILLER. But a function of maintaining it is the function of reporting it also. I mean, your system operator has to know what is there and ConEd is required to report to you major changes in their generating capability?

Mr. VOGEL. That is correct.

Mr. KITZMILLER. Back in the early 1970's, Consolidated Edison put in the gas turbines to which we have been referring several times here. It is kept at capacity of something in the neighborhood of 2,200 megawatts, if I am not incorrect. At the time they put them in, they had automatic operation of them. There was a push button literally available in the room, in the emergency center, available to the ConEd system operator that he could push and they were supposed to go on.

This means effectively those turbines are available 24 hours a day, is that right?

Mr. VOGEL. If they are on pushbutton start; yes.

Mr. KITZMILLER. Several years later Con Edison took that automatic capacity out; is that right?

Mr. VOGEL. I understand. I have heard that today here for the first time. I don't know that this was initially installed and taken out; no, sir.

Mr. KITZMILLER. As a matter of fact, the ConEd then decided, for reasons we don't know yet, that it would be better to man these stations individually, with individual people at each station; is that correct?

Mr. VOGEL. The stations were manned; yes.

Mr. KITZMILLER. The stations were manned?

Mr. VOGEL. But on a routine basis.

Mr. KITZMILLER. Manned on a schedule that meant that after 11 o'clock on any night there were about 252 megawatts of power available from the gas turbines as against something in excess of 2,000 megawatts; is that correct?

Mr. VOGEL. I am not familiar with the detailed numbers.

Mr. KITZMILLER. Is it substantially correct that they are not manned all the time?

Mr. VOGEL. I understand; yes.

Mr. KITZMILLER. When did the power pool learn that that change had been made and that the turbines were not manned?

Mr. VOGEL. Are you referring to the general policy when the decision was made by ConEd to remove the pushbutton starts or just the men?

Mr. KITZMILLER. First the decision to remove the pushbutton automated start and then man them on a reduced schedule.

Mr. VOGEL. I might ask our operating manager, Rolland Merrill.

Mr. MERRILL. I really don't know that myself.

Mr. KITZMILLER. Maybe I can help you. Let me put it this way: Did Mr. Kennedy, your system operator, know that night that according to the ConEd schedule only 800 megawatts then in excess of 2,000 were available?

Mr. MERRILL. No; he didn't know that.

Mr. KITZMILLER. It is substantially true, isn't it, that you found out about the change in ConEd's operating procedure that night at about 8:47?

Mr. MERRILL. No. My understanding is that the ConEd system operator makes a judgment when he no longer needs these turbines to meet his operating reserve requirements and he dismisses the men, but when he dismisses the men this makes these turbines unavailable. Then he is supposed to notify the pool that they are no longer available.

Mr. KITZMILLER. Had the pool been notified?

Mr. MERRILL. No; not before.

Mr. KITZMILLER. If I may, I would like to correct that record because I think that is not correct.

We can ask ConEd. They have a ConEd man who, I am sure, can address it.

The point of fact is they have a company policy that these men are released at a given time, at 8 o'clock, 7 o'clock, and 11 o'clock, at various stages, and the ConEd operator is only authorized to keep them on if there is an emergency, and at 8 o'clock at night there was not an emergency, so this then becomes, to quote the PSC—and I ask you whether you agree with this—"A change that affected the capability of the ConEd generating system to respond to emergencies" and they hadn't notified you?

Mr. VOGEL. I think it should be made clear that the obligation from the power pool standpoint to ConEd is with respect to maintaining a required operating reserve in accordance with our policies, and if they have four or five times that much of turbine capacity available and unmanned, this is strictly at their prerogative. There is nothing within the pool that says that they must maintain and man those turbines around the clock.

Mr. KITZMILLER. No, but the pool didn't know there had been a change?

Mr. VOGEL. They are supposed to notify the pool of the status; that is correct.

Mr. KITZMILLER. So they were in violation of their agreement, were they?

Mr. VOGEL. They were in violation with respect to they are supposed to keep us informed of the status of their generating facilities.

Mr. KITZMILLER. What sanctions do you have to impose when a company is in violation of its agreement?

Mr. VOGEL. We have never been required to use sanctions other than the pressures that might be put on by the other members of the power pool.

Mr. KITZMILLER. ConEd claimed that night to have 560 megawatts reserve in gas turbines. How many did it actually have available according to the record? According to the PSC report on page 4, part 4, there were 100 megawatts claimed at Gowanus which were unmanned at that time. If that is a true situation, they were in violation of their agreement.

Mr. VOGEL. Again with respect to information providing us with the status, but we are talking about the main obligations to provide operating reserve, and if they had not fulfilled this, then they were not violating their agreement as they had planned to do.

Mr. KITZMILLER. One further question along this line. ConEd claimed to have 701 megawatts available in 10-megawatt reserves in its steam units. Yet it only produced 326 megawatts, or just less than half the amount it claimed. Were you aware of that? Have you determined why?

Mr. VOGEL. I was aware that they did not produce what they were claiming, and there were various reasons for this set forth in the Consolidated Edison report. I do not remember the details.

Mr. KITZMILLER. But you did not expect it. Your system operator did not expect it that night nor have any reason to expect it?

Mr. VOGEL. No, sir.

Mr. KITZMILLER. The pool in policy 2–C provides for audits of synchronized reserve. Have you ever conducted those?

Mr. VOGEL. Yes, sir.

Mr. KITZMILLER. Have you ever conducted those on the ConEd system?

Mr. VOGEL. Yes, sir, all the systems.

Mr. KITZMILLER. They always worked?

Mr. VOGEL. I would say most of the time, yes. There has been some rare occasion when a system was unable to respond and demonstrate that they had the capability that they were supposed to have, and this is followed by letter from the operating manager to the vice president of that particular company asking for an explanation. It is reviewed with all the member systems.

Mr. KITZMILLER. Could you submit to this subcommittee, I presume you do not know now, could you submit to this committee the date of the last time you conducted an audit of the ConEd system?

Mr. VOGEL. This is prior to July 13?

Mr. KITZMILLER. Prior to July 1.

Mr. VOGEL. Yes, we will be happy to.

Mr. OTTINGER. Do you know that at the present time?

Mr. VOGEL. No, sir, I do not.

Mr. OTTINGER. You do not remember?

Mr. MERRILL. No, I do not. I would like to point out, though, that since 1973 we have had excess generation available, and we have

not been conducting these audits with the intensity that we were prior to 1973.

Mr. OTTINGER. How frequently are the audits made at ConEd?

Mr. VOGEL. They are made at the discretion of the supervisor of pool operations.

Mr. OTTINGER. Not done on a regular basis?

Mr. VOGEL. Not done regularly and not announced ahead of time.

Mr. OTTINGER. Then there would be no regular procedure. It could be 1 year, it could be 5 years?

Mr. VOGEL. That is correct.

Mr. KITZMILLER. Can you tell us now what was the impact of what the PSC called this particular event, a major discrepancy between the claimed reserve and the actual reserve on the designations made by the pool system operator?

Mr. VOGEL. The difference between the claimed reserve and the actual reserve on Consolidated Edison I think had no bearing on the actions taken by the senior pool dispatcher. His actions called for disconnecting load. I think he was recognizing that generation was not responding, that ties were not coming back, and his action was to order load disconnection, which is exactly what he did.

I think the absence of that particular reserve at that point in time is such that it would not have changed the action that he gave on that particular night. If generation had increased to the point earlier in the disturbance period, and resulted in reducing the flow and reducing the overload on ties, then it would eliminate the need for the senior pool dispatcher to call for load disconnection.

Mr. KITZMILLER. Do you think it had any impact on the ConEd operator? In this particular area, to use an unfortunate figure of speech, your senior pool dispatcher was not the only person in the dark. The ConEd pool dispatcher did not know what was happening either, so that you have a system where you are supposed to maintain a certain amount of power in reserve. You are supposed to bring it up. You calculate that it is going to work because you put out your request for it, and it does not show.

Is that in any way an explanation, do you think, of why the ConEd system operator did not react differently, did not go into load-shedding right away?

Mr. VOGEL. I cannot postulate on what the ConEd system operator was thinking, but from what I saw in the report he was expecting generation to increase and hoped to solve his problem.

Mr. KITZMILLER. You raised the question of load-shedding. Would you please tell us exactly what load-shedding means to you, to your senior dispatcher? Does it include voltage reduction?

Mr. VOGEL. No. Load-shedding, in the terminology which we use, means disconnection of load.

Mr. KITZMILLER. There is a reference in the PSC report in section 3, page 14. It observes that in ConEd operating instructions "Load-shedding includes both reductions and actual load disconnection." Is that a correct statement?

Mr. VOGEL. I have read their procedure, but I really could not answer. I am not that familiar with the detailed procedure at Con Edison.

Mr. KITZMILLER. If that is actually the ConEd situation, then the order to load-shed could just as well be read as an order for voltage reduction, and in fact the order to load-shed was followed by a specific order to reduce voltage.

Mr. VOGEL. I cannot comment on that because I am not that familiar with the ConEd instruction. I have read it here within the last 2 months following July 13. You are referring now to the instruction issued to the Consolidated Edison system?

Mr. KITZMILLER. Yes.

Mr. VOGEL. I am not that familiar with the details in that document.

Mr. KITZMILLER. What we have, it seems to me, is a massive confusion in communication. Is that an accurate definition?

Mr. VOGEL. I would not apply that definition.

Mr. KITZMILLER. Then let me go back and ask another question.

Early in the evening, some time around the hour, around 9 o'clock, your system dispatcher told the ConEd system dispatcher that the Jamaica line was out?

Mr. VOGEL. That is correct.

Mr. KITZMILLER. He never corrected that?

Mr. VOGEL. That is possible because he never did talk with the ConEd system operator following that period.

Mr. KITZMILLER. During that evening the ConEd operator was not aware that 93 was out, is that correct?

Mr. VOGEL. From the ConEd report, that is correct.

Mr. KITZMILLER. During the evening the ConEd system operator was asking for various load relief steps to be taken by your operator, including backing down Roseton, and he said so the power can come around and things like this. Did your system operator realize that those things could not help him?

Mr. VOGEL. Yes, and told him so.

Mr. KITZMILLER. Said it could not help?

Mr. VOGEL. And told him so.

Mr. KITZMILLER. Did it ever occur to him to ask why the ConEd operator thought they could help him?

Mr. VOGEL. No, at least I really cannot speak for the dispatcher, but did not ask him.

Mr. KITZMILLER. So there is a substantial area of confusion. You do not know how much generation you have. Apparently audits have not been performed recently or the audits, if performed, missed. You have major information about two ties that are out, misinformation, misunderstandings between the two.

Mr. VOGEL. Excuse me, but the reference to the Jamaica-Valley Stream, I think you have to realize that that was a transfer in power and that the meters were indicating zero, and could well draw the conclusion. I question a major misunderstanding.

Mr. KITZMILLER. The characterization of it as a major misunderstanding, I think you are right, but it was an area of confusion.

Mr. VOGEL. Yes.

Mr. KITZMILLER. One other question.

Are you aware that the ConEdison guide for action in major emergencies allows tie overloading above emergency levels, above short-term emergency levels?

Mr. VOGEL. I am aware that the application of emergency overload ratings as related to an oil-o-static cable is a little different than open wires and that their dispatchers had been given a little different instruction in relation to the loading permitted on underground cables that vary. Of course, this is mainly where they appear in the ConEd system.

Mr. KITZMILLER. That then is again a discrepancy between your operating procedures and the operating procedures you require of your members and the operating procedure imposed by ConEdison?

Mr. VOGEL. Our operators are trained that when we reach the short-time emergency loading on a facility, that you start to take immediate action, immediate corrective action, to reduce the loading. We have no provision for going above a short-time emergency rating.

Now the short-time emergency ratings are provided for the facilities by the member systems, and the reference that you are making, I think, is more in relation to an interpretation of the short-time emergency rating of a specific facility at one point in time, depending on what the electrical loading may have been prior to that occurrence, on an oil-o-static cable where you have a time delay in increasing temperatures, which are really what affect the ratings, so I think we are talking possibly about a different basis for evaluating the short-time emergency rating.

Mr. KITZMILLER. Is it your impression that the ConEdison system operator was willing to accept overloading above the short-time emergency loading?

Mr. VOGEL. My impression was that the ConEd system operator was anticipating generation coming up and getting assistance to bring the loading down, and that may have some bearing on his decision to delay further the load disconnection to reduce the loading.

Mr. KITZMILLER. But under your operating procedures, load disconnection would have been immediate, if that was the only alternative, would have been immediate when you go above the short-term emergency ratings?

Mr. VOGEL. Yes.

Mr. KITZMILLER. So you do have a difference in procedure, which is not being communicated back and forth between the two parties?

Mr. VOGEL. I think that you are drawing a fine line where you just cannot draw a fine line. Each case of an overload in a facility is different, in that there are various ways in which the overload can be relieved, one of them being in most cases load disconnection, and load disconnection as the last means that is normally taken to remove an overload, so that I think you have other courses of action.

So I do not want to give the impression that when a facility reaches its short time emergency rating that our dispatcher would call for load disconnection because that is not the case.

Mr. KITZMILLER. What did he do?

Mr. VOGEL. In this particular case he was calling for load disconnection over a long period of time, and it was well over; some of them were 100 percent over.

Mr. KITZMILLER. One was 140 percent I think.

Mr. VOGEL. But this was over a period of time; this was not the immediate occurrence.

Mr. KITZMILLER. Nonetheless, there are at least five or six areas where one operator was not operating on the same information that the other operator was operating on, and the other operator was apparently not aware that the first operator did not know. Can we do that again? That got a little long.

Mr. VOGEL. Yes, the number bothers me. I think there were occasions when your statement is a true statement, but I think you referred to five. You opened with a number.

Mr. KITZMILLER. There were several. I think there are actually five. I would be glad to go back and enumerate them. I will settle for there were several, if you will.

Mr. VOGEL. I think as far as the senior pool dispatcher was concerned that there was only the question with respect to Jamaica-Valley Stream line. There was no question in our dispatcher's mind with respect to the terminology used to order load disconnection.

Mr. KITZMILLER. There was disagreement, however, in that he knew that 93 was open, and the ConEd man did not.

Mr. VOGEL. I do not believe that is disagreement. That is different information.

Mr. KITZMILLER. It is confusion.

Mr. VOGEL. By two people, and I would not term it confusion either.

Mr. KITZMILLER. In being sure that you have the same information, do you exercise any standards over the information that is made available to the ConEd system operator? For example, do you have any standard that says you must demonstrate by such and such that a line is open or closed?

Mr. VOGEL. No, sir. We have the provision for the data that has to be sent to the New York power pool. We have provisions, requirements with respect to getting information directly from the source of generation. This is a loading on generation over 500 megawatts. We get that right from the source, but we have no specification.

Mr. KITZMILLER. Do you know whether the Public Service Commission exercises such a jurisdiction?

Mr. VOGEL. I could not say with certainty.

Mr. KITZMILLER. Is it your opinion that they rely upon the pool for this kind of information?

Mr. VOGEL. This is information displayed in the system, in the member system.

Mr. KITZMILLER. Knowing how much generation is up and knowing what the emergency conditions are in the system, and knowing what lines are out, in an operating situation?

Mr. VOGEL. This is a responsibility of all of the member systems as well as the New York power pool.

Mr. KITZMILLER. But as far as you know, the Public Service Commission does not exercise any regulatory authority in that area? They rely on you, for example, for the transfer limits?

Mr. VOGEL. Yes.

Mr. KITZMILLER. They rely on you for the generating reserve?

Mr. VOGEL. Yes.

Mr. KITZMILLER. So that if the system breaks down, as it did, there is no regulatory authority to step in, in the State, is there?

Mr. VOGEL. I would like to defer to counsel.

Mr. ALLEN. I am not sure what you mean, Mr. Kitzmiller.

In the dynamics of what happened on the night of July 13, I am not certain as to what role the regulatory authority could play. If you are referring to what particularly went on there, I am not sure exactly of the precise area of regulatory authority you are describing. It is a matter for trained men who can work fast.

Mr. KITZMILLER. No; I am talking now about the information that is available, which is somewhat different. For example, there was not adequate generating capacity available. There was not adequate generating reserve available, although it was listed as available. The PSC relies upon the power pool to set that generating reserve, and in fact on the company or the power pool or somebody else, certainly not the PSC, to determine that it is available.

Mr. ALLEN. Neither PSC nor FPC to my knowledge have ever called for an audit nor anything of that nature, if that is the thrust of your question.

Mr. KITZMILLER. So it is essentially unregulated?

Mr. ALLEN. I cannot go that far.

Mr. KITZMILLER. Unless it is regulated by you, and it is not regulated by you because it is up to what the company does, and you do not find out about it until it happens. It is unregulated, is it not?

Mr. ALLEN. In the sense that there are no orders of a regulatory body controlling the amount of operating reserve or the manner in which it will be displayed or called on, that is correct.

Mr. KITZMILLER. Would the power pool welcome the assistance of the Federal Power Commision under 545 in assuring that these standards are met?

Mr. ALLEN. I have no authority to respond to section 545 on behalf of the members systems, Mr. Kitzmiller. I have not reviewed it in detail, in any event.

Mr. KITZMILLER. I gather it is a less than enthusiastic response.

Mr. ALLEN. I cannot add to what I have already said.

Mr. KITZMILLER. I have one other area I would like to explore if I may. I do not think we have much longer. I want to follow up on the line that I started out with, which is, I think, kind of crucial to the discussion of what the authority of the Federal Power Commission or the Federal Government, the Federal Energy Regulatory Commission should be.

As I remember, you had testified that you do undertake studies of interconnections between your pool, members of your pool and other pools, to determine whether they are in the interests of the reliability of your system.

Mr. VOGEL. That is correct.

Mr. KITZMILLER. We were asking you, do you have an affirmative responsibility to help develop interconnections?

Mr. VOGEL. I think we have an affirmative responsibility to analyze the adequacy of interconnections and the need for the installation of additional interconnections, and these pretty much could or would come out of the reports of the studies that are

conducted. We have no authority to order or direct our member systems to proceed to install such interconnections.

Mr. KITZMILLER. Do you have any authority to exercise any influence you might have with the neighboring pool, to bring about an interconnection that was not being developed successfully?

Mr. VOGEL. We work very closely with the neighboring pools. I do not think we have ever, from a pool standpoint, attempted to bring any pressure on a neighboring pool, because I think in most cases it just has not been required.

Mr. KITZMILLER. Could you tell us about what you know, what you know as a pool, and yourself, about the proposals to strengthen interties at Linden-Goethals and at Hudson-Farragut?

Mr. VOGEL. I am not familiar other than in broad general terms, and I think most of that information was discussed at this particular meeting with respect to the Hudson-Farragut and Linden-Goethals tie.

Mr. KITZMILLER. Are you aware that the Reliability Council has said that these are urgently needed ties to assure liability? That was testified to by Dr. Brancato.

Mr. VOGEL. I am not aware that that is the case, no, sir.

Mr. KITZMILLER. Why does the covering letter filing your agreement with PJM contain the phrase "No new facilities will be installed or modified in connection with instituting this agreement"?

Mr. VOGEL. I think this is more a way of informing the Federal Power Commission that this is a pool-to-pool agreement, which calls for studying interconnections, but in no way, shape or form contains provisions for installing a specific interconnection.

That is my reaction. Counsel may be able to expand on that.

Mr. ALLEN. My understanding, Mr. Kitzmiller, is that normally you would file—you are required to disclose in filing such agreement whether in fact any facilities will be built as directed under the agreement. Of course these pool-to-pool agreements do not in fact direct the interconnection of facilities, but set up study groups and the like to decide on whether and when additional facilities should be built, although I am quite certain I did not file that letter.

Mr. KITZMILLER. No, it was the lawyer for the other side.

Mr. ALLEN. But I think it is a fair interpretation in my view of the regulations that what the Federal Power Commission wants to know is whether, in terms of service to someone of energy for sale and resale, whether you are going to need to build facilities to do it, and the normal pool-to-pool agreement does not contemplate that sort of thing.

Mr. KITZMILLER. So we are left then, if I may summarize, with the situation, I am going to summarize and ask you if this is true. I am going to ask you if this is your understanding of the situation.

The Federal Power Commission now has no authority to enter into the question of interties unless one of the parties or the Public Service Commission requests?

Mr. VOGEL. So far as my understanding, yes.

Mr. KITZMILLER. The Public Service Commission has no authority to order an interconnection with another system, has no authority

of its own? It does have authority to ask the Federal Power Commission to do so, but it has no authority of its own.

Mr. VOGEL. Yes.

Mr. KITZMILLER. The power pool has no authority?

Mr. VOGEL. That is correct.

Mr. KITZMILLER. In fact, it takes no initiative to encourage those interconnections?

Mr. VOGEL. I would not go that far. We make the studies, and if the occasion arises and the study indicates that a new interconnection is required, then the power pool would certainly recommend that it be installed.

Mr. DINGELL. What teeth would lie in that recommendation?

Mr. VOGEL. No teeth.

Mr. DINGELL. No teeth, no sanctions, no authority?

Mr. VOGEL. Other than just going on the record that if such interconnection were not installed that the reliability might be affected in a given year, some years hence.

Mr. DINGELL. Now what standards along this line, what power do you have to set standards with regard to reliability of equipment or maintenance of lines in service, to assure continuity of service for your members or for the membership as a whole?

Mr. VOGEL. We have no standards per se with respect to the detailed procedures used to maintain either transmission or generating facilities. We do have a procedure which is used to coordinate the outage of generating units, and transmission units on a routine basis scheduled upward of a year ahead of time, on a scheduled basis, in order to coordinate the outage such that we minimize the effects on overall reliability.

Mr. DINGELL. What you really are is an interchange, is it not, for the sale of electric power among your members, to assure that they always have an adequate supply? Is that not what you really are?

Mr. VOGEL. That is correct.

Mr. KITZMILLER. I am going to give you a copy of a document that was submitted to us today by Mr. Millstein that has been prepared by the staff of the Special Commission of Inquiry into Energy Failure of the State of New York, and it is a compilation of all the recommendations concerning reliability in connection with the ConEd system that have been made since 1965.

I think in view of your time problems and I think also in view of the fact that you haven't had a chance to read it, we won't ask you to respond to it now, but I would appreciate if, for the subcommittee, you could respond with a list of the actions that the pool has taken to conform to these recommendations, if any.

Mr. DINGELL. Or to require ConEd to conform with the recommendations. It would also be appreciated if you could identify any authorities that you have in the pool to see to it that these recommendations are carried forward, because I think we are ill-put to castigate you for doing that which you have no authority to do, but we are curious about both of those matters.

Mr. VOGEL. Fine, we will be happy to respond.

Mr. KITZMILLER. One other thing that troubles me and I wonder whether it is standard operating procedure. Under your binding agreement, your pool operator has the authority to order the ConEd system operator to shed load.

Mr. VOGEL. Yes.

Mr. KITZMILLER. Does he have the authority to order anybody else in the ConEd system to do anything?

Mr. VOGEL. No, sir.

Mr. KITZMILLER. After 9:09 that evening he never spoke to the ConEd system operator.

Mr. VOGEL. That is correct.

Mr. KITZMILLER. So that the system wasn't working then, was it?

Mr. VOGEL. Counsel corrects me. He has the authority to order anyone really that is acting at Con Edison in this role that would be performing a load relief measure.

Mr. KITZMILLER. You have a man who is essentially under the authority of the system operator. Your system operator gives the man who is under the ConEd system operator an order, because he can't get in touch with him. Is that the way you expected the system to operate?

Mr. VOGEL. I wouldn't expect it to operate, but I wouldn't see where it should cause any problem if that man is relaying the message to the system operator.

Mr. KITZMILLER. Why didn't your system operator use the hot line?

Mr. VOGEL. The hotline—let me go back just a moment—which is an all-call system, automatic ring, that was installed some years back on both a red mode and an amber mode, an amber for conference, a red for an emergency situation, was installed some years back, primarily when we lost a large generating unit. It was critical that all of the companies commence to pick up their generating reserve throughout the State in accordance with their requirements to replace the outage of that particular generator.

At this point in time, we are operating where our computer system performs exactly this function. When a major unit trips, in fact we had one last week, the computer automatically directs the increase in generation on an economical basis on all of the systems in order to restore that generation. So that the use of the hotline and the need for the hotline in loss of units and that sort of thing I think has semidisappeared.

This was a problem in the Consolidated Edison system, and with the exception of Lilco and exception of the neighboring pools are not really affecting the other neighboring systems. The loss of generation affecting the dispatcher, as you probably note from the tapes, he needed the generation picked up from New York. He didn't want generation picked up upstate. So at this point in time, I feel there was no real need to use the hotline.

Back in the early 1970s we installed our own hotline with Consolidated Edison. It has a green button, automatic ring. When our senior dispatcher uses it, it appears in the ConEd system operator position and the ConEd system operator knows that is the senior pool dispatcher trying to get hold of him. This could have been and was answered by the pool dispatcher—I am sorry—the power dispatcher, because it shows up in the other position.

Mr. KITZMILLER. If the ConEd system operator had known a tie broke at the time that it did, would that information have been useful to him?

Mr. VOGEL. I think the timing is such—and I could well stand corrected—definitely the ConEd system operator should have been informed that that tie was open.

There is no question about that for a minute. I think at the point in time the ConEd system operator was attempting to proceed with load disconnect and not being successful, so I think you will have to draw your own conclusions from that.

If we had told him it would have been another incentive that he has to proceed immediately to disconnect load, and I think the time—and I might stand corrected; I would have to check the actual time—the time is such that I don't think it made much difference in the action being taken by the ConEd system operator attempting to bring the disconnect——

Mr. KITZMILLER. If you had gone on the hotline, however, the ConEd operator would have known automatically. He would have heard the order given?

Mr. VOGEL. Provided he was listening.

Mr. KITZMILLER. I think that is all. I just want to close this—we were discussing the things that weren't known. The points of confusion that I have, and I think the record will show—I am asking you now if you agree with them—are load shedding, exceeding the short-term emergency, the condition of the Jamaica tie both when it was reported off and it wasn't off and when it was off and the ConEd operator didn't know about it, the available reserve, the fact that the ConEd operator was not speaking to the pool operator, and the use of the hotline, and, as a matter of fact, Mr. Kennedy, as I remember, discussed earlier and said, "Why, I probably should have used the hotline."

Mr. ALLEN. That is quite a long question.

Mr. VOGEL. I don't agree with some of the parts.

Mr. KITZMILLER. Would you agree there was a misunderstanding about load shedding, confusion about load shedding?

Mr. ALLEN. Mr. Kitzmiller, if I may, the questions relating to this, as you are aware, of course, were directly asked of Mr. Kennedy at the Millstein Commission hearing as well as in depositions taken by Mr. Rosner, and I think Mr. Kennedy's statements, which I am sure will be incorporated in one fashion or another into the record here, are sufficient as to what he believed.

Mr. KITZMILLER. Mr. Jurith and Mr. Durkin differed with him, so there was an area of disagreement?

Mr. ALLEN. I presume so.

Mr. KITZMILLER. There was an agreement about exceeding the short-term emergency or not?

Mr. VOGEL. I am not certain you can call it a disagreement.

Mr. KITZMILLER. The policies were not congruent. In fact, the ConEd system operator did not load shed when the line exceeded the short-term emergency?

Mr. VOGEL. I am not ready to draw the conclusion that this represented a confusion or difference in policies.

Mr. KITZMILLER. When the Jamaica tieline was reported open incorrectly and then when the Jamaica tieline was opened and not reported to the ConEd system operator, there was lack of information, some confusion; do you agree with that?

Mr. VOGEL. Well, I think I sort of stumble on your use of the word confusion. It was lack of informing the ConEd system operator that the tie was open. That I can agree with readily, and that there was a misunderstanding on the part of the senior pool dispatcher about the Jamaica-Valley Stream tie because it was running on zero when he was watching, the part that it was open rather than——

Mr. KITZMILLER. On the issue of an available reserve, there was also a misunderstanding?

Mr. Vogel. I think the senior pool dispatcher was really not informed of the status of it.

Mr. KITZMILLER. And on the use of the hotline, there obviously was some difference of opinion. As I remember, didn't Mr. Durkin testify that he felt that there should be a declaration of an emergency situation and that the hotline should be used to signal that?

Mr. VOGEL. That is correct; he so testified, from my knowledge.

Mr. KITZMILLER. And Mr. Kennedy felt, obviously, since he didn't use the hotline, that that was not required?

Mr. VOGEL. That is correct.

Mr. KITZMILLER. And he did not declare an emergency to ConEd. He told several other people ConEd was in an emergency but he never actually said to the ConEd system operator, "You are in an emergency. I order you to disconnect"?

Mr. VOGEL. Correct.

Mr. KITZMILLER. So there was some disagreement about the policy between the two offices?

Mr. VOGEL. I still stumble over the word disagreement and——

Mr. KITZMILLER. There was a misunderstanding?

Mr. VOGEL. Misinterpretation is a better word.

Mr. KITZMILLER. All right. I just wanted to establish for the record that there were these areas of disagreement.

That, frankly, is all that I have at this moment.

Mr. DINGELL. Gentlemen, the Chair thanks you. You have come a long way. You have had rather brisk questioning. We thank you for your assistance to the committee.

Mr. VOGEL. You are welcome, sir.

Mr. DINGELL. We hope that the illness in your family gets better.

Mr. VOGEL. Thank you.

Mr. DINGELL. Thank you all, gentlemen.

The committee will stand in recess until 2:30 p.m.

[Whereupon, at 1:35 p.m., the subcommittee recessed, to reconvene at 2:30 p.m. the same day.]

AFTER RECESS

[The subcommittee reconvened at 2:30 p.m., Hon. John D. Dingell presiding.]

Mr. DINGELL. The subcommittee will come to order.

The Chair expresses the great pleasure of the committee to have before us the new Chairman of the Federal Energy Regulatory Commission, a distinguished American and a good friend of us all.

Mr. Curtis, we are privileged to welcome you back here and delighted to see you here as a valued friend of long standing. As a distinguished public servant, we are proud to have you here.

STATEMENT OF HON. CHARLES B. CURTIS, CHAIRMAN, FEDERAL ENERGY REGULATORY COMMISSION, ACCOMPANIED BY DANIEL GOLDSTEIN, ASSISTANT GENERAL COUNSEL; WILLIAM W. LINDSAY, ACTING CHIEF, BUREAU OF POWER; AND ED FOWLKES, BUREAU OF POWER

Mr. CURTIS. Thank you, Mr. Chairman, and members of the committee. I must say that I might be more comfortable on the other side of the podium than on this side.

Mr. DINGELL. Some have found it so in this group.

Mr. CURTIS. Mr. Chairman, I have submitted a rather extensive statement, which certainly I do not intend to read to the committee. I would hope that it could be entered in the record.

Mr. DINGELL. Without objection the full text of your statement will appear in the record.

We will recognize you for such summary as you choose to give and such other comments as you deem appropriate.

I would ask that you identify your associates for the purposes of the record and to assist our reporter.

Mr. CURTIS. Yes, sir.

On my far right is Mr. Daniel Goldstein, an Assistant General Counsel. On my immediate right is Dr. William Lindsay, the Acting Chief of the Bureau of Power. On my left, Mr. Ed Fowlkes, of the Bureau of Power in charge of our reliability programs.

Mr. DINGELL. Gentlemen, we are happy to welcome you all. Thank you for being with us.

Mr. CURTIS. I am appearing here today, Mr. Chairman, in response to your letter-request of September 23. I have also submitted with this testimony in the form of an appendix some answers to specific questions which you have posed to me in letters of September 9, 12, and 20, which had not been addressed fully in the text of the statement.

Mr. DINGELL. Without objection both the letters and the responses will appear in the record at the appropriate place.

Mr. CURTIS. I would add that what appears as an appendix titled "Responses to questions 1 and 2 contained in Chairman Dingell's letter of September 9, 1977," should be more particularly received by the committee as information with respect to those questions.

You have posed to the Commission questions of what were identified as problems that the Commission had determined existed specifically with the ConEd system in its July 1967 report, and what actions had been taken to implement those noted deficiencies and to identify those actions which had not been taken.

Now what we have furnished the committee is, in essence, a summary of what is in place without an attempt at this moment in time to evaluate whether the actions taken by ConEd in this period satisfied and corrected the deficiencies noted. That subject would be explored in detail in the final staff report which we hope to conclude within the next couple of weeks, but rather than prejudge that statement, we merely furnished an indication or summary of the actions taken without an attempt to evaluate their sufficiency.

Mr. DINGELL. I think that is entirely appropriate and it will be received with that understanding.

The Chair does make the observation, in view of the fact that there may be proceedings pending before the Commission with

regard to matters which might touch directly or indirectly on the inquiry of the committee, that it is not the intention of the Chair or any member of this committee to in any fashion dictate to you in your function as chairman of an independent regulatory body.

As you will recall, I take some pride in the fact that I, together with other members of this committee, saw to it an amendment was adopted on the floor which afforded you the utmost amount of independence which it was within our power to give. We do not now seek in any fashion to trample upon that independence.

I want the record to so indicate, lest somebody might have some confusion over the meaning of this proceeding in light of the *Pillsbury* case.

Mr. OTTINGER. Are those questions and answers part of the testimony which you submitted, Mr. Chairman, or are they a separate——

Mr. CURTIS. It should be part of the testimony you received, Mr. Ottinger; it is the last several pages thereof. Picking up after page 58, which concludes the pagination of the formal statement, there are 14 pages of response. The only qualifying comment that I was trying to make is that we recognize that they are not, "responsive to your questions"; that the response will be made a part of the Commission's formal report. We are supplying information to the committee, but I was not satisfied that they were responsive because your questions sought an evaluation which we have not given you.

Mr. DINGELL. Mr. Curtis, the Chair does observe that we had submitted to us today a summary of the recommendations of the New York State Public Service Commission, staff task report, second report, and earlier recommendations by other bodies. I observe with curiosity that practically each and every one of the earlier recommendations is the subject of more current recommendations with regard to ConEd and with regard to the reliability of the system interconnections-intertie and with regard to the functioning of the New York power pool.

It would help us if we could make this available to you and your staff could give us answers as to what has been done with regard to correcting these comments and recommendations by the affected agencies.

I am sure you can understand the distress with which we observe that recommendations are not necessarily carried out, although I have, not infrequently, had the minimum high regard prescribed by law for your predecessors, I do not wish to blame you for any of their failures.

Mr. CURTIS. I would be happy to do that, Mr. Chairman.

Would you like me to dispense with the short summary of the statement?

Mr. DINGELL. I think that is entirely appropriate and you can make whatever comments you deem appropriate.

Mr. CURTIS. All right.

[Testimony resumes on p. 187.]

[Mr. Curtis' prepared statement and the responses to questions referred to, follow:]

STATEMENT OF
CHARLES B. CURTIS
CHAIRMAN, FEDERAL ENERGY REGULATORY COMMISSION
BEFORE THE
SUBCOMMITTEE ON ENERGY AND POWER, COMMITTEE
ON INTERSTATE AND FOREIGN COMMERCE
HOUSE OF REPRESENTATIVES

October 13, 1977

Mr. Chairman and Members of the Subcommittee,

I am appearing here today in response to Chairman Dingell's letter of September 23, stating that while these hearings will deal with issues raised by the Con Edison Company power failure of July 13-14, 1977, the Subcommittee is interested generally in the role played by interconnections among electric power systems in maintaining reliable service and particularly with the adequacy of regulatory mechanisms governing such interconnections.

I appreciate this opportunity to appear here today to discuss these matters. As you know, I have served as the Chairman of the Federal Regulatory Commission and its predecessor agency, the Federal Power Commission, just over two months. On October 1, the Department of Energy was officially inaugurated. While the Federal Energy Regulatory Commission, which has assumed most of the electric power jurisdiction previously held by the Federal Power Commission, is nominally a unit of the Department

of Energy, it is in purpose and in fact an independent regulatory body.

My testimony will be directed in part to the role of interconnections and interconnected systems in assuring reliability of service. It will include a discussion of the power failure on the Con Edison system and will answer questions raised by Chairman Dingell in letters to me dated September 9, 12, and 20.[1/]

NATURE AND PURPOSES OF INTERCONNECTIONS

"Interconnection" in electric utility parlance refers to a joining of two separate electric power systems through transmission facilities at one or more points to enable electric energy to be transferred between the two systems. An electric power system operating in electrical isolation is not only more costly to operate, but it is also likely to suffer from a lower level of service reliability. It is costly to operate because it must carry a high proportion of reserve generating capacity in relation to its

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1/ Chairman Dingell's letter of September 9, 1977 asked for:

(1) A detailed list of all the recommendations made for improvements or modifications in the Con Edison system, including equipment, design, operations and maintenance, following the power failure of 1965, and

(2) A list of the recommendations not implemented by the Company and an explanation of the reason for such omission, if known.

Attachment A responds to those questions.

maximum load requirements. It is likely to be unreliable since it is vulnerable to sudden load swings or failures of specific generating units. 1/

When such a system is interconnected with a neighboring system and thereby to a large interconnected network, its ability to provide reliable service at lower cost is vastly improved. This is particularly true when the interconnection is operated "closed," i.e., such that power flows freely between the systems without any necessity for closing switches.

The synchronous operation of electric utility systems requires a great deal of coordination. For optimum economic energy supply from interconnected systems, both generation and transmission expansion planning and system operation must be coordinated. Detailed operating procedures must be developed. Power system load flow and stability evaluations involving all the interconnected systems become necessary. Provisions must be made for protective relaying equipment so that major items of generation or transmission equipment can be isolated during system disturbances to minimize equipment damage as well as to minimize

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1/ Some of these considerations were discussed by the Supreme Court in its 1971 opinion in Gainesville Utilities Department v. Florida Power Corporation, 402 US 515.

the extent of any given power disturbance. Close communication among the participating systems is essential, including both oral communication and through electronic signals transmission. In addition, specific operating procedures must be developed for use during system emergency conditions as well as during periods of normal system operation.

The fundamental unit of interconnected system operation is the "control area." This refers to a bulk power supply system or interconnected group of systems such that power flows (into and out) are controlled between the area and adjoining control areas, rather than between systems within the control area. Examples of control areas include the New York Power Pool, the PJM Interconnection, and the New England Power Pool. All of the points of interconnection between the control area and systems outside the control area are telemetered to a control center. The generation within the control area is raised or lowered to the extent necessary to bring the algebraic sum of the power flows to zero plus or minus net scheduled imports or exports. Metering between the systems within a control area is primarily for purposes of measuring power flows so that after-the-fact accounting can serve as a basis for payments among the systems depending upon the specific amounts of energy generated and received.

Interconnected electric utilities exchange various types of power and energy among themselves. For example, when an interconnected system experiences an emergency shortage due to the sudden loss of power from a generating unit, energy will flow into the system from its interconnected neighbor until such time as the utility is able to bring additional generation resources on the line and reduce its line flow to schedule. Energy received under these circumstances is classified as "emergency energy" and is normally priced at incremental cost to the supplier plus a nominal percentage. Usually a system may receive emergency energy for a limited period of time, say 48 hours. If for some reason additional generation cannot be brought on the line within that period, the utility must begin taking service under another rate schedule (as, for example, short term power) which may carry a demand charge as well as an energy charge, and which is higher priced. Other types of interchange service between large systems include economy energy, diversity power, maintenance energy, firm power and unit power.

Interconnections may also be used by a utility to provide wheeling service to adjoining systems. For example, if System A wishes to purchase power from System C with which it is not directly interconnected, but both

systems are interconnected to System B, an arrangement may be made whereby B agrees to wheel (or transmit) the power from C to A at a price. Services of these types are important in that they enable the coordinating systems to achieve substantial economies without reducing the level of reliability.

BULK POWER SUPPLY SYSTEMS IN THE UNITED STATES

The bulk electric power supply systems in the United States interconnect generation resources in excess of 500 million kilowatts. More than 100,000 miles of electric power transmission lines operating at 230 kilovolts higher serve as the backbone of these bulk power supply systems.

There are three major distinct synchronous electric power supply areas in the contiguous United States. Electric power systems from the east coast to the line of states from Louisiana and Oklahoma and north to North Dakota, operate together in electric synchronism and form the eastern interconnected network. Seven Regional Electric Reliability Councils are involved in coordinating the planning for this power supply network. Generation resources in excess of 400,000 megawatts were employed to satisfy a peak load of about 300,000 megawatts during the summer of 1977.

Electric utilities west of the Rocky Mountains that are members of the Western Systems Coordinating Council (WSCC) form a second major synchronous power supply network. The 1977 summer peak load of 64,000 megawatts was satisfied from resources totalling over 88,000 megawatts. The third major power supply network involved in the bulk electricity supply for the United States includes electric utilities located in eastern and central Texas. These utilities are members of the Electric Reliability Council of Texas (ERCOT) and operate intrastate only. The 1977 ERCOT summer peak load was 26,000 megawatts and was supplied from resources totalling over 35,000 megawatts.

Within the eastern power supply area covered by seven interconnected Electric Reliability Councils, there are significant inter-regional power and energy transfer capabilities at many locations. At some Council interfaces the inter-regional power transfer capability is stronger than the intra-area transmission system thereby placing a constraint on inter-regional energy transfers. The attached map (Attachment B) shows the interconnections among the various regions of the country.

During the past 15 years, both 500 kV and 765 kV transmission line voltages have been established within the United States. Since these lines can provide approximately 2,000 and 3,000 megawatts of power transfer capability, respectively, the construction of a single line can result in a major improvement in electric energy transfer capabilities.

Current data as filed by the Regional Reliability Councils with the Federal Power Commission indicate that significant expansions in the bulk power transmission network is expected within the next decade. About 38,000 miles of transmission lines rating 345 kV and above are planned for installation between now and 1986. This reflects an 85% increase in EHV transmission line mileage.

ADEQUACY AND RELIABILITY OF BULK POWER SUPPLY

Adequate power supply for any given system or group of systems means possession of or access to generating resources to meet load requirements plus sufficient generating reserve margin to cover equipment outages, forecasting errors and other similar contingencies. It also requires sufficient transmission capability to assure that power can be transmitted from generation facilities to load centers, including sufficient excess capability

such that the occurrence of credible outage contingencies will not affect the ability of the system to supply its loads. To the extent that a system does not have adequate generating facilities on its own system, additional power and energy must be obtained from other systems. Utilities commonly make arrangements to obtain firm power, unit power, and other types of power from other systems for periods of time ranging from a few weeks to many years. Adequate interconnections between systems are essential if arrangements of this sort are to be effectuated.

A reliable bulk power system is one for which there is a high probability that it will be able to continue to meet its load requirements in spite of the occurrence of a reasonably credible single contingency outage. The definition of single contingency outage currently varies from one system or group of systems to another but may, for example, include the outage of a generating unit, the outage of a transmission line, the outage of a transmission structure (which may contain from 2 to 4 transmission circuits) or some combination of generator unit and transmission line outage. Normally, an electrically isolated system would be unable to meet any of these contingencies without system shutdown unless it carried an

enormously high percentage of generating reserve margin. Adequate interconnections with other systems enable the system experiencing the emergency to obtain sufficient power from other systems to maintain stable conditions until additional generating resources can be activated. This occurs as a result of the fact that modern power systems are designed to respond automatically to changes in load levels and frequencies.

It should be evident that the mutual ability to call upon assistance from other systems in times of emergency places responsibilities on each of the interconnected systems. That is, interconnected operation makes it possible for one system to "lean" on others unless it accepts responsibility for assuming its fair share of the burdens of interconnection. This means, among other things, that participating systems must carry roughly proportional installed generating reserve margins, must carry their fair share of spinning reserve and operating reserve, and must maintain generating equipment in an adequate state of repair so that it can be made available in time of emergency to a neighboring system. To the extent that interconnection participants exercise their full share of responsibility for interconnected operation, they can achieve either substantially improved reliability of service or substantially improved economy of operation without sacrifice of reliability.

REGULATION OF BULK ELECTRIC POWER SUPPLY RELIABILITY

The principal sources of Commission authority to regulate the adequacy and reliability of bulk electric power supply are contained in Sections 202, 205, 206 and 207 of the Federal Power Act. Under Section 202(a), the Commission is charged with the responsibility of promoting and encouraging voluntary interconnection and coordination within and between regional districts. Under Section 202(b), the Commission is authorized under certain circumstances, to require involuntary physical connection of the transmission facilities of a public utility with those of another person engaged in the tranmission or sale of electric energy. Under Section 202(c), the Commission may, under conditions of emergency, require temporary connections of facilities and such generation, delivery, interchange, or transmission of electric energy as in its judgment will best meet the emergency and serve the public interest. Under Sections 205 and 206, the Commission is empowered to regulate wholesale rates charged by public utilities for transmission or sale of electric energy subject to the jurisdiction of the Commission, including the classification, practices, and regulations affecting such rates and charges, together with all contracts which in any manner affect or relate to such rates, charges,

classifications, and services. Among the provisions of rate schedules which may be regulated by the Commission, for example, are those which provide for power supply to wholesale customers under conditions of shortage or other emergency. Section 207 empowers the Commission, upon complaint by a State Commission and upon a finding that any interstate service of any public utility is inadequate or insufficient, to determine the proper, adequate, or sufficient service to be furnished.

Under Section 202(b), the Commission has, in a number of instances, directed public utilities to interconnect with, and exchange power and energy with, electrically isolated or otherwise inadequately interconnected systems. Historically, complaints under this section have been filed by municipal electric systems. Usually, interconnections of such isolated systems not only substantially improve the reliability of service of the small system applying for the interconnection, but may also have the effect of improving the reliability of the public utility since the generating reserve margin of the small isolated utility is normally much larger than that of its public utility neighbor. The administration of Section 202(b) is now assigned to the Federal Energy Regulatory Commission.

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While the Commission has rarely employed Section 202(c) in the past since in most instances utilities are prepared to assist one another voluntarily under conditions of emergency, its importance for assuring reliable power supply is evident. Under this section the Commission is empowered to act upon its own motion without necessity for hearing so that under conditions of emergency requiring action, it can act promptly. The Economic Regulatory Administration will now have the responsibility for administering Section 202(c) except in cases in which the parties are unable to agree to terms of the arrangement necessary to carry out the order. In such cases, the Federal Energy Regulatory Commission will prescribe the terms after hearing, including any compensation or reimbursement to be paid by any party.

Section 205 requires that all rates be just and reasonable and not unduly preferential or discriminatory. Of the 4,000 rate schedules on file with the Commission, approximately one-half are in the form of interconnection and coordination agreements. The remainder are for firm requirements service.

Interconnection and coordination agreements are contractual agreements between electric suppliers providing for more economic and reliable operation of existing power

facilities and for services which effectuate joint planning of power supply facilities. These arrangements may be bilateral or multilateral; they vary greatly in form and content. The most complex arrangements are generally multi-party pooling agreements. These differ from other coordination agreements in that (1) they provide for a greater degree of coordination of planning and operation usually through a permanent committee structure and (2) they provide for sharing of generating reserve capacity and include rate provisions covering differences between actual installed capacity and installed capacity obligations under the contract.

Under Section 205, the Commission has occasion to deal with provisions of rate schedules which relate to the continuity of service to wholesale customers under conditions of shortage or other emergency. In those circumstances, the Commission's efforts have been directed generally toward assuring that the wholesale customers are treated in a nondiscriminatory manner. The Commission has also had occasion to deal with periods of notice required by provisions of rate schedules prior to contract termination. The Commission's efforts in this regard have been directed to assuring that there be a sufficient notice period to avoid unplanned excess capacity on the system of the supplier, while at the same time assuring

that the customer has reasonable opportunity to obtain other sources of power without undue delay. Administration of Section 205 is now the responsibility of the Federal Energy Regulatory Commission.

Action by the Commission under Section 207 can only be taken upon complaint by a State Commission. Our records show only two cases in which State Commissions has invoked this section. Since both of these cases are currently pending before the Commission, I shall not discuss them further. It is evident, nevertheless, that the Commission's authority under this section is extensive if any State Commission sees fit to invoke this authority under circumstances in which they believe interstate power supply is inadequate or insufficient. Administration of Section 207 is now the responsibility of the Federal Energy Regulatory Commission.

As may be evident from the above, the number of formally litigated cases having a direct impact on power supply reliability have not been large. Much of the effort on the part of the Commission and its staff to promote bulk power supply reliability in the past has been through efforts to encourage voluntary improvements under the authority of Section 202(a). In the early 1960's, such efforts involved the various activities related to the National Power Surveys. More recently, the principal

focus has been on efforts to work with and through the Regional Reliability Councils.

The first Regional Reliability Council -- the Northeast Power Coordinating Council (NPCC) -- was formed in January 1966, less than three months after the Northeast Power Failure of November 9-10, 1965. In January 1967, the East Central Area Reliability Council was formed. In its report on Prevention of Power Failures in July 1967, the Federal Power Commission urged that the electric utility industry organize strong regional organizations in those parts of the country in which they did not already exist, for the purpose of achieving adequate reliability through coordination of planning, construction, operation, and maintenance of individual bulk power supply systems. It also recommended the formation of a national council, to be made up of representatives of the regional organizations to exchange and disseminate information on regional coordinating practices and to review and assist in resolving problems of inter-regional coordination.

By 1968, reliability organizations had been formed in all parts of the country. The National Electric Reliability Council (NERC) was established by Agreement dated June 1, 1968. By January 1970, the membership of NERC had become the nine Regional Reliability Councils that exist at the present time. Since its formation, NERC has

acted as the national spokesman of the electric utility industry in matters regarding reliability of bulk power supply. Since 1971, NERC has issued an annual report assessing the reliability of power supply in North America.

Each of the nine Reliability Councils is an association of electric utilities within a geographic area. The council boundaries were established by the utilities involved on the basis of commonality of interests and historic working relationships.

The members of specialized committees within each council are familiar with power system planning and operations of the utilities they represent, and review and assess bulk power supply planning on a large-scale, long-range coordinated basis. For the same reason they are qualified to review, evaluate, study and take measures to implement such practices as lend themselves to coordinated operations. The councils and their committees concern themselves only with reliability and adequacy of power supply and do not involve themselves in rate or other economic matters.

The relationship between the Federal Power Commission and the Regional Councils has been based both on the provisions of Section 202(a) of the Federal Power Act and on an official Commission Statement of Policy in 1969. That Policy Statement, which evolved from a full-scale

investigation of the factors surrounding the 1965 Northeast Power Failure, encouraged the Councils to provide for participation by Federal officials and representatives of State Public Utility Commissions in their planning and review procedures.

Beginning in 1970, the Commission specified in a series of orders the information it wished to receive from the Regional Reliability Councils in order to carry out its nationwide responsibilities regarding power reliability. The first such Commission order, in April 1970, spelled out ten items for annual response by the nine Regional Reliability Councils. These topics covered information related to bulk power supply reliability and planning; annual reports providing that information have been filed voluntarily by the Regional Councils in April of each year since 1970.

The annual reports by the Councils project in detail the loads and resources for each area for 10 years in advance, and in general terms for a second 10-year period. Each generating unit projected for completion within 10 years is listed and identified as to owner, capacity, fuel, and site to the extent the information is available. Peak demands are projected for summer and winter, along with annual net energy requirements, for each year in the first decade. Information is also given concerning

transmission line construction, load flow studies and other factors pertinent to coordinated planning and operation.

When the Commission Staff finds items in the reports that indicate further investigation is required, these matters are taken up with the appropriate Councils and the specific utilities involved. In addition, the Staff participates in a limited way in some of the principal meetings of some of the Councils. The Chief of the Commission's Bureau of Power has been designated by the NERC as the official "observer" at annual meetings of its Executive Board.

Under the Department of Energy Act, responsibility for administering the provisions of Section 202(a) is reserved to the Secretary, who has delegated this responsibility to the Economic Regulatory Administration.

CON EDISON, NEW YORK POWER POOL (NYPP) AND THE NORTHEAST POWER COORDINATING COUNCIL (NPCC)

Power systems in the State of New York, and particularly the Con Edison Company have had as much or more difficulty in maintaining a reliable bulk power supply as any other area of the country. The most serious failure, from several points of view, occurred in the system of Con Edison on July 13-14, 1977. Before describing that failure, I believe it is important that I

describe the relation of the Con Edison system to the New York Power Pool (NYPP) and the Northeast Power Coordinating Council (NPCC).[1/]

Northeast Power Coordinating Council (NPCC)

On January 19, 1966, the electric systems in New York, including Con Edison, New England and Ontario, signed a Memorandum of Agreement establishing the Northeast Power Coordinating Council (NPCC), the first organization of its kind in North America. NPCC currently consists of 31 member systems which supply about 98% of the electric requirements in New England, New York, and the Canadian Provinces of Ontario and New Brunswick.

The purpose of NPCC as stated in the Agreement is ". . . to promote maximum reliability and efficiency of electric service in the interconnected systems of the signatory parties by extending the coordination of their planning and operating procedures." Full membership is limited to electric utility systems, whether investor-owned companies or governmental agencies, which by virtue

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1/ Descriptive information on Con Edison, NYPP and NPCC can be found in the FPC Staff Report entitled, Electric System Disturbance on the Consolidated Edison Company of New York, Inc. System, dated August 4, 1977. Chapter III of the Report and Chapters II and III of the Supplemental Report cover Con Edison, NYPP and NPCC, respectively.

of generating or transmission capacity or concentration of load can have a substantial effect on the service reliability of the interconnected systems.

Four distinct planning and operating entities exist within the NPCC region, two in the United States and two in Canada. NPCC member systems located in New England are also members of the New England Power Pool (NEPOOL), and systems in New York State are members of the New York Power Pool (NYPP) -- both of which operate under formal agreements on file with the Commission. New Brunswick Electric Power Commission and Ontario Hydro are single entities serving their respective Provinces in Canada.

The member systems of NPCC have agreed to the following:

1. The member systems of NPCC shall report periodically their 10-year plans (including alternatives) for transmission and generation.
2. NPCC shall evaluate the plans from the standpoint of suitability and the reliability of the Northeast Interconnected Systems and report its assessment and recommendations to the membership.

NPCC evaluates the plans using established criteria as set forth in an NPCC documentt, "Basic Criteria for Design and Operation of Interconnected Power Systems."

These are minimum criteria which all members of NPCC use in their planning and design; each pool and member may supplement the criteria as required to conform to the uniqueness of their particular system. NPCC also has established a Council-wide Operating Reserve Policy covering procedures to be used in time of major emergency, including load shedding criteria. Again, these are minimum requirements.

In addition to coordinating, planning and operation among the four NPCC areas, NPCC also maintains relationships with two other Reliability Councils, the Mid-Atlantic Area Coordinating Council (MAAC) and the East Central Area Reliability Coordination Council (ECAR), through inter-area agreements. Each of these agreements establishes an inter-area review committee to:

1. Exchange information on respective activities and decisions, including system future plans and forecasts.
2. Examine the effects of activities and decisions in one area on the reliability of bulk power supply in the other area and report findings to the respective parties.

NYPP and Con Edison

Con Edison is one of the original signatories (on July 21, 1966) to the New York Power Pool Agreement.

Presently, there are eight Pool members, all operating and serving customers in New York State. These include the seven major privately owned systems in the state and the Power Authority of the State of New York.

The purpose of the New York Power Pool (NYPP), as stated in the NYPP Agreement, is to obtain substantial mutual benefits for all members of "coordinated operation of their electric systems, including increased reliability of service and reduced capital costs made possible by coordinated system planning and reduced operating costs made possible by the interchange of electric energy for economy purposes." The Agreement establishes the Power Pool Control Center "for the principal purposes of (1) coordinating the operations of member companies of the Power Pool insofar as they may affect the reliability of the bulk power supply on the interconnected systems in New York State; (2) dispatching energy requirements on an economy basis; and (3) monitoring the internal and external operations of the Power Pool to ensure umimpaired overall security of bulk power supply at all times."

The NYPP Agreement establishes certain planning and operating committees with requirements which each member, including Con Edison, is obligated to follow.

Each member furnishes the NYPP Planning Committee with system load and generation capability forecasts, statistical data, and any other information which may reasonably be required in the course of the studies undertaken by the Committee. The NYPP in their planning studies subscribe to the Northeast Power Coordinating Council's design criteria and have developed additional design criteria, "Design Standards for Long-Range Planning and Studies of Short-Range Operating Limits," which are consistent with and supplement those of NPCC. The NYPP planning studies test the combined future plans of the Pool as a single system to assure that they meet the established planning criteria agreed upon by all members.

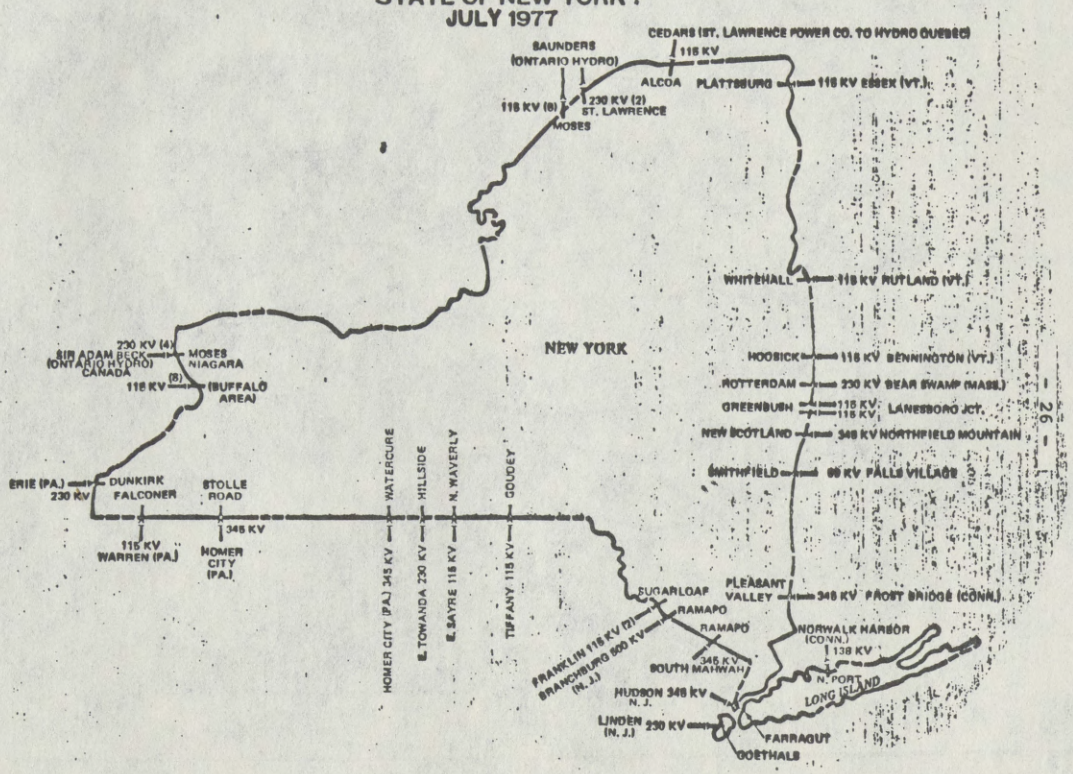
Each member must consider the required installed capacity reserve as stated in the NYPP Agreement. At present, each member is required to maintain 18% generation capability over their maximum peak hour load for a capability period -- summer or winter. Actual capability reserve could result in a capability deficiency or surplus with the deficient members being charged by the Pool and payments made to the members having surplus. Because of the NYPP's load diversity, the individual systems' 18% requirement currently translates into a 22% Pool-wide installed reserve requirement, which in turn currently equates to a "Loss of Load Probability" (LOLP) index of

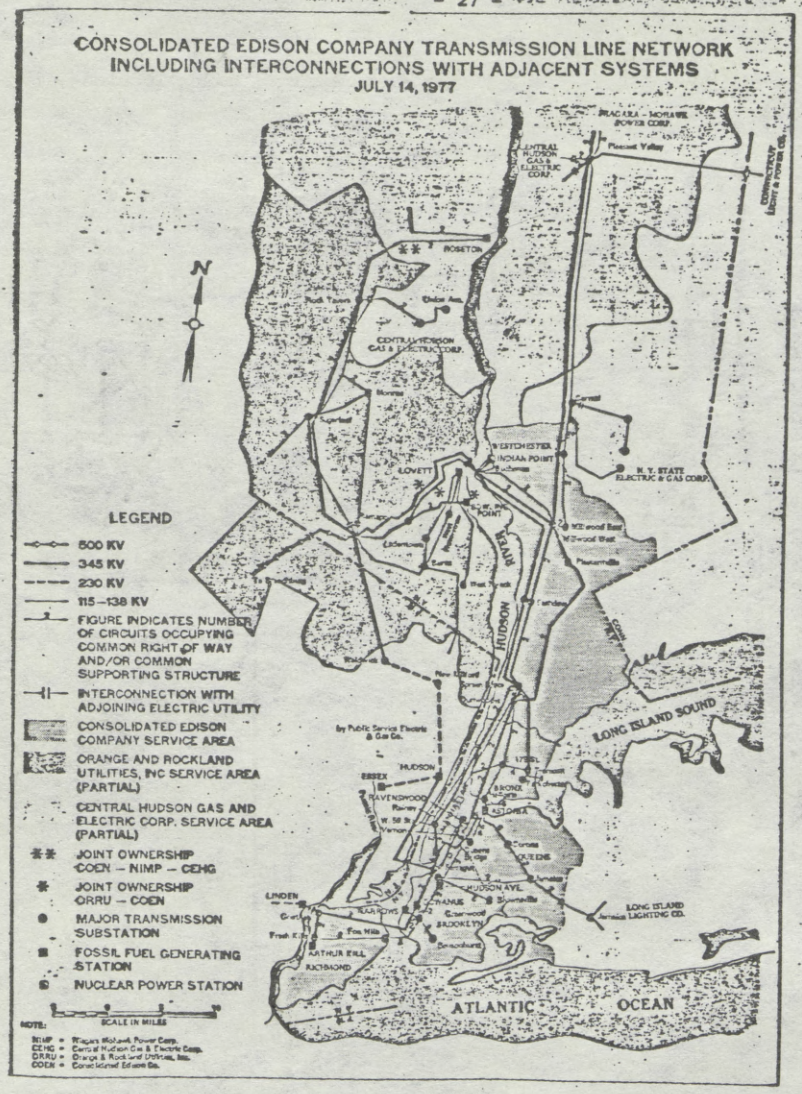
one-day loss in 10 years, taking into account NYPP's interconnections with other areas.

The NYPP is interconnected directly with the New England Power Pool (NEPOOL) to the east, Ontario Hydro of Canada to the north, and the Pennsylvania-New Jersey-Maryland Interconnection (PJM) to the south. The interconnections are shown in the diagram on page 26.

The principal transmission system for the movement of bulk power within Con Edison, and for power exchanges with other systems, is a 345 kV network. It is basically north-south oriented and ties together the generating capacity and load centers of the five Boroughs of New York City with the Indian Point, Bowline Point, and Roseton Plants, and Westchester County load areas to the north. This network overlays a widespread 138 kV supporting grid. A geographic layout of principal transmission lines and generating plants is given in the diagram (page 27) of Con Edison's transmission line network including ties with other NYPP member systems and Public Service Electric and Gas Company of New Jersey. Nearly half of Con Edison's transmission circuit miles consist of underground cable and almost 60% of the total circuit miles operate at 345 kV.

ELECTRIC POWER SYSTEM INTERCONNECTIONS
STATE OF NEW YORK .
JULY 1977




CONSOLIDATED EDISON COMPANY TRANSMISSION LINE NETWORK
INCLUDING INTERCONNECTIONS WITH ADJACENT SYSTEMS
JULY 14, 1977
N
LEGEND
500 KV
345 KV
230 KV
115–138 KV
FIGURE INDICATES NUMBER OF CIRCUITS OCCUPYING COMMON RIGHT OF WAY AND/OR COMMON SUPPORTING STRUCTURE
INTERCONNECTION WITH ADJOINING ELECTRIC UTILITY
CONSOLIDATED EDISON COMPANY SERVICE AREA
ORANGE AND ROCKLAND UTILITIES, INC SERVICE AREA (PARTIAL)
CENTRAL HUDSON GAS AND ELECTRIC CORP. SERVICE AREA (PARTIAL)
JOINT OWNERSHIP COEN – NIMP – CEHG
JOINT OWNERSHIP ORRU – COEN
MAJOR TRANSMISSION SUBSTATION
FOSSIL FUEL GENERATING STATION
NUCLEAR POWER STATION
SCALE IN MILES
NOTE:
NIMP = Niagara Mohawk Power Corp.
CEHG = Central Hudson Gas & Electric Corp.
ORRU = Orange & Rockland Utilities, Inc.
COEN = Consolidated Edison Co.
NIAGARA - MOHAWK POWER CORP.
CENTRAL HUDSON GAS & ELECTRIC CORP.
ROSETON
CENTRAL HUDSON GAS & ELECTRIC CORP.
LOVETT
WESTCHESTER
INDIAN POINT
N.Y. STATE ELECTRIC & GAS CORP.
HUDSON
LONG ISLAND SOUND
by Public Service Electric & Gas Co.
HUDSON
ESSEX
RAVENSWOOD
ASTORIA
LINDEN
KEARNY
FRANKLIN
BROOKLYN
ARTHUR KILL
RICHMOND
HUDSON AVE.
LONG ISLAND Service LIGHTING CO.
ATLANTIC OCEAN

The NYPP Agreement obligates the member companies to provide the required minimum operating reserve as established by the NYPP Operating Committee and set forth in the Pool Operating Policy. Operating reserve is generating capability which can be made available in a short time (e.g., 10 minutes or less) to cover errors in forecasting loads on a day-to-day basis and to cover sudden loss of a major generating or transmission facility. Each member must provide required operating reserve from generation resources owned by the member or through purchases from other NYPP members or neighboring Pools.

The NYPP has established an Operating Policy which consists of operating guides conforming with the intent of the NYPP Agreement. The guides cover such reliability related areas of operation as:

1. Operating During Major Emergencies
2. Operating Reserve and Voltage Reduction Policy
3. Load Curtailment Policy
4. Operating Procedure for Energy Conservation During Fuel Shortage

These guides provide a common approach and application of operating procedures for each NYPP member in times of critical shortage of generation capacity, fuel, or sudden loss of a major generation or transmission facility creating an emergency condition.

April 4, 1977, marked a significant advancement in the operation of the New York Power Pool. Pool-wide automatic (computer directed) economic dispatch was implemented and executed on a real-time basis.[1/] Prior to April 4, manual methods were utilized in performing economic dispatch. The Pool members dispatched their respective generating units economically in accordance with hourly transaction schedules developed by the NYPP Control Center. Prior to April 4, in other words, the Con Edison system was a control area, as were the other members of NYPP.

Additional savings are now possible through the implementation of the Pool-wide automatic economic dispatch. The effect is to operate the New York State bulk power supply as a single system and at the same time permit each member company to retain its corporate identity. During the course of economic dispatch, each hour is divided into dispatch intervals with duration as small as five minutes.

1/ "Real time" in this context means the performance of computations during the actual time that the economic dispatch is being executed so that the results of the computation can be used in guiding the economic dispatch.

During each interval there is a determination made of the most economic loading point for every available generator. The allocation of generation output ignores company boundaries and results in the exchange of economy energy among Pool members in the most economical manner.

Billing of all members is performed by the Pool Operations Center. All internal and external purchases and sales, with the exception of firm contracts, take place between member companies and the Pool. All external transactions, with the exception of firm contracts, occurs between the NYPP and neighboring systems or Pools. The Pool produces hourly, daily and monthly billing reports for its members.

THE JULY 13-14, 1977 CONSOLIDATED EDISON COMPANY OF NEW YORK, INC., SYSTEM DISTURBANCE

One of the most serious disturbances to ever befall an electric power system occurred on the Con Edison system on the evening of July 13, 1977. Electric service was interrupted for periods ranging from five hours to 25 hours following a sequence of events initiated by lighting storm activity in the lower Hudson Valley of New York State. Over 8 million people in the New York metropolitan area were affected. 1/

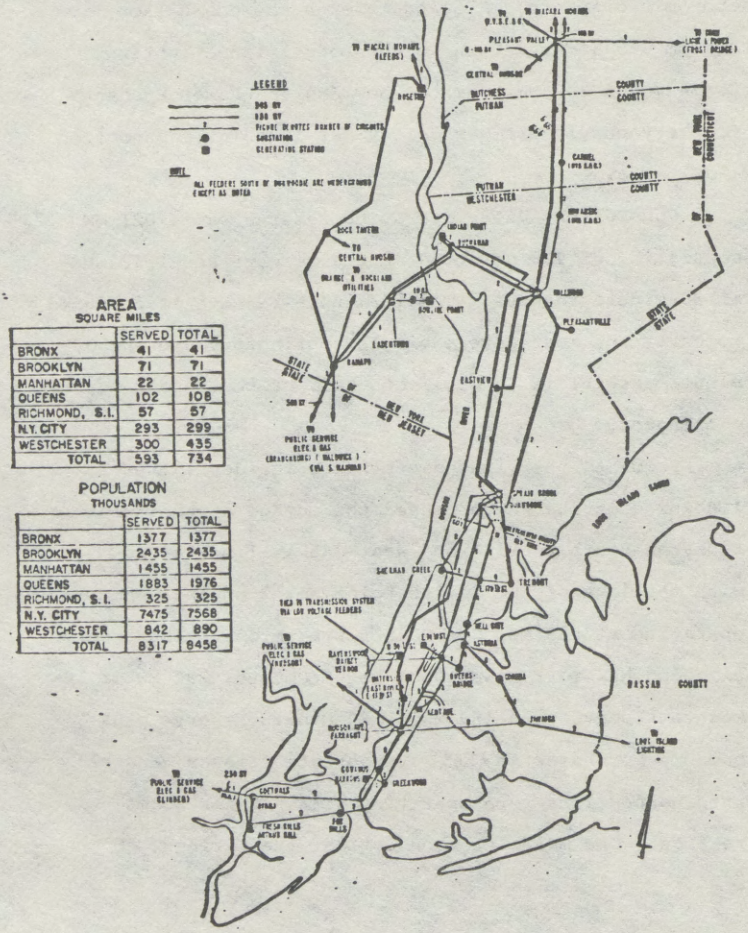
Prior to the initial disturbance event, at 8:35 p.m., 3,008 MW of the total Con Edison system load of 5,208 MW was being supplied by system generation in the New York City metropolitan area, and 2,200 MW was being delivered through interconnecting transmission facilities into the area. External generation sources included contributions from Con Edison's share of the Bowline Point Unit No. 1 (rated 601 MW) and Roseton Nos. 1 and 2 (rated 600 MW each) of which Con Edison owns, respectively, 66% and 40%. The remaining imports consisted of scheduled interchanges from the Hydro-Electric Power Commission of Ontario, the Quebec Hydro-Electric Commission, the Power Authority of the

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1/ Exhibit 1 shows the Electric Operating Territory and Principal Facilities of Con Edison as of December 31, 1976.

Exhibit 1

ELECTRIC OPERATING TERRITORY AND PRINCIPAL FACILITIES
DECEMBER 31, 1976



AREA
SQUARE MILES

	SERVED	TOTAL
BRONX	41	41
BROOKLYN	71	71
MANHATTAN	22	22
QUEENS	102	108
RICHMOND, S.I.	57	57
N.Y. CITY	293	299
WESTCHESTER	300	435
TOTAL	593	734

POPULATION
THOUSANDS

	SERVED	TOTAL
BRONX	1377	1377
BROOKLYN	2435	2435
MANHATTAN	1455	1455
QUEENS	1883	1976
RICHMOND, S.I.	325	325
N.Y. CITY	7475	7568
WESTCHESTER	842	890
TOTAL	8317	8458

State of New York, and Orange and Rockland Utilities, plus about 550 MW in economy energy. The Con Edison generation was operating under New York Power Pool economic dispatch. Flowing through the Con Edison system was about 250 MW to the Long Island Lighting Company and 200 MW from the New England Power Exchange to the Pennsylvania-New Jersey-Maryland Interconnection (PJM) area.

Con Edison system operating reserve was 2,021 MW consisting of 738 MW in 10-minute reserve and 1,283 MW in 30-minute reserve. The 10-minute reserve is designed to cover the most severe single contingency and the 30-minute reserve is to cover one-half of the second contingency.

Prior to the first disturbance incident, the lightning strike which caused the outage of the two Buchanan South to Millwood West 345 kV lines along with the loss of the Indian Point No. 3 nuclear unit operating at 883 MW, Con Edison system operating reserve exceeded New York Power Pool requirements, 292 MW of 10-minute reserve plus 163 MW of 30 minute reserve plus economy purchases in their appropriate classes, and all interconnections were operating within their normal ratings. One main interconnection, the Farragut to

Hudson (Public Service Electric and Gas Company - PJM) 345 kV transmission line was unavailable.

As the result of a series of subsequent events on the Con Edison system, along with slow response of system area generation and failure of available operating procedures to stabilize system conditions, the total system load, 5,750 MW, was lost shortly after 9:30 p.m. The disturbance events are described in the August 4, 1977 publication Federal Power Commission Staff Report on July 13-14, 1977 Electric System Disturbance on the Consolidated Edison Company of New York, Inc., System 1/ and in the two Con Edison Board of Review publications (1) First Phase Report-System Blackout and System Restoration July 13-14, 1977, (July 26, 1977) and (2) Second Phase Report-System Blackout and System Restoration July 13-14, 1977, Analysis of System Separation (August 24, 1977).

One of the matters of some concern with respect to this power failure was the unavailability of the 345 kV transmission line interconnecting Con Edison

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1/ The August 4, 1977, Staff Report was a preliminary report based upon limited information available at that time. A comprehensive staff investigation is now in progress and a detailed final report is in preparation. It is anticipated that the final report will be available within a matter of weeks.

The Farragut to Hudson tie is one of two phase-angle regulated interconnections between Con Edison and PSEG-PJM. The other, the Goethals to Linden tie, has an identically rated phase-shifter and crosses the Arthur Kill River with 230 kV overhead construction from Staten Island, New York.

On September 4, 1976, the Farragut substation phase-angle-regulating transformer failed, sustaining extensive damage. During Staff's investigation of the July 13, 1977 Con Edison system disturbance, the Farragut Angle Regulator TR-11 "Chronology of Events After Failure" (Exhibit 2) was supplied by Con Edison. The circumstances of the failure were investigated by Con Edison staff together with Westinghouse Electric Corporation (the manufacturer) personnel following the failure. As a result of the extensive damage sustained along with past poor operating performance, Con Edison decided to purchase a new phase-angle regulator with an improved design. The phase-angle regulating transformer had caused ouages to the interconnection on four other occasions since its installation in 1972. On February 23, and April 21, 1977, respectively, verbal and written orders were issued to the General Electric Company for manufacture of a new regulating transformer and a spare.

immediately with the Public Service Electric and Gas Company system, a PJM member. The Farragut to Hudson 345 kV line emanates from the Con Edison system's Farragut 345/138 kV transmission substation located at 43-133 John Street, Brooklyn, New York. The principal feeder is designated by Con Edison as B3402. Its components are a 345/345 kV 575 MVA FOA rated three-phase ±25 degrees phase-angle-regulating transformer, TR-11, in series with about 3.7 miles of 345 kV high-pressure oil-filled pipe-type cable transmission line which goes west under the Hudson River to the PSEG's Hudson substation in New Jersey. The intertie is rated 519 MVA (normal), 661 MVA (long-time emergency) and 719 MVA (short-time emergency).

A transformer is a device consisting of a winding with tap or taps, and two or more coupled windings, with or without a magnetic core, for inducing mutual coupling between electric circuits. A phase-angle regulating transformer or phase-shifter is a special transformer application. It is a voltage regulator that advances or retards the phase-angle relationship of one circuit with respect to another to control the real power (watts) flow between the two circuits. It is a device suitably adapted and arranged for the control of voltage, phase-angle, or both, of the regulated circuit.

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Exhibit 2

FARRAGUT ANGLE REGULATOR TR-11
CHRONOLOGY OF EVENTS
AFTER FAILURE

DATE	
9-4-76	Failure
9-6-76	Con Ed Internal Inspection with Westinghouse
9-7-76	Con Ed/West. LTC Inspection
9-13-76	Con Ed/West. LTC Inspection
9-16-76	Con Ed/West. Failure Review Meeting
9-20-76	Con Ed/West. Perform "Post Mortem" on LTC
10-8-76	Regulator Design Review Meeting with G.E.
10-27-76	G.E. Design Questions Answered by letter
10-29-76	Design Review Meeting with ASEA
11-10-76	Electrical Engineering Study Completed recommending new design
12-2-76	Meeting with Westinghouse on Replacement Regulator
12-6-76	Purchase Specification Issued
12-17-76	Invitation to Bid sent to Vendors
2-22-77	Board Approval for Regulator Purchase
2-23-77	Verbal Order given to G.E.
3-2-77	Post Order Meeting
4-21-77	Written Order given to G.E.
4-26-77	Received Control Drawings
5-6-77	Meeting with Con Ed/G.E. at Factory to Expedite Drawing Approval

In response to a recommendation in the August 4, 1977 Federal Power Commission Staff Report on the Jyly 13-14, 1977 disturbance, Mr. Arthur Hauspurg, President of the Con Edison Company on August 24, 1977, related that the new regulator's scheduled delivery, following manufacturer consultation had been expedited from March 1978 to January 1978. However, he also stated that:

> "Although the manufacturer has committed to this date, there is some uncertainty of meeting it because it is based on the successful completion of all stages of manufacture in minimum time with no allowance for contingencies."

With the new shipping date, January 15, 1978, the interconnection with its phase-angle regulator is expected to be in service by May 1978.

While the regulations of the Commission do not specifically prescribe that the Commission be advised of any electric utility's spare equipment inventory nor the manufacturing lead time for the replacement of any specific piece of equipment, Commission Staff in carrying out the Commission's reliability program deal frequently with utility systems' representatives and were aware that the Farragut phase-angle regulating

transformer was unavailable. Furthermore, Commission Staff are familiar with the manufacture, installation, and operation of phase-angle regulating transformers.

To facilitate the Commission's capacity to identify and rectify where possible the prolonged unavailability of major bulk power supply facilities such as the Farragut to Hudson interconnection, the Bureau of Power Staff began in 1976 to formulate a proposed Commission Order that would require the immediate reporting of major bulk power supply facility failures expected to be out of service for extended periods. This material was still in process at the time of the failure in July 1977. In addition, planning was in progress for the periodic reporting of major bulk power supply equipment failures and their expected return to service as part of a new respondent reporting system. These procedures were not for the purpose of identifying the unavailability of replacement equipment but to identify extended bulk power supply facility outages that might present hazards to the bulk power supply adequacy and reliability. We plan to make all of this draft material available to the Economic Regulatory Administration, which now has responsibility for these matters.

Most bulk electric power supply equipment is complex equipment designed for specific electric system

application and therefore generally not available as shelf items. This is especially so with regard to phase-angle regulating transformers which are designed to control the real power flow between specific systems or system groups. Furthermore, whether or not the replacement time for a particular piece of equipment is reasonable is subject to manufacturing capability, shipment facility availability and other constraints related to the system and manufacturer involved.

If the Farragut to Hudson interconnection had been operational during the July 13-14, 1977 disturbance, it would have been beneficial both in minimizing the effects of the disturbance and in expediting service restoration following system shutdown. In retrospect, it may have prevented the collapse of the Con Edison system. Had this line been in service, an additional source of input to the Con Edison system would have been available to supply power to the Con Edison system via another strong parallel path thereby lowering the loads on other paths before and after disturbance events. Given the circumstances that occurred on July 13, 1977, the extent of overloads that occurred on interconnecting transmission would have been of lower magnitude. There would have been one more interconnection to prevent

islanding of the Con Edison system, and the feeder's additional power flow (phase-angle) control could have been used to adjust overloads on other feeders. However, the capability of the interconnection to supply support power during the disturbance could only have been provided insofar as surplus power was available from PJM without overloading or causing the failure of the interconnection or PJM inputs thereto.

In the restoration phase of the July 13-14, 1977 disturbance, the Farragut to Hudson interconnection would have provided an additional source of real (watts) and reactive (volt-amperes reactive) power for generator start-up and voltage stabilization purposes during the restoration process. Since the pipe-type cable feeder has sufficient oil pumping and pressurization facilities at the Hudson end the feeder could have been energized even though no power was available at the Farragut (Con Edison) terminal, providing no other feeder auxilary equipment had failed. Earlier energization of several 345 kV transmission lines could have been effected on July 14, 1977. The tie could have been used to expedite energization of the Rainey 345 kV station for synchronizing the Ravenswood No. 3 unit and other area generation to restore load.

A second matter of particular concern in connection with the July 13 power failure is the

extent to which the proposed 2,000 MW Cornwall pumped storage hydroelectric project (Project No. 2338) might have contributed to prevention of the failure had it been constructed and in service on July 13. The project was proposed to be installed on the Hudson River, in the vicinity of the Village of Cornwall, Orange County, New York, about 40 miles north of New York City with 8-258 MVA generating units. Application for the project was originally filed on January 29, 1963. As envisioned for installation in 1977,[1/] power from the project to the Con Edison system load would have been provided by constructing 4.2 miles of double-circuit 345 kV submarine cables from the West side of the Hudson to a new substation on the East side, the Cornwall East substation, and then proceeding 18.4 miles east via double-circuit overhead 345 kV transmission to the Kent 345 kV switching substation, on the north-south transmission corridor between the Pleasant Valley and Millwood substations. From Kent substation, about 43 miles of double-circuit overhead 345 kV transmission line would bring project power into Con Edison system at the Sprain Brook substation near

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1/ Northeast Power Coordinating Council, Load and Capacity Report, March 1969.

Yonkers, New York in southern Westchester County. Each line constituting the double-circuit 345 kV facilities would have the capacity to transmit 2,000 MW. Exhibits 3 and 3a display the planned 1977 facilities.1/ The 345 kV lines from Kent to Sprain Brook would have paralleled the present Pleasant Valley to Millwood West 345 kV lines as far as Millwood West.

Present Con Edison generation expansion plans2/ show four Cornwall generating units initiating operation in 1988 and 1989. Output from the plant is provided for through the Cornwall to Cornwall East to Kent double-circuit 345 kV transmission described earlier. From Kent switching station two 345 kV lines would be constructed north to Pleasant Valley substation and two 345 kV lines south to the Pleasantville substation via Wood Street and by-passing Millwood West. This configuration would provide four 2,000 MW, 345 kV paths from Pleasant Valley to the Con Edison system. This system

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1/ Exhibit 3b shows the location of faults in transmission lines into Con Edison system on July 13, 1977.

2/ Northeast Power Coordinating Council response to FPC Order 383-4, Docket R-362, Appendix A-1, April 1, 1977.

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Exhibit 3

SIMPLIFIED SCHEMATIC DIAGRAM OF 1977 CON EDISON SYSTEM
WITH 1969 PLAN FOR 2000 MW CORNWALL PUMPED STORAGE PROJECT 2338

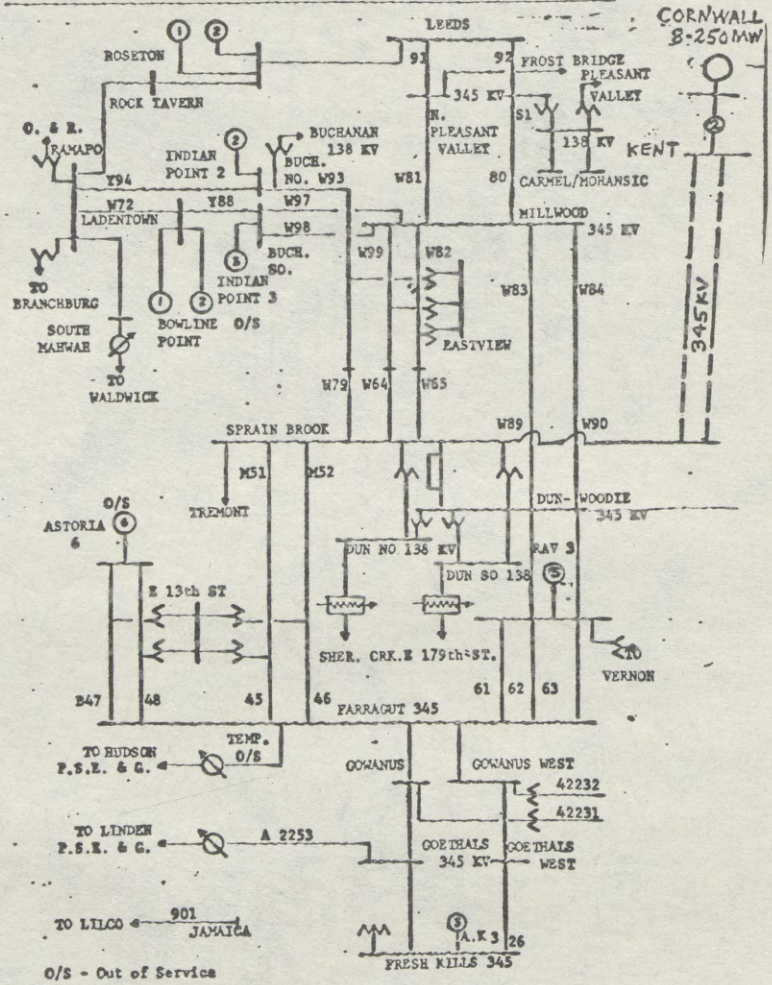


Exhibit 3a 1977 Configuration

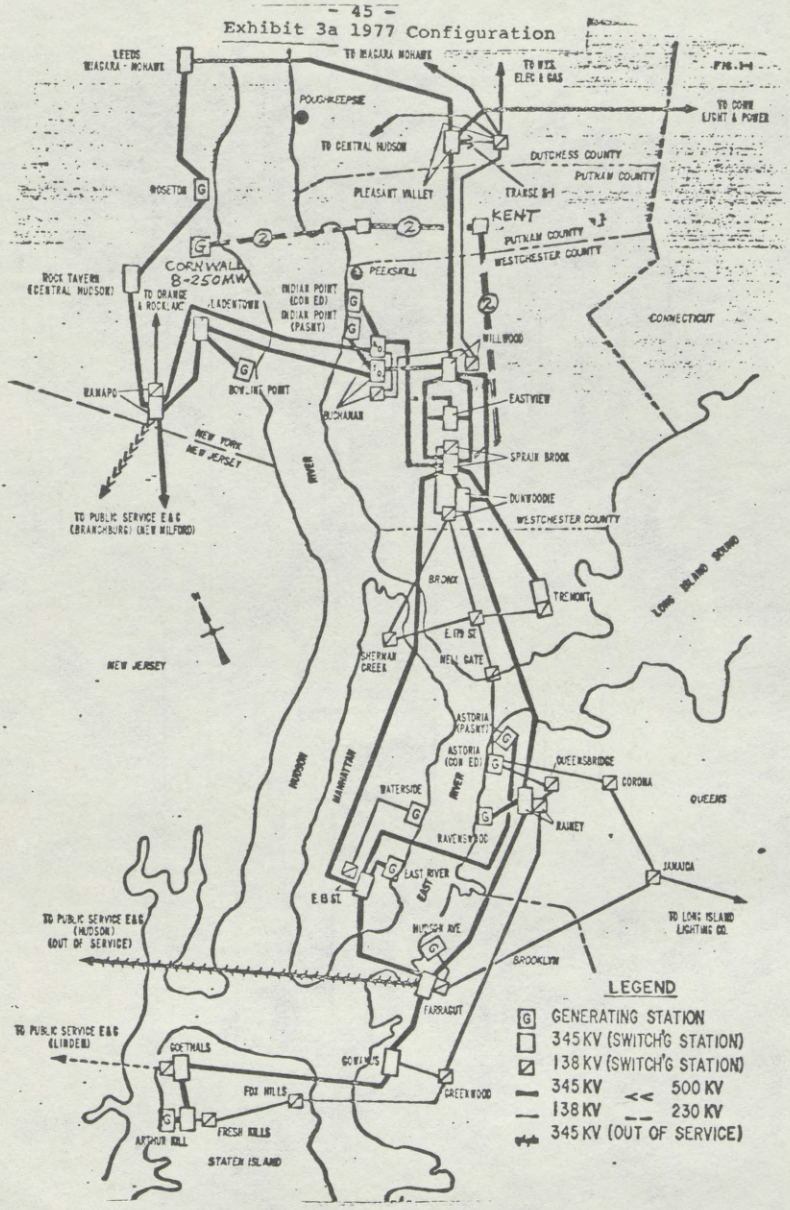
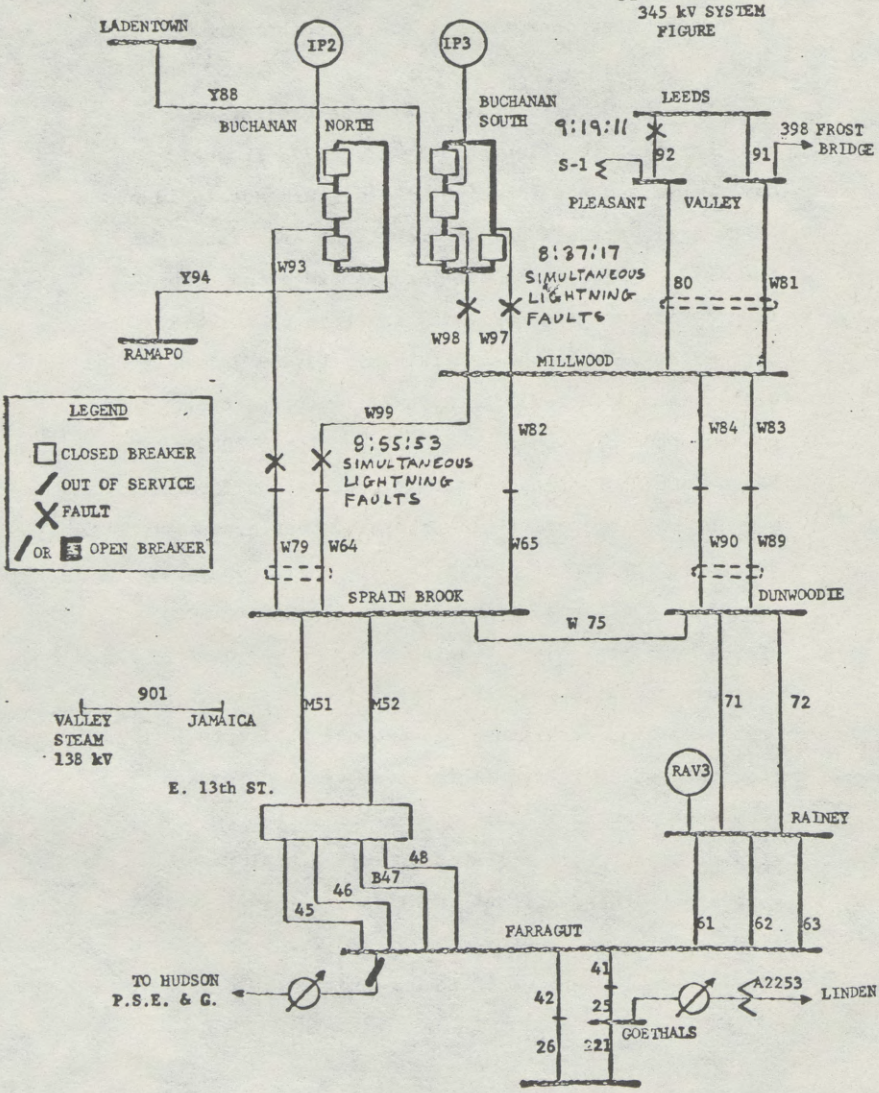


Exhibit 3b

LOCATIONS OF FAULTS ON TRANSMISSION LINES BRINGING POWER SOUTH INTO CON EDISON SYSTEM ON JULY 13, 1977

SIMPLIFIED SCHEMATIC
345 kV SYSTEM
FIGURE



configuration also shows an additional Farragut to Hudson interconnection to PJM and other transmission changes.

Had the Cornwall pumped storage Project No. 2338 been in operation on July 13, 1977, it could have minimized the impact of the disturbance incidents in several ways. These contributions are based upon the 1977 configuration earlier described and generation duration curves provided in Project No. 2338 proceedings. When the initial July 13, 1977 disturbance occurred, the Cornwall pumped storage project probably would have been supplying 300 to 500 MW and decreasing output in preparation for pumping mode operation or would have been consuming 200 to 300 MW in the pumping mode. In either case, immediate additional capability to the Con Edison system would have been available due to the quick response capability of this type of generation. Pumped storage generators can produce full output from cold start in from three to seven minutes and from full pumping to full generation in two to five minutes. Both modes of operation would meet a 10-minute reserve requirement faster than fossil-fired generation. Between 1,700 and 2,200 MW of additional power would have been available to

reduce line overloads and supply system requirements.

The second incident at 8:55 p.m. included the loss of one of the Pleasant Valley to Millwood West (W81) 345 kV lines. Had the Cornwall Project been operational, the preincident loading of this line would have been lower such that the defective relay may not have operated. Nevertheless, even if the line had tripped, there would have been three 345 kV sources from the north rather than one (the #80 line), such that the overload could have been minimized.

PROPOSED LEGISLATION

Efforts of the Federal Power Commission to exercise such responsibility as it has for assuring adequate, reliable electric bulk power supply have suffered from the lack of a strong legislative foundation. As described earlier, the legel authority of the Commission in this area, with certain rather narrowly limited exceptions, is largely confined to promoting and encouraging voluntary actions by public utilities. As the bulk power supply networks grow increasingly more complex, the need to confirm Commission efforts to encourage and promote cost effective power supply reliability and adequacy becomes more urgent.

Enactment of H.R. 8444 would represent an important step in providing the Commission with the legislative mandate and the necessary authority to carry out the responsibility for assuring adequate, reliable bulk power supply. Three sections of this Bill are especially important in this regard: Sections 541, 542, and 545.

Section 541 extends the authority of the Commission under Section 202(b) of the Federal Power Act in six ways:

(1) The Commission would be empowered under certain circumstances to direct that a utility provide pooling, wheeling, or otherwise coordinate with another utility or co-generator, in addition to its current authority to require physical connection and the sale, delivery or exchange of energy. The scope of the Commission's authority to require transmission (wheeling) service is unclear; it should have such authority when it finds such action "necessary or appropriate in the public interest . . . ." This would enable the Commission to bring about improved efficiency about improved efficiency in some cases

in some cases through more comprehensive coordination in the planning and operation of facilities. It would be of particular value in enabling a small system to obtain power and energy from a utility other than the one to which it may be directly connected. This would have the effect of broadening the bulk power supply market and introducing an element of competition that does not now exist.

While it is clear that in the Gainesville case, the Supreme Court affirmed the Commission's authority to direct coordination upon complaint under Section 202(b) as now written,[1/] it appears that the words "provide pooling" and "otherwise coordinate with" in Section 541(b) (1) may empower the Commission to require the continued operation of an existing power pool even though the parties wish to terminate it. Such authority may be essential if power pool dissolution that is not in the public

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1/ This case involved a complaint by a municipal system against a large "public utility" seeking interconnection and coordination.

interest is to be prevented. There have been at least two instances in recent years of decisions to break up power pools by the constituent members.

(2) The Commission would be empowered to act on its own motion in addition to its current authority to act "upon application of any State Commission or of any person engaged in the transmission or sale of electric energy." This is authority the Congress may well wish to confer on the Commission. It may sometimes be the case that while a new or additional interconnection may be in the public interest, it may not be in the interest of any individual or group with standing to complain under 202(b). Or it may be that while a small system may wish to seek relief under this section, the cost of pursuing such action may appear prohibitive. It may, for example, be in the public interest that the systems in Peninsular Florida be more heavily interconnected with the rest of the United States. Such improved interconnection might conceivably have prevented the large

power failure in southern Florida that occurred earlier this year. Under the Act as now written, however, the Commission has no power to direct such additional interconnection capabity absent a complaint by one of the utilities involved or a State Commission.

(3) The Commission would be empowered to act upon application of any qualified cogenerator. This provision recognizes the need to encourage cost-effective cogeneration and constitutes an important step in removing obstacles to such expanded cogeneration.

(4) The Commission would be empowered to order any "electric utility" to interconnect and provide service rather than being limited to "public utilities" as defined in the Act. This change would extend Commission authority for purposes of this section to include Federal and other publicly-owned systems and cooperatively-owned systems as well as the private systems that are now included in the concept of "public utility." Congress may well determine that such expansion of Commission authority is essential if the Commission is to have the necessary capability to promote comprehensive coordination of electric facilities.

Public and cooperative systems currently account for about 20% of the existing investment in bulk power supply facilities. Efforts to bring about comprehensive coordination could be severely hampered if this large proportion of bulk power supply facilities remained outside Commission jurisdiction.

(5) The Commission is empowered to "direct any electric utility owning or operating any bulk power transmission facility. . . ." to increase the transmission capacity of such facility. Such authority is essential to enable the Commission to carry out its responsibility for assuring bulk power service reliability. Service reliability requires not only that there be interconnections between systems, but that such interconnections be of sufficient power transfer capability to permit necessary power flows under conditions of emergency. Such authority is also essential under certain circumstances if the Commission's power to prescribe wheeling service is to be made effective since otherwise it might only be in a position to direct

transmission service to the extent that the utility has excess capacity in its transmission system.

(6) The Commission is empowered, upon its own motion or upon application, to commence a proceeding to determine whether a centrally dispatched power pool is feasible and in the public interest in any regional district in which such a pool is not operating. If the Commission determines after hearing that such a pool is feasible and in the public interest, it is empowered to require its establishment. Central dispatch of a power pool represents an optimum form of operation which enables the participating systems to take advantage of all economic opportunities for minimizing costs. It is important that the public be assured that where such pools are feasible, they be set in motion.

Section 542 grants to the Commission extensive authority to deal with shortages and anticipated shortages of electric energy. The Commission is empowered to require prompt reporting of anticipated shortages, fair treatment of wholesale customers vis

a vis retail customers under conditions of shortage, and "such connection of facilities and such generation, sale, delivery, exchange, or transmission of electric energy, pooling, wheeling, or other transmission service or other coordination as in its judgment will best serve the public interest." Finally, the Commission is empowered to require the filing of contingency plans respecting electricity supply shortages.

Recently it has become apparent that electric power shortages in some parts of the country within the next few years are real possibilities. The National Electric Reliability (NERC) has issued repeated warnings to this effect. In a report dated December 1, 1976, the Commission's Bureau of Power found that "regional shortages of generating capacity and/or electric energy are distinct possibilities in the period from 1979 to 1985."1/ In several individual cases, public utilities have sought to divest themselves of the responsibility for providing firm power supply to wholesale customers because the cost of resources to provide for total system load growth had grown so large.

1/ Factors Affecting the Electric Power Supply, 1980-85, Executive Summary and Recommendations, December 1, 1976, p. 5.

Various initiatives by the present Administration are designed to provide assistance in assuring that these shortages do not occur. Every effort must be made, of course, to assure that they do not. Nevertheless, we must be prepared to deal with any anticipated shortage in a timely manner. We must be able to assure that appropriate contingency plans are in place. We must be able to assure non-discriminatory treatment for customers affected by a shortage. Finally, we must have authority to take such emergency actions as are feasible and in the public interest. Section 542 would provide the Commission with authority that is adequate to these purposes.

Section 545 would direct the Commission to prescribe rules requiring reliability levels that are both cost-effective and sufficient to meet the demonstrated public need. At the present time, the level of reliability that is planned for on any given system or group of systems is a management decision which presumably takes into account a variety of considerations including public acceptance, costs, environmental constraints, and locational constraints, among others. The extent to which various factors bear upon the decisions of different managements may vary substantially. Thus, it

appears that at any given time, partly for this reason and partly because of events between the planning and the realization of plans, the reliability of systems varies from marginally reliable systems to those having substantial amounts of excess capacity. The ability of regulatory agencies to deal with such matters through the authority to regulate rates is quite limited. It is essential that regulatory action be taken at the planning stage and that the planned reliability levels reflect the public interest rather than seeking some sort of subsequent remedial action if planning criteria are found not to be in accordance with the public need.

Section 545 would also empower the Commission to prescribe rules requiring minimum standards of quality in the purchase, construction, operation and maintenance of bulk power facilities. Some utilities make considerable efforts in this regard, including for example, careful monitoring of on-site construction as well as of manufacture at the factory. The growing interdependence of power systems means, however, that inadequate attention to these matters by one or a few systems can have serious and widespread consequences. The public interest may require enforceable

minimum standards if reliable power networks are to be assured.

The strengthening of the Commission's authority in all these areas would substantially improve the Commission's ability to effectuate the goals of Section 202(a). While passage of these sections of H.R. 8444 would not guarantee that power failures would cease to occur, it would be important step in assuring that the frequency and extent of such occurrences are minimized.

ATTACHMENT A

RESPONSES TO QUESTIONS 1 AND 2 CONTAINED IN CHAIRMAN DINGELL'S LETTER OF SEPTEMBER 9, 1977

Following the November 9, 1965, disturbance which affected New York, the New England states, and portions of Canada, numerous studies and investigations of the disturbance were carried out which led to recommended improvements in equipment, design, operations, and maintenance for the electric power systems involved. The Commission's own recommendations were contained in Chapter IX of Volume I of the Commission's Report to the President, Prevention of Power Failures, dated July 1967, on pages 88 to 95. Recommendations that appear to relate most directly to the Con Edison system are listed below, together with some discussion of the extent to which the Con Edison system has implemented these recommendations.

1. Coordinated programs of automatic load shedding should be established and maintained in areas not so equipped, to prevent the total loss of power in an area that has been separated from the main network and is deficient in generation. Load shedding should be regarded as an insurance program and should not be used as a substitute for adequate system design.

Con Edison did not have automatic load shedding provisions on November 9, 1965, and based upon subsequent investigation would not have experienced a system shutdown had it separated from other deficient systems rather than attempting to provide further assistance. At present, Con Edison has in effect automatically controlled facilities at five levels of declining frequency to effect a load reduction of 4,199 MW or 48.8% of load based upon a 1977 summer peak load of 8,600 MW. Exhibit 4 shows the program procedures.

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EXHIBIT 4

Summary of Con Edison System Automatic Load Reduction Program
Based On A 1977 Summer Peak of 8,600 MW

Frequency Setting-Hertz	Operation	Customers Affected	Load Reduction MW	Load Reduction Percent
59.5	8% Voltage Reduction	13 kV and 27 kV area substation in Manhattan, Bronx, Brooklyn, Queens, Staten Island and Westchester.	435	5.0
59.3	4 kV Load Shedding	389,141	711	8.3
58.8	- 4 kV Load Shedding - Low Voltage Network Load Shedding	268,695 - 416 MW 148,900 - 580 MW 996	996	11.6
58.3	Low Voltage Network Load Shedding	489,270	794	9.2
57.8	Low Voltage Network Load Shedding	313,185	1,263	14.7
	Total	1,609,191	4,199	48.8

2. Utilities should complete a thorough reassessment of their needs for emergency power for system operation.

The recommendation was directed toward provisions for auxiliary power equipment so that power production equipment would not be damaged in shutting down, plants would have power available for startup, and sufficient communications, recording and control equipment would be available for system restoration processes. During the November 9, 1965, disturbance, Con Edison sustained turbine bearing damage on 1,500 MW of generation as a result of the loss of auxiliary equipment's power supply.

By mid-1967, Con Edison added 24 diesel generating units totaling 10.2 MW at several generating stations to provide emergency shutdown and startup power for generating units. All shutdown equipment was designed to start automatically. An emergency diesel generator is also installed at their Energy Control Center.

Combustion turbine generators, which can be started quickly, were at the following power plants as of December 1976:

Station	Total No. of Units	Total Nameplate Capacity - MW	Year Installed
Storia	13	654	1967,70,71
Arthur Kill	1	16	1970
Buchanan	2	40	1970, 1971
59th Street	2	34	1969
Gowanus Bay	4	620	1971
Hudson Ave.	5	84	1968, 1970
Indian	1	17	1969
Kent Ave.	2	28	1968, 1969
Narrows	2	348	1972
Ravenswood	11	456	1967, 1970
74th Street	2	38	1968, 1969
Waterside	1	14	1968

3. To the extent they do not now exist, strong regional organizations should be established throughout the Nation, for coordinating the planning, construction, operation and maintenance of individual bulk power supply systems; representation of systems should be by groups, where feasible, to facilitate progressive improvements in coordination.

In June 1968, the electric utility industry formed the National Electric Reliability Council (NERC) to encourage improved coordination at both the regional and national levels. Presently, there are nine Regional Reliability Councils in the contiguous United States. Con Edison is a member of the New YORK Power Pool (NYPP), which is a subregion of the Northeast Power Coordinating Council (NPCC), the regional organization covering New York, New England, and the Canadian Provinces of Ontario and New Brunswick.

4. Utility companies should establish procedures to make close and frequent checks of relay settings controlling major facilities in light of changing circumstances.

Soon after the disturbance of November 9, 1965, relay settings on all Con Edison system transmission lines were re-examined.

In 1970, Con Edison initiated a computerized testing and maintenance program. Each month a computer generated summary presents the testing status for over 4,000 relay items. Exhibits 5 and 6 show the Relay Test Summary and Trip Summary for July 1977. Exhibits 7 and 8 are plots

EXHIBIT 5

RELAY TEST SUMMARY 7/77

LOCATION	VOLTAGE	TOTAL ITEMS	DUE NO.	DUE OVER 6 MONTHS NO.	OVERDUE NO.	OVERDUE PCNT.##	SYS TESTED SINCE 1/77 NO.	SYS TESTED SINCE 1/77 PCNT.##
MANHATTAN AND BRONX SS	4-20KV	1095	305	40	0	0.0	161	14.7
	23-45KV	26	17	4	0	0.0	3	11.5
	69-138KV	261	107	31	0	0.0	81	31.0
	230-345KV	26	18	9	5	19.2	3	11.5
	MISC.	99	32	3	0	0.0	19	19.2
	TOTAL	1507	479	87	5	0.3	267	17.7
BROOKLYN AND QUEENS SS	4-20KV	696	170	79	1	0.1	140	20.1
	23-45KV	509	137	52	1	0.2	103	20.2
	69-138KV	162	115	58	9	5.6	23	14.2
	230-345KV	91	37	14	4	4.4	29	31.9
	MISC.	81	32	10	0	0.0	19	23.5
	TOTAL	1539	491	213	15	1.0	314	20.4
STATEN ISLAND SS	4-20KV	243	93	22	3	1.2	0	0.0
	23-45KV	110	33	11	0	0.0	0	0.0
	69-138KV	41	33	19	9	22.0	1	2.4
	230-345KV	17	7	5	0	0.0	0	0.0
	MISC.	5	5	2	2	40.0	0	0.0
	TOTAL	416	171	59	14	3.4	1	0.2
NORTHERN WESTCHESTER SS	4-20KV	785	103	12	0	0.0	156	19.9
	23-45KV	7	2	2	1	14.3	3	42.9
	69-138KV	115	44	6	0	0.0	40	34.8
	230-345KV	150	47	1	1	0.7	36	24.0
	MISC.	40	10	1	0	0.0	15	37.5
	TOTAL	1097	206	22	2	0.2	250	22.8
LOWER WESTCHESTER SS	4-20KV	171	5	0	0	0.0	17	9.9
	23-45KV	12	0	0	0	0.0	2	16.7
	69-138KV	4	0	0	0	0.0	3	75.0
	230-345KV	0	0	0	0	0.0	0	0.0
	MISC.	1	0	0	0	0.0	1	100.0
	TOTAL	188	5	0	0	0.0	23	12.2
WHOLE SYSTEM	4-20KV	2990	676	153	4	0.1	474	15.9
	23-45KV	664	189	69	2	0.3	111	16.7
	69-138KV	583	299	114	18	3.1	148	25.4
	230-345KV	284	109	29	10	3.5	68	23.9
	MISC.	226	79	16	2	0.9	54	23.9
	TOTAL	4747	1352	381	36	0.8	855	18.0

- PERCENT OF TOTAL ITEMS

EXHIBIT 6

TRIP TEST SUMMARY 1/77

LOCATION	VOLTAGE	TOTAL ITEMS	DUE NO.	DUE OVER 6 MONTHS NO.	OVERDUE NO.	OVERDUE PCNT.##	SYS TESTED SINCE 1/77 NO.	SYS TESTED SINCE 1/77 PCNT.##
MANHATTAN AND BRONX SS	4-20KV	919	202	2	2	0.2	42	4.6
	23-45KV	24	13	0	0	0.0	5	20.8
	69-138KV	245	107	24	6	2.4	104	42.4
	230-345KV	26	15	9	2	7.7	5	19.2
	MISC.	7	0	0	0	0.0	3	42.9
	TOTAL	1221	337	35	10	0.8	159	13.0
BROOKLYN AND QUEENS SS	4-20KV	681	83	40	9	1.3	65	9.5
	23-45KV	450	84	12	8	1.8	156	34.7
	69-138KV	160	110	67	21	13.1	38	23.8
	230-345KV	85	58	20	6	7.1	18	21.2
	MISC.	11	7	5	5	45.5	0	0.0
	TOTAL	1387	342	144	49	3.5	277	20.0
STATEN ISLAND SS	4-20KV	236	25	15	12	5.1	0	0.0
	23-45KV	110	17	11	5	4.5	1	0.9
	69-138KV	37	35	32	11	29.7	2	5.4
	230-345KV	16	8	6	0	0.0	3	18.8
	MISC.	0	0	0	0	0.0	0	0.0
	TOTAL	399	85	64	28	7.0	6	1.5
NORTHERN WESTCHESTER SS	4-20KV	759	53	4	0	0.0	110	14.5
	23-45KV	7	3	2	1	14.3	3	42.9
	69-138KV	108	33	9	5	4.6	64	59.3
	230-345KV	139	67	34	17	12.2	44	31.7
	MISC.	3	2	0	0	0.0	0	0.0
	TOTAL	1016	158	49	23	2.3	221	21.8
LOWER WESTCHESTER SS	4-20KV	168	13	1	0	0.0	15	8.9
	23-45KV	12	0	0	0	0.0	2	16.7
	69-138KV	4	4	4	0	0.0	0	0.0
	230-345KV	0	0	0	0	0.0	0	0.0
	MISC.	1	0	0	0	0.0	1	100.0
	TOTAL	185	17	5	0	0.0	18	9.7
WHOLE SYSTEM	4-20KV	2763	376	62	23	0.8	232	8.4
	23-45KV	603	117	25	14	2.3	167	27.7
	69-138KV	554	289	136	43	7.8	208	37.5
	230-345KV	266	148	69	25	9.4	70	26.3
	MISC.	22	9	5	5	22.7	4	18.2
	TOTAL	4208	939	297	110	2.6	681	16.2

- PERCENT OF TOTAL ITEMS

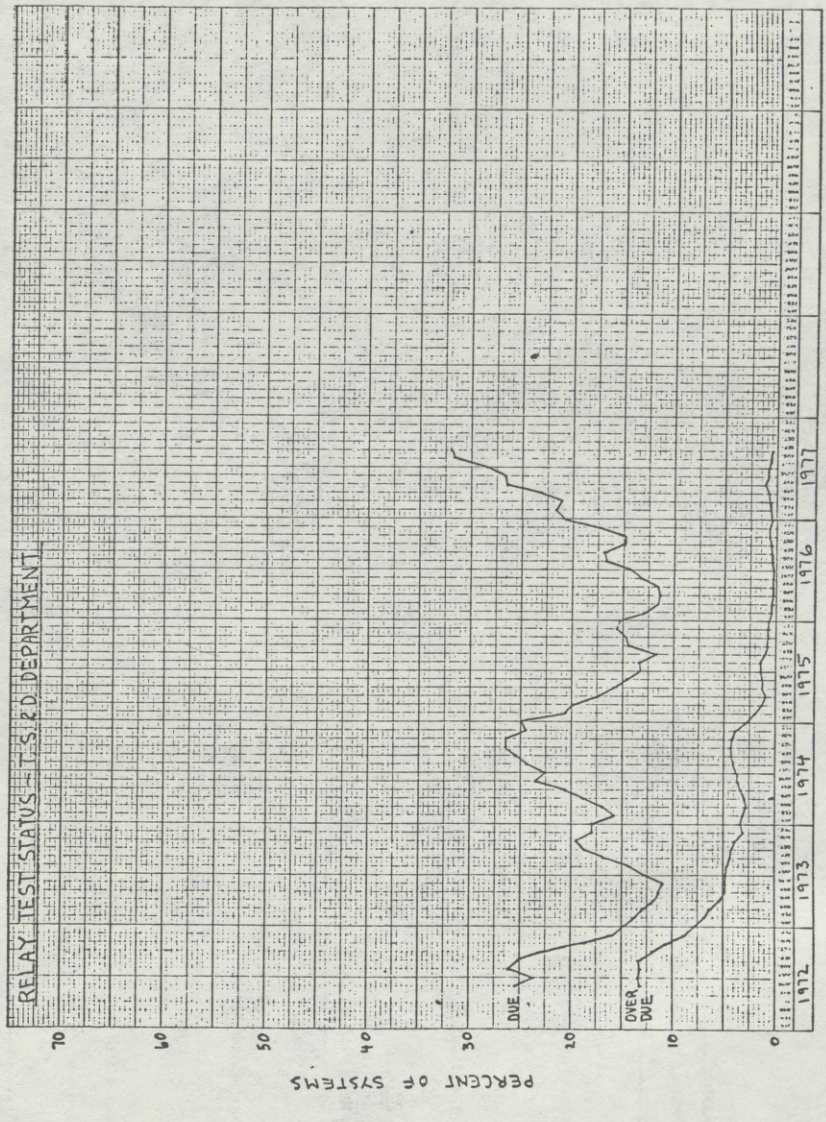
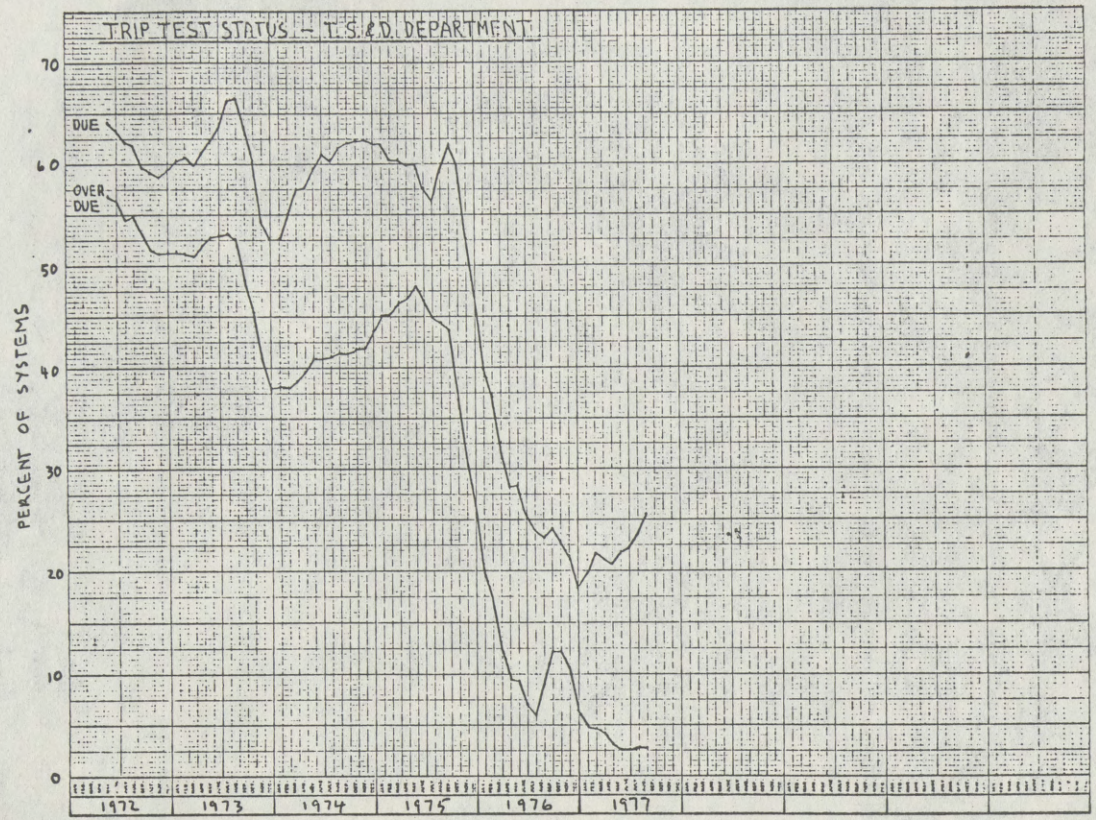

RELAY TEST STATUS - T.S.I.D. DEPARTMENT
PERCENT OF SYSTEMS
70
60
50
40
30
20
10
0
DUE
OVER DUE
1972
1973
1974
1975
1976
1977

EXHIBIT 8


TRIP TEST STATUS — T.S.&D. DEPARTMENT
PERCENT OF SYSTEMS
DUE
OVER DUE
0
10
20
30
40
50
60
70
1972
1973
1974
1975
1976
1977

of the "Due" and "Overdue" percentages for the May 1972 to August 1977 period, respectively, for Relay Test Status and Trip Test Status.

Con Edison participates in the program for the Selection, Setting and Maintenance of Relays within the Northeast Power Coordinating Council's Task Force on System Protection.

5. Early action should be taken to strengthen transmission systems serving the Northeast. Transmission facilities should be critically reviewed throughout the Nation, and planning and construction of needed additions accelerated on schedules which will provide ample transmission capacity to meet a broad range of potential needs for both reliability and economy as they occur.

The following interconnections were recommended for Con Edison.

(1) A 500 kV interconnection between southeastern New York at Millwood (Con Edison) and the Pennsylvania-New Jersey-Maryland Interconnection (PJM) at Branchburg, New Jersey (Public Service Electric and Gas Company).

This line was originally planned for service in 1968 and was finally energized in early 1972 at 500 kV between Ramapo (Con Edison) and Branchburg. At Ramapo, the voltage is transformed to 345 kV, and two 345 kV transmission lines bring the power across the Hudson River to the Buchanan substation. From Buchanan, two 345 kV lines connect to Millwood West and one to Dunwoodie via Eastview substation.

Another 345 kV line from Waldwick (PSEG, PJM) also terminates at the Ramapo substation.

(2) An extra-high voltage (above 230 kV) DC (direct-current) interconnection between Con Edison and the Quebec Hydroelectric Commission.

This line has not been installed. Extra-high-voltage 765 kV and 345 kV facilities are planned for the exchange of seasonal diversity power between Con Edison and Quebec Hydro next year. Studies in progress include a review of a Pleasant Valley to Farragut DC line.

(3) Completion of the 345 kV line between Gowanus (Brooklyn) and Goethals (Staten Island) which was not available during the November 1965 disturbance.

The facility was placed in service in 1968. Presently, there are two 345 kV lines between Gowanus and Goethals. Also, Goethals is the terminal of an interconnection with PSEG-PJM at Linden, New Jersey.

6. Utilities should review their capability margins both in transmission and generation capacity and evaluate their quick response spinning reserve including provisions for generation with quick starting and load pickup capability.

In 1966, the New York Power Pool established the requirement for the Pool reserve margin as the largest operational Pool unit plus 200 MW. In 1969, the Con Edison system had sufficient reserve capacity to cover the loss of its

largest unit (Ravenswood No. 3, rated 1,000 MW), plus the loss of a medium size unit (400 MW) plus a miscellaneous contingency of about 500 MW, a total of 1,900 MW or 26% of the forecasted 1969 peak summer load of 7,350 MW. At the time of the disturbance on July 13, 1977, Con Edison had an operating reserve margin of 2,021 MW or 34% of load.

Con Edison has quick starting combustion turbine capability totalling 2,349 MW at various generating stations throughout their system. Furthermore, the installation of Cornwall pumped-storage hydroelectric Project No. 2338 which would provide 2,000 MW in 8-250 MW nominal units of quick response reserve is now scheduled for operation in 1984-89.

7. Utility systems should study the adequacy of automatic equipment, communication facilities, recording facilities, and operating procedures during emergencies.

During the November 9, 1965 disturbance, Con Edison's communications system was dependent upon supply from the main system. This was also true for automatic recording equipment whose meters were dual range types. Con Edison along with other utilities have since modified their communications and control systems in several ways. Signal systems were installed to warn all operators when emergencies exist and also alert system operators of neighboring utilities. Two separate leased-wire channels are available to all generating stations. Power supplies

for signalling were installed independent of system supply. At energy control centers, 100 kV diesel generators were provided for emergency lights, instruments, drives and other emergency facilities. Audible warning and printout of tie-line overloads were provided by computer controlled equipment. Battery and Emergency AC power sources were added to ensure continuity of records when system supply was lost. Two additional frequency meters were installed at energy control centers to provide additional records, and oscillographs were modified to provide longer post incident records.

8. Control centers should be provided with a means for rapid checks on stable and safe capacity limits of system elements.

At the Con Edison Energy Control Center a Contingency Assessment Computer Analysis is readily available to system operating personnel via cathode-ray tube displays. This program provides the operator with quick access to stable and safe capacity limits for system facilities for conditions other than those specified in Operating Instructions. In addition, there is similar capability at the NYPP Control Center for the NYPP.

9. Systems control centers should be equipped with display and recording equipment which provide the operator at all times with as clear a picture of system conditions as is possible.

It was indicated that desirable displays would include narrow and wide range indicators of system frequency, tieline and principal

transmission line flows, lines out of service, positions of switches, overload conditions, generating units in service, unit and plant outputs, available spinning reserve and current rate of response, voltages and frequency (in the event of an area separation from the network) at key points, area control error, and appropriate alarms.

On July 13, 1977, following the second disturbance incident (loss of the Buchanan North to Sprain Brook [W93/W79], Millwood West to Sprain Brook [W99/W64], and Pleasant Valley to Millwood West [W81] 345 kv lines), the Con Edison System Operator thought the W93 was energized from Buchanan North despite the fact that the line meter read zero megawatts. There were no Buchanan North circuit breaker status lights on the display board; however, he could have determined the breaker status through his computer controlled console. Breaker status lights have since been installed on the system status display board.

10. Thorough programs and schedules for operator training and retraining should be vigorously administered.

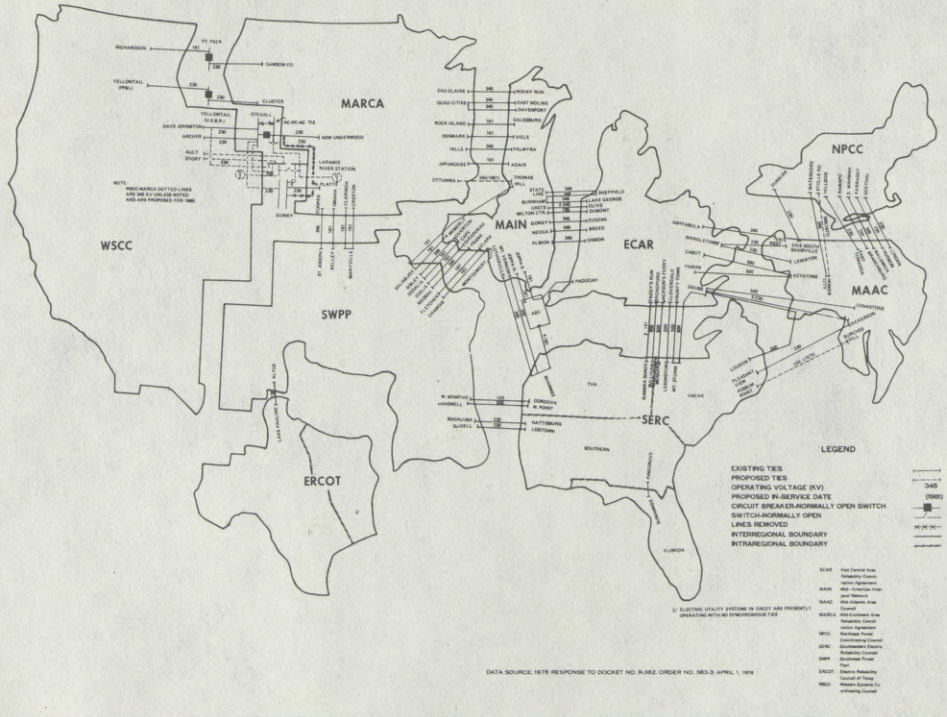
Con Edision reports that its system operating personnel include four levels of staff below the level of Chief District Operator. These are Emergency Supervisor, District Operator, Power Dispatcher, and System Operator. Emergency Supervisors are selected from best qualified Field Operator, Substation Operator, High Board Operator, and Substation Mechanic personnel with a minimum of five years' electric operations experience. New District Operators are selected from experienced Emergency Supervisors, New Power Dispatchers from knowledgeable District Operators, and New System Operators from experienced Power Dispatchers exhibiting outstanding aptitude and qualifications.

All District Operators and Emergency Supervisors are under the direction of the Chief District Operator and his two Assistant Chief District Operators responsible for their selection. The Chief System Operator and Assistant Chief System Operator are responsible for the selection of System Operators, Power Dispatchers, and District Operators. Chief System and Chief District Operators are usually graduate engineers.

All training programs for Emergency Supervisor, District Operator, Power Dispatcher, and System Operator include formal, usually in-house, courses, continuous on-the-job training activities, and field visitation days. Field visitation and training days, 10 to 15 per year, are designed to keep system operating personnel abreast of system changes, aware of new field work performance techniques, and current as to new equipment and its features added to the system.

To augment present training programs, Con Edison plans a new Energy Control Center with a system simulator so that operating personnel can obtain further training under simulated system conditions similar to training provided for nuclear plant operators.

IMPORTANT REGIONAL TRANSMISSION LINE TIES
138KV AND ABOVE
DECEMBER 1976



1/ ELECTRIC UTILITY SYSTEMS IN ERCOT ARE PRESENTLY OPERATING WITH NO SYNCHRONOUS TIES

DATA SOURCE: 1976 RESPONSE TO DOCKET NO. R-362, ORDER NO. 363-3, APRIL 1, 1976

Mr. CURTIS. Yesterday I testified before the Commission on Energy Failures in New York City, at which time this document was made available to me. In the course of that testimony I made a point with Chairman Millstein that I would like to reiterate to this committee.

That point is to examine these recommendations, twice-made in the mid 60's, in terms of the context of the Commission's legislative program. First, as you know, the Federal Power Commission has maintained that its authority to assure reliable and adequate electric service was primarily, if not solely, grounded in section 202(a) of the Federal Power Act, which calls upon voluntary coordination of activities.

Mr. DINGELL. I must confess I find that section quite ineffective in terms of achieving any particular level of behavior by the regulated utilities.

Mr. CURTIS. Well, Mr. Chairman, it was only beginning to be implemented at all in 1965, following the first major Northeast power failure.

In that implementation have evolved the regional reliability councils and the National Electric Reliability Council, which now cover the 48 contiguous States. It relies on voluntary and cooperative action.

The point that I wanted to make is, at the same time that the Commission noted these deficiencies and sought through cooperative action their correction, the Commission determined to go to the Congress to seek mandatory authority to compel action which was not forthcoming. Legislation was presented to the Congress in 1967 which was an immediate outgrowth of and rooted in the Commission's reports of 1965 and 1967.

Unfortunately, that legislation failed to win approval in either of the jurisdictional committees of the House and the Senate. The importance of that is that the Commission was denied, by the Congress, the authority to compel action where action was not voluntarily forthcoming, which understandably undercut the Commission's persuasive abilities to achieve voluntary cooperation from the utilities in taking the corrective action which had been noted as required.

Now I should pose this in the sense that apparently the Congress determined that it was not in the public interest to reside mandatory authority in the Federal Power Commission at that time. I would not want to leave the implication that the Congress decided that it did not wish the Commission to pursue correction of these specific deficiencies; but that it did at that time, even with then-President Johnson's support, determine not to provide the Commission with the authority to compel the steps to assume reliability that it had sought.

In 1967, the Commission, as you noted, did identify certain deficiencies with the ConEd system. I would like to ask Dr. Lindsay to recount to the committee, to the extent that we have been able to retrace through our institutional memory, what steps were taken or not taken at that time to correct the deficiences.

Mr. LINDSAY. At that time the Commission in its prevention of power failures report made a series of some 31 recommendations,

and the attachment A to the statement describes to some extent what has transpired since with respect to about a dozen of these.

I think it is fair to say, or repeat what Chairman Curtis has said, that perhaps the most significant thing that was done was the formulation of the various voluntary regional electric reliability councils and the National Electric Reliability Council. This required some additional prodding on the part of the Commission, but in any event, the councils were formed and were formed as specifically reliability organizations, as opposed to economic-type organizations.

There were, of course, a number of other more specific recommendations made. One obvious one that comes to mind is the recommendation that there be additional operator training programs instituted or reinvigorated. There is some question as to the extent to which that particular recommendation was followed.

The operator-training program at Consolidated Edison Co. is, at the present time, apparently contemplating use of a simulator, a device for simulating various kinds of incidents so that operators get experience dealing with unusual incidents of this sort, but that is still in the planning stage.

Mr. CURTIS. Mr. Chairman, let me try and be a little more specific on this.

As best as we can tell, we do not have a Commission record of what specific steps were taken to effect the recommendations. Much of the communication that occurs between the Commission's staff and these utilities, particularly the reliability councils, is conducted through oral statements with an emphasis on persuasion. I cannot recount for the committee whether there were specific, organized, scheduled followup inspections, inquiries or attempts to call deficiencies to higher levels of management, either within the commission or within ConEd.

I think it is fair to say that the Federal Power Commission has been unable to win, in the budgetary process, authority to direct sufficient resource attention to the reliability question. We have a total staff of 25 people in this area of resposibility and it is not their only function. It is a woefully inadequate application of resources, considering the congressional and public expectations from the Federal Power Commission to carry out a legislative mandate to assure an abundant supply of electric energy

Mr. DINGELL. Mr. Curtis, as a kindness to the committee, could you give us for the record, at your own good convenience, a statement of the sundry powers which you have to deal with wheeling, interconnections, displacement, and pooling of electric power under your existing authorities, and what you would be given by H.R. 8444 and what additional powers you would need to address the kind of situation which brought about the New York power failures of July last, and of the middle sixties?

Mr. CURTIS. Mr. Chairman, I would be happy to supplement my statement, to try to fill in those gaps and work with the staff to determine where those gaps exist.

Mr. DINGELL. As you have observed, I have instructed Mr. Potter and Mr. Roca and Mr. Kitzmiller to wait upon whoever you would designate to discuss the response to that in more detail. Quite honestly, I am interested in your criticism of the provisions of H.R.

8444 on which we will be going momentarily to the Senate to engage in a conference leading ultimately toward enactment of that legislation; to have your views as to where that might be perfected within the proper framework of the conference to give you the necessary and needed authorities to deal with matters of this sort.

Mr. CURTIS. Mr. Chairman, I would note that in my formal statement, from pages 11 through 19, I did attempt to describe the existing powers as they reside in the Federal Power Act.

Beginning on page 48, there is a discussion of the proposed legislation as it passed the House.

Mr. DINGELL. I do not want you to do the same statement twice for us. If you feel you have given us an adequate response to that matter, we will be more than glad to accept it.

I still would like Mr. Kitzmiller, Mr. Potter, and Mr. Roca to visit with your folks and discuss in somewhat greater detail to try to ascertain how the legislation we will be going to the conference with the Senate on is going to work in light of the circumstances which we have seen in July, and how it might possibly be perfected in a technical way so it might better serve the needs of yourself and the people of New York and elsewhere.

Mr. CURTIS. Very well.

Mr. DINGELL. The Chair recognizes the gentleman from New York.

Mr. OTTINGER. I take it from what you have said that you have analyzed the legislation, section 541 in particular.

Mr. CURTIS. Yes.

Mr. OTTINGER. You address it in the statement. I have not had a chance to read your full statement. There are a couple of things that give me concern, though. You may have answered this already.

In section 541(b)(2)(b) on page 183, it says:

> No order may be issued under subparagraph (a), paragraph (1) unless the Commission determines that (b) no utility subject to such order or consumers of such utility will suffer economic hardship thereby.

That seems to me to be a gaping hole. That paragraph (1) is the basic power to order interconnections, wheeling or pooling, and so forth. I could not imagine a situation where some customer would not claim he would suffer economic hardship in that process and would open it to a possible lawsuit. I wondered if that is not much too open-ended an exception.

Mr. CURTIS. I think there is not a ready understanding of what is meant by economic hardship, it being a term subject to further definition which may be defined in court actions. I think here, legislative history in the joint statement of managers and conference report or on the floor will greatly assist the Commission in the exercise of this authority—but what I took it to mean is that the Commission would not be expected to, or be able to exercise this authority if it would require the incurrence of costs beyond the reasonable benefits expected to result from the interconnection.

Mr. DINGELL. The Chair might observe that sort of comports with my intentions on the legislation, in any event.

Mr. OTTINGER. I wondered if we might not have you take a look at that whole subsection 2. It seems to me, for instance in the field

of reliability, if there is an intertie that is needed solely for the benefit and protection of the system so it will not go out like the New York system did go out, then there should not be a requirement that either (a) economic benefit, which has to be demonstrated, or (b) that there be a lack of economic hardship.

It would seem to me that where you have a situation where 9 million New Yorkers may have to suffer the consequences of lost electricity, in a city like New York, where elevators do not work, and your whole city is virtually paralyzed, your transportation system does not work and so forth, that you should not have to measure your ability to order that interconnection by either benefits to the consumer of requiring that intertie or lack of economic hardship to the utility or to consumers as provided in subsection (b).

Mr. CURTIS. I certainly will, Mr. Ottinger, be happy to provide the committee with a suggested interpretation or application of that limitation, if the Congress chooses to so condition the authorities.

I would point out to you that in the so-called reliability section, 545, the committee has determined that the Commission shall require a level of reliability sufficient to meet the demonstrated public need and not in excess of that which is cost-effective. Then it says "except where necessary for purposes of meeting the demonstrated public need."

That also, I think, is a standard to the exercise of our authority that could usefully be fleshed out in the joint statement of managers, as to what you intend.

Mr. OTTINGER. I take it you are in a situation even if there are language changes that you think would be desirable, it is something we can use in the negotiations, we are not going to be frozen in, since the Senate will enact very minimal legislation in this area?

Mr. CURTIS. Yes, sir, they have. I think my personal position, and I do not speak for the Commission on this matter because positions of the Commission must be developed by a majority. But my personal position is that the authorities in 541, 542, and 545 would go a long way in strengthening the commission's hand in obtaining greater assurance of the adequacy and reliability of service.

Mr. OTTINGER. You think that section 545 overrides the qualifications here in 541, with respect to liability, that is?

Mr. CURTIS. Yes, sir, I do.

Mr. OTTINGER. That is very encouraging.

Mr. DINGELL. If the gentleman would yield, I observed you were quoted at one point, Mr. Curtis, in the press as having indicated you felt that had this bill been law sufficiently in advance of the New York blackout of July last, that you might have been able, in using those powers to the full, to have prevented the blackout and to have brought about a sufficient status of reliability in the New York power pool and ConEd's system in particular to have possibly prevented it.

Am I correct in that position?

Mr. CURTIS. I do not remember making such a statement, Mr. Chairman, and I would be reluctant to. I think these authorities

would have been important in obtaining correction of the previously noted deficiencies.

Mr. DINGELL. Which you have difficulty doing under present law?

Mr. CURTIS. Yes, sir. I cannot tell the committee that had we had these authorities there would not have been a blackout.

Mr. DINGELL. But you can tell us you would have been much better off in moving to head it off and assuring reliability up there in the ConEd system?

Mr. CURTIS. If the authorities were given, and adequate staff resources to carry them out were given, I think it is fair to say we could speak more confidently of the adequacy and the reliability of electrical systems than we can today; but, I cannot translate that confidence into saying that we could have prevented the New York power failure. In fact, I do not think we could have.

I would, though, like to make another point, if I can make one comment without awaiting a later opportunity to give you specific recommendations on these sections.

I do not believe, and would recommend to the committee against including a requirement that the reliability powers in 545 be exercised within 2 years of enactment. I do not believe it can be done broadly within 2 years. I think that those authorities much more effectively should be exercised to react to problems, and specific difficulties which we may encounter. I would contemplate that these would be residual powers that the Commission would have available to it if voluntary action did not effect a result required in the public interest.

You will remember that under your leadership, Mr. Chairman, in February of this year, you caused to be lodged in the Chairman of the Federal Power Commission the rather extraordinary authorities to allocate natural gas during the emergency period, in order to respond to human needs, safety, and plant protection.

The Chairman did not find it necessary to use those authorities to compel action; but just having them available to him, he was able to work with industry and obtain cooperative action, responsive to this defined public need that made unnecessary Federal or governmental compulsion of action. I think that is an important principle, that these powers, as extraordinary as they are, should be residual powers relied on only when voluntary action does not develop results necessary in the public interest.

I think it would be a mistake to place in the Federal Government an assumption of what must be management's primary responsibility—that is, to provide adequate and reliable service to their customers. The one who seeks the license of the people to provide public utility service must accept the primary responsibility for providing that service in a continuous and reliable manner. That is management's responsibility and it is Government's responsibility only to act residually to repair circumstances where management may have failed to meet that public requirement. Government will never be able to develop the resident expertise to substitute for management's ability to plan its systems and meet that requirement of public utility service.

Mr. DINGELL. Of course no comment by you is required, but I would be hard put to find a candidate that would be better, as the first beneficiary of those powers, than ConEd.

I think I have been intruding on Mr. Ottinger's time.

Mr. OTTINGER. I would not disagree with the chairman's assessment.

In the recent blackout situation, there were a number of reliability defects which have been disclosed, other than the intertie problems. I wondered whether the current legislation or other legislation presently available to you gives you power which you think you ought to have, adequate power, to acquire correction of that kind of deficiency?

I am talking about lack of independent pumps to keep the oil going through the lines so that they can be restarted; I am talking about inadequate electronic control panels and displays in the control room to enable the system operator to be able to respond adequately to an emergency and matters of this kind.

Mr. CURTIS. Let's first say, existing authority is not adequate to achieve that result, unless it is found in section 207 of the Federal Power Act which contains rather broad, pervasive authority to deal with the inadequacies of interstate services. That, as you know, may only be triggered upon application of a State commission. The FERC may not act on its own motion, but if triggered, then it would have the authority to respond rather pervasively in assuring an improvement, if found to be necessary, in the interstate service.

There is a point where you lose the interstate nexus and you are down to determining the adequacies of retail service to individual customers, and that would fall to the New York Public Service Commission in this case. Determination as to the adequacies of retail service is not within reach of the Federal Power Act, nor in my opinion would it be easily within the reach of the Commission if it were equipped with the authorities provided in H.R. 8444. I am not convinced it should be.

I think there is a quite proper relationship and shared area of responsibility between the State and the Federal Government, and there should be a point where the Federal Government steps aside and leaves these matters to the State interests to pursue and protect.

Mr. OTTINGER. Of course we saw in 1965 that a failure within the ConEd system, if not adequately addressed, can cause cascading consequences as it did at that time to the entire Northeast region.

So that I assume that to the extent that that remains a possibility, ConEd—the Federal Power Commission, rather—might have to reach beyond that which is obviously and patently an interstate matter. It does not have to be a tieline that runs between two States.

Mr. CURTIS. Mr. Ottinger, I think the reality is that there are not sharp lines between either of the terms "adequacy" and "reliability," they are merged concepts. And there are not sharp lines between what affects interstate transmission of electric energy and what affects only the retail distribution of electric energy.

Hopefully we will have authority resident either in the Federal Government or in the State that does not have gaps so that some-

thing can fall through the interstices of the regulatory scheme and fail to get addressed.

I am compelled to note that if there is any happy note to observe in the failure occurring this last summer, it is that it did not produce the cascading effect that occurred in the Northeast power failure in 1965. So obviously we have done something right along the line.

Mr. OTTINGER. I will terminate shortly.

Let us take a specific example, the total failure of the ConEd system to train its system's operators for coping with emergency; is that something that the people of the State of New York or in any other State can look to the Federal Power Commission to deal with in any way? Do they have to rely on the State public service commission for correction of that kind of inadequacy?

Mr. CURTIS. Well, first of all, ConEd is a participant in the New York Power Pool. The New York Power Pool is a regulated entity under the Federal Power Act with respect to its rates. This authority, if coupled with the proposed provisions on reliability, would, in my opinion, permit the Commission to reach down to the training methods for systems operators and the qualifications of persons in those control centers.

The question I think for you is: Who can do it best, and how do you really effect reliability standards?

I would not want to prejudge it, but I would be inclined to think that if this act were passed and the authorities given to the Federal Energy Regulatory Commission, the way it should be exercised is working through the reliability councils in developing mandatory criteria which the Federal Energy Regulatory Commission could then place into effect, with or without modification. It would be preferable to have the legal requirement of regulation implement the standards developed by the council or the power pool rather than relying on what are sometimes frail, contractual relationships among the parties.

Mr. OTTINGER. I would just like to say that that appears very badly needed because the power pool was just before us and testified that they had no power to enforce their orders at all; in fact, that the ConEd system operator failed to comply with the direct order of the Federal Power Commission to shed load, and there is nothing they can do about it. Nor indeed does the public have any recourse to the power pool, according to the testimony of the power pool's attorney; they cannot be sued even if they make a grievous error.

So there is a total lack of resource there or enforceability of the power pool's orders, which I take it is the same situation with respect to the Reliability Council. I think there is at least a residual—a tremendous need for residual enforcement power on behalf of the Federal Energy Regulatory Agency.

Mr. CURTIS. Yes. Hopefully it would be viewed as a useful device to maintaining the disciplines of the power pool. Once systems ties themselves together, they not only physically do so, they tie also their destinies together. I would think they would wish to have some means of assuring that the disciplines of the power pool are observed.

The point I was trying to make is, I would try to discourage the Congress from giving to any Federal entity the responsibility of evolving reliability requirements and then ordering them into effect. I think we have a very useful mechanism already in place in the character of the reliability councils and I would much prefer a system that uses them, working with the power pools, with and without their areas of influence, to develop reliability standards, or work with the power pool specifically and have government only give effect to their defined requirements.

We would need authority to modify them, and to assure their adequacy.

Mr. DINGELL. Our problem appears to be nobody has put any in place. It does not deal with the need for modification. We are almost in a position where almost anything would be an improvement.

Mr. CURTIS. We have a good base case to work from, Mr. Chairman, yes, sir.

Mr. OTTINGER. Thank you very much for your indulgence, Mr. Chairman. I have used more than the 5 minutes.

Mr. DINGELL. The gentleman is more than welcome.

The Chair recognizes Mr. Potter.

Mr. POTTER. Mr. Curtis, would you turn to page 47 of your statement. I want to ask you a few questions about the Storm King case.

You indicate in that statement that had Storm King been in operation on July 13, it could have minimized the impact of the problems on the basis of certain information in the record of the FPC's proceedings.

Can you tell me what the assumptions were upon which this statement was based? How full do you believe the reservoir would have been at 9:30 p.m. upon the night of July 13 had the project been in existence?

Mr. CURTIS. Mr. Potter, let me make a couple of preliminary comments if I could.

First of all, I would make the point that the comments on Cornwall or Storm King are in the testimony in response to the specific question directed to us by the chairman, which asked us if Cornwall had been in place would there have been any conceivable contribution from Cornwall which would have either minimized or prevented the incident.

As you know, the case involving the Cornwall license is still before the Federal Energy Regulatory Commission. Hearings are to be concluded primarily on the effect on fisheries, and I would want to be very clear with the committee that our comments are not intended to address the advisability of Cornwall in the first place, but merely to state from a technical, electrical engineering standpoint, had it been there, would it have helped?

So let me, on those preliminary comments, ask Mr. Fowlkes to explain why from an engineering standpoint, on the basis of the information that was available to us, we determined that conceivably it could have helped.

Mr. POTTER. Mr. Fowlkes, your turn in the barrel.

Mr. FOWLKES. As shown in the Chairman's statement on page 44, exhibit 3, there is the configuration that we were able to determine would have existed in 1977.

Mr. POTTER. I am not talking about the lines now. I am talking about the state of the reservoir. I have another set of questions on the line.

Mr. FOWLKES. I did not look at the state of the reservoir. However, the material that I did look at showed that the plant would either have been pumping or generating a certain amount of power at that time, say 300 or 400 megawatts.

Mr. POTTER. May I refer you, Mr. Fowlkes, to a document which is in evidence in the 1974 proceedings on this infamous project. This document is a set of computer printouts proposed by Con Edison showing how they would propose to operate the reservoir overtime. For everybody who is here who may not understand the glories of pump storage, the general idea is that you fill it up in the night when you have a lot of excess power and run it downhill when you have demand, and then you pump it back up again when you get more power.

The documents which are in the FPC record indicate that in July 1980, because construction is unlikely by 1977, that the plant would be operated in such a way as to have a completely full reservoir at midnight on Sunday, pump it all the way down to mud during Monday, pump it up some of the way on Monday with whatever economic power was available and pump it back down.

According to these documents, if the plant were run as the computer indicated that it might be—in this particular case it is according to these documents—the plant would be almost down to zero at 9 p.m. on Wednesday night in the middle of the week, if this were the case.

Could you reasonably expect the Storm King pumper storage project to make any difference in the circumstances which occurred the night of July 13, 1977?

Mr. FOWLKES. Even if the reservoir was very close to its minimum level at this particular time of day, the plant could also have been operating in the pumping mode. In that case they would have initiated refill of the reservoir. If they were operating in a pumping mode, and assuming they were running at somewhere in the order of 400 to 500 megawatts, that still would have been beneficial in allaying some of the consequences of the July 13 disturbance.

Mr. POTTER. Where do you assume that pumping power would be coming from?

Mr. FOWLKES. Based on the 1977 configuration now—and I want to also indicate that the only operational data that I had available to me at the time to do this evaluation was a generation duration curve and it showed the 1976 operational period at 2,000 megawatts.

Mr. POTTER. I think the point is that this information has been superseded by the additional information which came from ConEd.

Mr. FOWLKES. That may be true, but you are talking about a 1980 operation and we are also talking about circumstances that may have existed on July 13. So I wanted to get something as close as I could to what was expected to be operational in 1977.

So as reported in the Order No. 383 submission by NPCC for load and capacity for 1969, the plant was to have been operational in 1977 and the generation duration curve that I did my analysis from shows 1976 summer period operation which should be similar to 1977 operation.

Mr. POTTER. Let me be sure that I understand what you are saying. You are saying if the plant had been built as originally proposed and operated according to these curves, then it would have provided this kind of assistance had Con Edison not later decided to change the mode in which the plant was operating?

Mr. FOWLKES. I am not denying or trying to modify the way they proposed that it be operated.

Mr. POTTER. Excuse me, let the record show that I am not proposing that it be operated at all. What I show you and what I refer to is a set of documents prepared by Consolidated Edison and now in the record of your case.

Mr. FOWLKES. I did not look at the production costs study. I only looked at the generation duration curve. Based on that, it would either have been generating in the order of say 400 to 500 megawatts or it would have been taking 400 to 500 megawatts of energy for pumping purposes.

Now based on your supposition that it was not generating but it could have been pumping, then there would have been a release of 400 to 500 megawatts of capability to allay the impact of the disturbances that occurred on July 13.

In addition, you are generally not going to draw it down to "mud," but you would draw it down to some minimum level such that you still would have some residual capability. Now the capability reduces in the plant as the head goes down, but you still have some residual capability for emergencies.

Mr. OTTINGER. If it were drawn down to the minimum according to your curves and was in the pumping mode, for how long could it supply 400 to 500 megawatts of power?

Mr. FOWLKES. I really can't specifically answer your question without looking at the operation curve as proposed for the project.

Mr. POTTER. I can provide that. Perhaps it would be most useful if we were to introduce a few pages of this incomprehensible document into the record which will show precisely what the proposed operation would be under these circumstances.

Mr. FOWLKES. It would be better if we could get one for 1977 as opposed to 1980 because system conditions and many other factors in ConEd and the New York Power Pool would change over that period of time.

Mr. POTTER. That is true, but the 1977 figures you suggest were figures proposed by ConEd some years before. The figures that I have are the most recent figures that I am aware of that have been produced by ConEdison. These were produced in 1974 and that is 3 years before the 1977 outage occurred.

Mr. FOWLKES. For what years operation of the plant?

Mr. POTTER. I think the record should also show that according to these documents, the reservoir capacity would be down at minimum level. According to these records, pumping would not start until 1 p.m. So what amount of displaced power that might be

available would not in fact be available until they actually started to do their pumping.

Mr. CURTIS. Mr. Chairman, I want to make clear that the Commission understood the question to have been posed as "Had Cornwall been in operation during this period." The analysis that Mr. Fowlkes did, as the statement indicates on page 47, is based upon the 1977 configuration.

Now this whole exercise probably is just too speculative to make any assumption on it.

Mr. POTTER. That is precisely the point.

Mr. CURTIS. We tried to construct, to be responsive to your question, the circumstances had it been in operation in 1977. It seems reasonable to me to use 1977 configurations. But the short of it is that no one can tell because it was not in operation and systems have changed.

Mr. DINGELL. I think your most recent comment lays to rest all the concerns felt by the committee.

Mr. POTTER. Not entirely, Mr. Chairman. There is one additional point that has to do with the lines that are discussed in Mr. Curtis' statement.

On page 48 of your statement you said that "even if the line had tripped, there would have been three 345 kV lines from the north rather than one."

Would you turn to your exhibits 3 and 3a. I read this exhibit as indicating that the lines that you are talking about are actually not lines to the north at all. They are lines from the Cornwall plant to a substation at Kent and then running down parallel to the north-south tie lines into the Springbrook substation. Is that correct?

Mr. FOWLKES. Yes; that is correct.

Mr. POTTER. How would those lines as shown on exhibits 3 and 3a have been available to carry any power other than from the Storm King plant alone?

Mr. FOWLKES. In the 1977 configuration shown here, they would have only been available to carry power from the Storm King project.

Mr. POTTER. The next question I have has to do with the plans of ConEdison. It is my impression, and perhaps you can confirm it for me, that they have in fact proposed to build two lines which would run, two additional lines which would run north-south in any case; is that right?

Mr. FOWLKES. Yes, from Kent. In other words, this figure 3a on page 45 would be modified such that between Kent and Pleasant Valley would be two additional 345 kV lines running north. That is the proposed configuration for 1988 operation of the Cornwall project. In that configuration there would, of course, have been the extra lines directly to the north.

Mr. OTTINGER. But then you switched from the 1977 configuration now to 1988?

Mr. FOWLKES. That is the present proposed date for the Cornwall project and the most recent FPC Order No. 383-4 submission.

Mr. OTTINGER. As of the 1977 plans, how would the Cornwall power have been transmitted?

Mr. FOWLKES. The 1977 plans as I found them are as shown on exhibit 3 and exhibit 3a.

Mr. OTTINGER. If the plant had been completed, then you are assuming that these extra lines would have been completed as well?

Mr. FOWLKES. Correct, they would have to be completed, otherwise you would not have an outlet for the power from the plant.

Mr. POTTER. You are saying that they proposed to build these lines between Pleasant Valley and Kent and what goes south from Kent?

Mr. FOWLKES. The two lines that are shown on page 45 along with other system additions.

Mr. POTTER. Would that be in the same transmission corridor as the ones that went out?

Mr. FOWLKES. It would be on the same transmission corridor so far as I know all the way to Millwood as is shown on this drawing.

Mr. POTTER. Had those lines been in existence, whether or not the Storm King project was there, that could very well have provided the additional measure of power, I mean had those lines been in existence and not gone out, that could very well have provided the additional measure of power that in your belief might have saved the system?

Mr. FOWLKES. It would have been beneficial in allaying the results of incidences that occurred on that day. In particular, as you will note in our discussion of the disturbance, the W–81 line, which is one of the 345 kV lines between Pleasant Valley and Millwood and the relay contact had been bent, which meant it was in a partially closed position. It picked up, and had the other two lines been in operation, the overload that it experienced on that evening would not have been as severe and possibly it may not have tripped out. None of those feeders went out as a result of any other circumstances.

Mr. POTTER. I just want to be sure that I have nailed down the point that Con Edison now proposes to build these lines; right?

Mr. FOWLKES. Yes.

Mr. POTTER. Regardless of whether Storm King ever rears its ugly head or buries its ugly head; isn't that correct?

Mr. FOWLKES. I could not definitely say that. I would say, however, that with those additional lines it provides another avenue for utilization, effective utilization of the pump storage project in the New York power pool operation.

Mr. POTTER. If and when it is available?

Mr. FOWLKES. If and when it is built, but I don't know if they are planning to build those lines whether or not the Cornwall project is built. The reason you put pump storage in is so that you can more economically operate your whole system. In the evening you can base load at minimum load, or some more economical operating value, your other generation and you don't have to shut it down in the evening.

Mr. POTTER. That is the theory upon which one justifies pump storage. Whether or not the economics will support it is something which I think we don't need to discuss.

Mr. FOWLKES. All the pump storage projects I am aware of are justified as operating on that basis.

Mr. OTTINGER. In the plans, was Cornwall to be manned in the evening?

Mr. FOWLKES. I don't know.

Mr. OTTINGER. It is my recollection that it was not.

Mr. POTTER. One last question about the alternatives that were proposed. As I recall, in the *Storm King* case which involved, I think, the construction of gas turbines in the city, do you recall how many megawatts of capacity of gas turbines were proposed as an alternative?

Mr. FOWLKES. No; I do not, but I would in general think it would be a higher number of magnitude in terms of capacity. You would need more than 2,000 megawatts.

Mr. POTTER. That is not important. I think the point is that had the gas turbines operated as had been proposed with a fast start capability and being able to be fire up without having somebody come from home to push the button, that could also have provided a certain measure of additional capacity within the city where the load was located; is that not the case?

Mr. FOWLKES. That capacity would have been beneficial if in fact it had operated. However, as you, I hope, also know, many times they don't start when you push the button, whereas if we had Cornwall in pumping mode, when you trip the breaker you automatically have that energy available to supply the energy needs.

Mr. POTTER. No; assuming there is water in the reservoir.

Mr. FOWLKES. No. In a pumping mode you are taking power. When you stop pumping you are not taking that power for pumping and it can be utilized for other services.

Mr. POTTER. Unless that power was coming from up north, in which case you would be out of luck anyway. Isn't that right?

Mr. FOWLKES. There are other avenues of access for power to come into the ConEd system other than through that corridor.

Mr. POTTER. But most of them dropped, did they not? Isn't that the reason ConEd had its problems?

Mr. FOWLKES. At what point in the disturbance are you discussing?

Mr. POTTER. By 9:20 it was effectively an island.

Mr. FOWLKES. It was an island at roughly 9:29 to 9:30 when we lost the last tie to Linden. However, prior to that as you will note, the system went through a substantial number of disturbances that no system is designed to withstand. If we get back to the first two incidences at 8:30 and 8:55, there could have been substantial contribution in terms of the Cornwall project's operation, and in terms of pumping power there were paths available. Namely, you have paths through Lilco and also the path through Public Service Electric and Gas Co. system.

Mr. POTTER. But you will recall what happens to those ties. I am not trying to belabor the point, but it seems to me that had Cornwall been pumped from stations within the city, you might have had a situation where you could drop off that load and pick it up and handle your problems. Had those pumps been powered by stations coming from outside the city, then you are just in exactly the same situation you were before.

Mr. FOWLKES. You have to be specific in terms of the series of incidences that occurred on July 13. Depending on where you are

in that series makes a big difference. If you had had it in operation, you may never have gotten to those incidences anyway.

Mr. OTTINGER. As I understand it, the plant would have been pumping water at 9 o'clock in the evening?

Mr. FOWLKES. Yes. That gives you that quick release of power immediately available because you don't use it for pumping.

Mr. OTTINGER. Assuming it can be turned on and there is enough water in there to operate it.

Mr. FOWLKES. No; excuse me, sir. If you are taking energy to pump, that means you are operating the generators as synchronous motors in which case they are driving the water wheel turbines such that they are causing the flow of water to progress from the Hudson River up to the reservoir. In that instance they are taking energy. That energy has to come from somewhere. It is either coming from the ConEd system or from some other generators within the New York Power Pool.

So if you immediately open the breakers to those synchronous motors, then that energy is available for use for other purposes instantaneously. Only if you go a long ways into the sequence of incidences that occurred on July 13 do you get to the circumstance wherein there is nowhere for that pumping power to come from outside the ConEd system.

The only time you get to that is when you trip out Linden-Goethals.

Mr. OTTINGER. If you release the power being used to pump water at Cornwall, you are back to where you were at 9:20, which is an additional power demand on the system. If in addition to everything else ConEd was doing it also had to run those machines, the pumps to pump the water, that is an additional demand on the system. You have not improved your system by dropping that. You are back to where you were that night.

Mr. FOWLKES. No; you have improved your situation because that energy is now available to handle a particular contingency that you are using it for.

Mr. OTTINGER. That is an additional draw on the ConEd system?

Mr. CURTIS. No, it would be a net gain because it would be additional power. In other words, you just divert the power that you are using for pumping to other needs.

Mr. OTTINGER. But since you did not have a Cornwall plant at all, you had that power available to you anyway.

Mr. CURTIS. Can I suggest that electric systems have to be designed to be reliable in what they have on line and not what might have been? I really do believe that this is so speculative that it is not useful in determining the adequacy and reliability of the ConEd system to ponder what might have been in place in 1977.

We tried to give you from an engineering standpoint the best answer to your question. Frankly, we wished you had not asked. I take it that you wish we had not answered.

Mr. OTTINGER. Well, this all started because in the Federal Power Commission's original report and release on the blackout July 13, it made comment with respect to the contributions that might have been made by Storm King which I think, as you just indicated, is highly speculative.

Mr. CURTIS. Yes, and I think that comment was gratuitously made because of the speculative character of the system.

Mr. POTTER. Mr. Chairman, I would like to have put in the record at this point our inquiry, the painful inquiry that produced this painful answer so that the record will be complete.

Mr. DINGELL. The Chair will so order, provided we have assurances that there will be no more action.

Without objection it is so ordered.

[The letter referred to follows:]

September 20, 1977

The Honorable Charles B. Curtis
Chairman
Federal Power Commission
825 North Capitol Street
Washington, D. C. 20426

Dear Mr. Chairman:

In the Federal Power Commission's Staff Report of August 4, 1977, it is stated that ".... had the Cornwall Project, which was first authorized by the Federal Power Commission in 1965, been in operation, the operating schedule for July 13 would have been different and the effects of the initial disturbance could have been minimized."

Would you please furnish the Subcommittee with a schematic drawing showing:

1. over which transmission lines the power from the Cornwall Project was proposed prior to July 13 to have been delivered to New York City, and

2. the location of the faults that occurred on July 13 on the transmission lines bringing power south into New York City.

Also, please provide the Committee with a description of the projected methods of operation, as they existed prior to July 13 and taking into account the fact that the Farragut station was down, that would have delivered Storm King power to Con Edison system at the time the failure occurred.

I appreciate your attention to this matter.

Sincerely,

JOHN D. DINGELL, M.C.
CHAIRMAN

Mr. POTTER. I would only ask that the Commission confirm to us whether or not my understanding is correct, which is that ConEd has in fact applied for authority to construct these two additional lines entirely independently of whether or not the pump storage project is ever built. I believe that to be the case. If it is, I would like to have you let us know that.

That is all the questions I have. Thank you.

Mr. CURTIS. Mr. Chairman, I would point out that that application might not be filed with us but with the New York Public Service Commission.

Mr. KITZMILLER. That is correct.

Mr. DINGELL. That is right, because they are intrastate lines.

Mr. POTTER. If you can find that out for us then?

Mr. CURTIS. If it is part of the project, and it is a primary line then it would be filed with us. If your hypothesis is that it is not, it would not be before us. In 1967 part of that reliability legislation was to obtain for the Commission the authority to license all bulk power lines. The Congress chose not to give us that authority. I am not sure I would seek it, believe me.

Mr. POTTER. I recall that. We will secure that information in our own devious way.

Thank you.

[Testimony resumes on p. 237.]

[The following material was received for the record:]

SUBMISSION OF
SCENIC HUDSON PRESERVATION CONFERENCE
TO THE
SUBCOMMITTEE ON ENERGY AND POWER, COMMITTEE
ON INTERSTATE AND FOREIGN COMMERCE
HOUSE OF REPRESENTATIVES

October, 1977

This submission is made on behalf of the Scenic Hudson Preservation Conference in connection with the Subcommittee hearings on the New York City Blackout of July 13-14, 1977.

The principal purpose of our submission is to review the claims of Con Edison and the Federal Power Commission (now the Federal Energy Regulatory Commission) regarding the contribution that the Storm King Project would supposedly have made in avoiding the Blackout. We believe that it would have done nothing to avoid or minimize the service collapse and share the view of Chairman Curtis that the FPC's contrary statement was speculative and gratuitous.

At the same time, we believe that the 1977 Blackout, viewed in the historical context described below, illustrates the urgent need for a Federal regulatory authority that can (and will) order essential interconnections when utilities fail to act responsibly and in a timely fashion. For this reason, Scenic Hudson supports those sections of H.R. 8444 which would provide for a Federal regulatory role over interconnections.

Scenic Hudson and Its Involvement with the 1965 Blackout.

Scenic Hudson is an unincorporated association of individuals and conservation organizations which has sought since 1963 to protect the Highlands of the Hudson River and Storm King Mountain in particular. Scenic Hudson has led the opposition to Con Edison's proposed Storm King (Cornwall) Pumped Storage Project and has also been active in many other cases concerned with safeguarding the Highlands environment.

In December 1965, Scenic Hudson won an important judicial victory when the U.S. Court of Appeals for the Second Circuit set aside the license that the FPC has issued for the Storm King Project and remanded the case for a review of alternatives, as well as environmental impacts. Just a month before this decision, the Blackout of November 9, 1965 had enveloped the Northeast, and Con Edison was quick to claim that if only it had had the Cornwall Plant, the service collapse could have been avoided. The FPC, in a premature judgment in December 1965, had made a similar suggestion; and thus, as the renewed hearings began, Scenic Hudson was required to come to grips with these contentions.

In an effort to deal with the issue on a professional basis, Scenic Hudson retained Dr. Alexander Kusko, a consulting engineer and instructor in Electrical Engineering at Massachusetts Institute of Technology.* Dr. Kusko reviewed

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* Dr. Kusko had been a Professor of Electrical Engineering at MIT before leaving to set up his own consulting firm.

Con Edison's system in detail, as well as the events leading to the 1965 Blackout. Based on this review, Dr. Kusko testified that the critical flaws in Con Ed's system had nothing to do with the absence of pumped storage capacity. Rather, he stated, the failings were the weakness of the company's interconnections, especially its ties to the PJM systems to the west. Further, he testified, the Storm King plant could present increased risks since its power would be funnelled along the same narrow right-of-way that supports Con Edison's interconnections to Upstate New York and New England. Gas turbines, by contrast, located in the City, with automated quick-start capability, would provide the needed reserves without the exposed transmission. Accordingly, Dr. Kusko recommended substantial reinforcement of the company's interconnections, including increased ties via Staten Island, in conjunction with effective turbine reserves.*

The FPC Response

In 1967, shortly after Dr. Kusko presented his testimony, the Federal Power Commission issued its comprehensive three-volume report on the 1965 Blackout entitled Prevention of Power Failures. This report effectively confirmed Dr. Kusko's analysis. The key to reliability, the Commission noted, and the essential requirement to avoid

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* Dr. Kusko's testimony is set forth in Volume 98 (pp. 14960-97) of the Transcripts in FPC Project No. 2338. The most pertinent excerpts are annexed to this submission as Exhibit A.

blackouts, was the strength of interconnections. The type of power available, in contrast, whether hydroelectric, steam or other, was expressly stated to be inconsequential; and the hasty, premature suggestion of 1965, which implied that hydro reserves were somehow superior, was rejected (see Volume III, p. 4; Volume II, p. 21).

Nonetheless, after reaching these conclusions following the lengthy 1966-67 study, when the issue of licensing the Storm King plant came before it again in 1970, the FPC (then headed by John Nassikas) ignored its own results. Claiming that the Project would provide unique, if not essential, reliability, the FPC dismissed interconnections as merely peripheral and relicensed the Storm King plant. Meanwhile, Dr. Kusko's urgings that Con Edison's interties be greatly strengthened were largely forgotten.

The 1977 Blackout

On July 13, 1977, the Con Edison system was closed down for the second time in 12 years with a complete Blackout. The human and institutional errors which led to this collapse are by now fairly well-known, and they can only be described as extraordinary. Yet when the FPC Staff was called upon for its analysis, what should be trotted out but the Commission's historical stalking horse -- Cornwall: Had it been in operation, so the Staff Report claimed, "the

effects of the initial [July 13] disturbance could have been minimized," and "conceivably", according to Chairman Curtis' initial statement, the Blackout might have been avoided.

The speculative and gratuitous nature of these claims was acknowledged by Chairman Curtis in his oral testimony, and it would perhaps be sufficient to leave matters at that. We believe, however, that, where, as here, the commentary of the Commission was, in the first instance, patently mistaken, that record should be set specifically and unequivocally straight: The Storm King plant could not have provided assistance in the Blackout because, according to Con Edison's own operating schedules introduced into the FPC record in 1974, the reservoir would have been empty when the July 13 disturbance occurred and thus no reserves would have been available from it.*

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* The projected operating schedules were introduced as Exhibit 24 in the 1974 hearings on Project 2338. Relevant excerpts are annexed as Exhibit B. These same records also show that contrary to FPC Staff claims, Project pumping on weekday nights such as July 13 would not have begun until 12 or 1 A.M. -- long after the Blackout had occurred.

The contrary assumption in Chairman Curtis' statement was mistakenly based on a 1967 exhibit that had long since been superceded. Scenic Hudson had, since 1974, tried to bring this change in operating procedures to the FPC's attention, but was continuously rebuffed -- a not untypical example of the FPC's tendency towards self-willed ignorance when it comes to Cornwall.

Chairman Curtis' statement also suggested that if Cornwall had been in operation, there would have been two additional 345 KV transmission lines extending northward to Pleasant Valley, and these added lines could have alleviated the overloads on the parallel Pleasant Valley lines that tripped out on July 13. The problem with this suggestion, however, as reflected in Mr. Curtis' exhibits and as brought out by Mr. Potter in his questioning, was that the Cornwall lines would not have extended to Pleasant Valley, but would have terminated 10 miles south at Kent. Thus they could not have provided the claimed assistance.

Had two additional lines in fact extended northwards to Pleasant Valley -- and if they had not failed because of lightning strikes, defective relays or other cause -- it may well be that they would have provided critical assistance and even avoided the Blackout. But such lines do not depend in any way, and have never depended, on the construction of the Storm King plant. To the contrary, Con Edison is now intending to add these lines completely independently of the Cornwall Project and well before it is proposed for operation. (This was clearly known to the Commission Staff.* Again, however, for whatever reason, this important information was not mentioned in the submissions to the Subcommittee.)

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* In February 1977, Con Edison applied to the Court of Appeals for modification of the injunction against the Storm King plant so that it could build the two new Pleasant Valley connections free of that injunction. The FPC made submissions in response and acted directly on at least one application by Con Edison specifically referenced to the plans for the lines. Thus the Commission was fully aware of the plans.

The key point, of course, is that better interconnections -- and not Cornwall -- are the crucial requirement if the reliability of Con Edison's system is to be sustained. The need to further strengthen the interconnections to the north, for example, was described by Dr. Kusko in his 1967 testimony. Yet 10 years later, a key link was still left inadequately reinforced.

Even more pertinently, Dr. Kusko had emphasized the urgency of strengthening ties with the PJM systems to the west, including those via Staten Island. Again, however, when the northern interconnections failed on July 13, the connections via Staten Island were virtually unchanged from those that had been in place in 1967. The FPC, for its part, despite its recommendations in its Report on Power Failures, did nothing in follow up.

This institutional failure seems only too likely to be repeated. Recurring to the recommendations made 10 years ago, the FPC Staff Report urges a prompt strengthening of the interconnections with PJM; and recognizing the questionable dependency of Con Ed on "a long, narrow transmission corridor" to the north, the Staff has recommended that the company "reassess its plans for the location of new generating facilities." (August 4 Report, p. 6). Yet in the next breath, the fixation with the Storm King plant reappears -- without the slightest mention that the

transmission lines for the Project would run on the same "long, narrow transmission corridor," thus repeating and reinforcing the very patterns that made the system so vulnerable.*

This type of limited vision cannot, we submit, any longer be afforded. There must, we believe, be some effective mechanism for ensuring, as Norman Clapp testified, that the Con Edison system does not continue to "put too many of its eggs in the one [transmission] basket at the north end of its system." There must be a mechanism, in short, to ensure adequate interconnections in an adequately designed system for New York City and all other areas of the country. If such authority is to be entrusted to the Federal Energy Regulatory Commission --and we are fully agreed that it must be vested at the Federal level -- we can only hope that the Commission will begin with a reappraisal of its advocacy relative to the Storm King plant.

October 21, 1977

Respectfully submitted,

Albert K. Butzel
Counsel for Scenic Hudson
Preservation Conference

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* The extraordinarily vulnerable situation that would be created by the construction of the Cornwall Project and its transmission lines is reflected in reliability studies run by the New York Power Pool. These studies, excerpts of which are annexed as Exhibit C, show that a loss of the Cornwall-Pleasant Valley Lines could lead to a cascading power failure.

EXHIBIT A

REBUTTAL TESTIMONY OF ALEXANDER KUSKO

Q Please state your name and address.

A Alexander Kusko, 141 Main Street, Cambridge, Mass.

Q Are you the same Dr. Kusko who testified previously in this proceeding and whose qualifications are set forth in TR 12777-12781?

A Yes.

Q Would you briefly summarize the materials that you have reviewed in connection with the preparation of your rebuttal testimony?

A I have read most of the testimony of Con Ed's technical witnesses. I have also reviewed the testimony and exhibits of Dr. Jessel, and particularly those relating to the responsiveness of reserve capability of both Cornwall and gas turbines. I have read the depositions of Mr. Baker, Mr. Closs and Mr. Vencill. I have familiarized myself with the Stone & Webster report titled "Northeast Interconnection Study" and the report of the FPC's Advisory Committee on Bulk Power Supply. I have also reviewed a recent report by the Public Service Commission of the State of New York on the November 1965 black-out. I have reviewed the stability study run by Con Ed in connection with a 3000 MW loss of generation at Cornwall. I have

reviewed two transmission planning studies supplied to Scenic Hudson by Con Edison. The first deals with the proposed 500 KV interconnection between Con Ed and the PJM Companies. The second is a joint report of Con Ed and the Public Service Company, dated October 1966, and deals with the proposed conversion of the present Staten Island tie from 138 KV to 230 KV. Finally, I have spoken with representatives of the A.S.E.A. and Worthington companies regarding their experience with gas turbines.

Q. Dr. Kusko, during the course of the proceeding, Con Ed's witnesses have testified that the Cornwall Project would provide the company's system with a unique source of emergency reserve capacity. Do you believe that this project would, in fact, provide the optimum or, indeed, even an adequate source of emergency power?

A I do not.

Q Upon what do you base your opinion?

A In general, upon the company's proposed method of Cornwall operation, viewed in the context of its system generating and transmission facilities and the types of emergency conditions that might occur. And, specifically, upon studies that I have made which demonstrate the inadequacy of the proposed Cornwall operation to meet the extreme emergencies

which if they occurred would most severely burden the Con Ed system.

Q Will you briefly describe the type of contingencies which could result in serious emergencies?

A Many contingencies could result in emergencies on the system. The most serious of these would include the loss of a major source of generation or an entire power plant, the loss of major interconnections, a fault condition at an internal bus, including breaker failures, the loss of all circuits on a single right of way, the loss of an entire substation, and cascading trip-outs of underground cables acting in parallel. Similar failures on other interconnected systems could also create serious emergency conditions. This is, of course, what happened during the November, 1965 black-out.

Q What would be the consequences of such losses or failures?

A The consequences would depend upon the severity of the loss or failure and on the conditions of the system at the time of the emergency, including the manner in which the spinning reserves were distributed. The consequences would also depend on the conditions of Con Ed's interconnections at the time. Indeed, of all the factors which will determine whether or not Con Ed can ride out a major emergency, the strength of the interconnections will be the most important.

Q Why would that be the case?

A Because in the emergency situations that will most seriously threaten the system, Con Ed could not survive without reserve assistance from its interconnected neighbors, no matter how rapidly its own spinning reserves might respond.

Q Could you give an example?

A Yes. Take one of the cases from the Stone & Webster Report - Case 306. In this case, Stone & Webster hypothesized 1968 winter peak load conditions throughout the Northeast, together with the interconnections that would tie into other systems, such as PJM, at the time. Stone & Webster then hypothesized a three phase fault followed by major breaker failure at Con Ed's Rainey substation as the emergency contingency. The stability study run by Stone & Webster based upon such a fault condition showed that the immediate effect of the failure would be to trip out all of the interconnections leading into the Southeastern New York, or SENY system. In addition, the study shows that the entire generating capacity of the Ravenswood plant, together with some 800 MW at the Astoria generating station, would not remain in synchronism with the rest of the system. In effect, this means that these generators - representing

in the aggregate more than 2000 MW - would trip out. Under these circumstances, Con Ed and SENY would find themselves without interconnections and, at the same time, generation deficient by more than 2000 MW. No matter how rapid SENY's spinning reserves - and even if Cornwall reserves were fully available within 10-15 seconds--they would not be rapid enough. The remaining generators would grind quickly to a halt and the New York area would black-out.

Q Is there a solution to contingencies of this sort?

A Yes. The answer is to strengthen the interconnections so that they will not trip out and so that the reserves of a vast interconnected pool can be drawn on in the case of such an emergency. In my opinion, this is the only means of assuring Con Ed's customers of reliable service. Recent reports of the Federal Power Commission, including the Commission's Report to the President on the Northeast Power Failure and its Interim Report of November 1966, as well as the 1967 Report of its Advisory Committee on Reliability of Electrical Bulk Power Supply, also suggests that this is the answer.

Q Would you explain what function interconnections serve in the case of such serious contingencies?

A In substance, interconnections, if adequate, permit the company or pool suffering the contingency to

take advantage of "instantaneous" reserves available from connected systems in capacities far in excess of anything that could ever be provided by the individual company itself. The interconnections also combine the effect of the inertias of all the connected machines, thus maintaining close to nominal frequency during the first few seconds of a serious contingency.

Take, for example, the SENY companies as a group, and assume for the moment that they are, or have become, isolated from the major Northeast systems, including PJM. Assuming a 10,000 MW load and present reserve criteria, the SENY companies would probably have on their own system about 1200 MW of spinning reserves. However, only a limited part of this reserve would be available within 15 seconds of a major emergency. (And it is within this 15 second period that the fate of the system would probably be determined.) Under these circumstances, a major deficiency in generation - in the magnitudes that would be likely if the interconnections had separated - simply could not be made up in time.

Assume now the same circumstances except that the SENY group remains tied to a 200,000 MW interconnected system - the tie-lines themselves being

of sufficient strength to withstand the initial fault or loss of generation. Under these circumstances, major deficiencies in generation would be picked up not simply by remaining units on the SENY system (which without the inter-ties would not be enough), but by units throughout the interconnected area. With the magnitude of capacity available, contributions of kinetic energy would in themselves significantly cushion the initial shock. In addition, far more instantaneous reserve - indeed, from 10 to 20 times as much as could be provided by the SENY machine alone - would be available within a few seconds. In short, the entire generation deficiency - whether 1000 MW or 2000 - would be picked up in a few seconds by units operating throughout the interconnected area, and would allow the SENY companies to ride through. They would then have from 5 to 15 minutes to restore generation on their systems, or to arrange for other interconnected companies, such as those in the Upstate area of the New York Power Pool, to provide it.

From the foregoing, it can be seen that the ability of Con Ed and the SENY companies to share the reserves of other systems through adequate interconnections is critical.

Q. Dr. Kusko, do you believe that Con Ed's present interconnections are sufficiently strong to see the Company through major emergencies?

A. I do not. I think this is evident from the Stone & Webster report to which I have already referred, for example Case 306.

Q. In your opinion, what are the major weaknesses of the Con Ed ties that place it in such a vulnerable position?

A. Certainly the major weakness is the lack of strong ties between Con Ed-SENY and the PJM companies. The stability limit of about 1000 MW to Upstate New York and 410 MW limit to New England via Pleasant Valley and Southington, Connecticut, must be improved.

Q. You are cognizant, are you not, of Con Ed's plans for strengthening its interconnections?

A. Yes. Briefly summarized, the company proposes the following improvements:

1. The present 138 KV tie between Con Ed and Public Service of the PJM Group, via Staten Island, will be converted to 230 KV operation. According to a joint Con Ed-Public Service report, dated October, 1966, this will permit Con Ed to import, on a sustained emergency basis, between 200 MW and 500 MW of power, depending on the loading of Ravenswood 3 and the amount of power flowing

from Upstate New York. Tie-line tripping devices will be set so that 900 MW of power can be carried over the tie for 15 seconds and 600 MW for 15 minutes.

2. A second interconnection between the PJM companies and Con Ed has been proposed, which would tie Con Ed into the 500 KV Keystone backbone. The proposed interconnection will consist of a single circuit 500 KV overhead line from Branchburg, New Jersey to Suffern, New York, a 500/345 KV, 1000 MVA autotransformer at Suffern, and a single circuit 345 KV overhead line from Suffern to Con Ed's Buchanan substation, whence lines will lead out to Millwood. According to an October, 1963 report titled "EHV Tie Study", which was published jointly by the PJM and ESUPRA (Empire State Utilities Power Resources Associates) companies and made available to Scenic Hudson by Con Ed, this line from Branchburg to Suffern to Buchanan will have a transfer capability, on a sustained basis, of about 1000 MW. The Report also notes that with this tie, the Con Ed system, the neighboring systems and the connections between them could withstand the sudden loss of 2000 MW of supply to Con Ed without any instability and

without exceeding acceptable short-time circuit loadings in both the PJM and ESUPRA territory.

3. According to Mr. Cuneo, the limitation on Con Ed's Convex tie, which I previously described as 410 MW, will be, or perhaps, has already been improved to 538 MVA.

Q. If the plans that you have described are carried to fruition, would the reliability of Con Ed's system be substantially improved?

A. Without any question. In this connection, the planned improvement of the ties to PJM (and through PJM to the vast systems to the west) is particularly important. With both the Branchburg line and the strengthened Staten Island tie in operation, Con Ed should be able to ride out most major emergencies. And certainly it would be able to ride out without Cornwall the types of cases where, hypothetically, Cornwall might be relevant.

Q. Is it your opinion, then, that with the interconnections strengthened as Con Ed plans, the system will be secure?

A. No. In my opinion, there will be need for additional improvement, because there will still remain cases where the system could not hold up even with the proposed Branchburg tie. Again, these are cases which Cornwall could not protect against, however

operated. The only answer is further strengthening of the interconnections, which will be necessary whether or not the pumped storage plant is built. Improvements should include additional ties to PJM, to assure the full assistance of that neighboring pool and the Interconnected System Group beyond. Particular attention should be given to strengthening the ties via Staten Island. I would expect that the PJM Keystone system will ultimately be extended into the load area of Public Service, directly across the Arthur Kill from Staten Island, by overhead or underground circuits. Con Ed should make every effort to interconnect with these high capacity circuits at the earliest possible date.

In addition, I believe that the ties to north must be further strengthened. Mr. Cuneo noted that the northeast utilities are now conducting studies in that connection, but no conclusions have apparently been reached.

Another means of improving the interconnections which I think merits study is the prospect of constructing mine mouth generation in Pennsylvania, with ties not only to the Con Ed busses, but into the PJM system as well. Proposals such as those

made to Con Ed by MAPCO (Ex. 420, 421) could thus serve the dual function of providing Con Ed with additional generation and at the same time providing interconnections where they are most needed. I believe that the MAPCO proposals should be re-evaluated within this context.

Q. Could you state your conclusions regarding system reserves and reliability?

A. In my opinion, the Con Edison system must be designed to withstand the possible loss of a complete plant, a major internal fault or all of the circuits on a vulnerable right of way. The only way that the SENY pool can withstand such failures short of load shedding procedures is to improve tie line capability. In the case of major failures the available spinning reserve--with Cornwall or without--in the area would not be adequate to protect the system against a severe frequency drop and subsequent breakup.

The strengthening of SENY's interconnections, to the extent that they can carry the area following severe internal faults or loss of generation, will provide these companies with a period of 5 minutes or more to recover, activate their spinning reserve generation, and restore normal tie line power flow.

The improvement of the interconnection then will change the reserve requirement, not necessarily in magnitude but in required responsiveness. The requirement for at least half of the spinning reserve in a few seconds will no longer be necessary and the reserve then can be allocated to gas turbines or other modes of generation that can be brought up to load quickly.

A comparison of reserve generation suitable for operation in the Con Edison system during the 5 minute period following major loss of generation shows, in my opinion, that cold starting gas turbine sets are superior to pumped storage because of their distribution throughout the system. They can be brought on where most needed and are not vulnerable to being blocked such as might be the case of a system failure involving the Cornwall plant, switching stations, or transmission line right of way.

EXHIBIT B

EXPLANATION OF RESERVOIR OPERATION AND PARAMETERS

The computer simulations represent Cornwall as 2000 MW of available capacity for both pumping and generating, with a plant efficiency, including transmission losses, of 74%. The reservoir size is 23,400 MWHRS maximum with a minimum level of 550 MWHRS resulting in a net usable storage capability of 22,850 MWHRS.

The program dispatches pumped storage on a weekly cycle. It is constrained to begin each week, at 8 AM Monday morning, with a full pond. Thereafter, the normal computer dispatch will permit drawdown of the pond from Monday to Friday. To the extent possible within economic and operating constraints available capacity on the system will be used to partially restore the pond each weekday night. The pond will be drained to the minimum level by Friday night and then refilled again by the next Monday morning.

Spinning reserve credit is allowed on pumped storage as follows:

1- Pumping Mode- while pumping energy is being supplied all of the capacity used for pumping is credited to spinning reserve up to the maximum spinning reserve requirement of the system.

2- Generating Mode- during generating periods, [redacted] unused capacity of the pumped storage plant is credited as spinning reserve up to the maximum spinning reserve requirement of the system.

The computer simulation does not include any purchases except those which are already planned as firm for the years under consideration.

[1980 is projected 1st year of operation]

GENERAL ELECTRIC COMPANY FUEO
PRODUCTION COST PROGRAM

SYSTEM PLANNING
PRODUCTION COST PGM
ELECTRIC GENERATION PLANNING

TYPICAL OPERATION JUNE 1980

30CT.74

JUN 2 - JUN 8, 1980 LOAD SUMMARY

	ORIGINAL LOAD (MW)	R-OF-R	HYDOEB	LOAD MODIFIERS (MW) CRNWLL	STORGE					MODIFIED LOAD (MW)	SPINNING RESERVE (MW)
1	5699.92	1.00	600.00	0.0	23399.93	0.0	0.0	0.0	0.0	5098.92	0.0
3	4983.30	1.00	600.00	0.0	23399.93	0.0	0.0	0.0	0.0	4382.30	0.0
5	4851.00	1.00	600.00	0.0	23399.93	0.0	0.0	0.0	0.0	4250.00	0.0
7	6515.77	1.00	600.00	0.0	23399.93	0.0	0.0	0.0	0.0	5914.77	0.0
9	9613.80	1.00	600.00	1531.22	23399.93	0.0	0.0	0.0	0.0	7481.58	0.0
11	10550.92	1.00	600.00	2000.00	20337.49	0.0	0.0	0.0	0.0	7949.92	240.00
13	10826.55	1.00	600.00	2000.00	16337.49	0.0	0.0	0.0	0.0	8225.55	240.00
15	11025.00	1.00	600.00	2000.00	12337.49	0.0	0.0	0.0	0.0	8424.00	240.00
17	10683.22	1.00	600.00	2000.00	8337.49	0.0	0.0	0.0	0.0	8082.22	240.00
19	9216.90	1.00	600.00	1134.32	4337.49	0.0	0.0	0.0	0.0	7481.58	0.0
21	8842.05	1.00	600.00	759.47	2068.85	0.0	0.0	0.0	0.0	7481.58	0.0
23	7563.19	1.00	600.00	0.0	549.92	0.0	0.0	0.0	0.0	6962.15	0.0
25	3752.91	1.00	50.00	-695.72	549.92	0.0	0.0	0.0	0.0	4397.63	0.0
27	3219.30	1.00	50.00	-1229.33	1579.58	0.0	0.0	0.0	0.0	4397.63	0.0
29	3219.30	1.00	50.00	-1229.33	3398.99	0.0	0.0	0.0	0.0	4397.63	0.0
31	4540.09	1.00	600.00	-458.54	5218.39	0.0	0.0	0.0	0.0	4397.63	0.0
33	7162.94	1.00	600.00	0.0	5897.02	0.0	0.0	0.0	0.0	6561.94	0.0
35	7778.14	1.00	600.00	573.74	5897.02	0.0	0.0	0.0	0.0	6603.39	0.0
37	7819.93	1.00	600.00	614.53	4749.54	0.0	0.0	0.0	0.0	6603.39	0.0
39	7979.89	1.00	600.00	775.50	3520.47	0.0	0.0	0.0	0.0	6603.39	0.0
41	7748.37	1.00	600.00	543.97	1969.48	0.0	0.0	0.0	0.0	6603.39	0.0
43	7370.21	1.00	600.00	165.82	881.54	0.0	0.0	0.0	0.0	6603.39	0.0
45	6557.67	1.00	600.00	0.0	549.91	0.0	0.0	0.0	0.0	5956.67	0.0
47	5417.68	1.00	600.00	0.0	549.91	0.0	0.0	0.0	0.0	4816.68	0.0
49	3752.91	1.00	50.00	-695.72	549.91	0.0	0.0	0.0	0.0	4397.63	0.0
51	3219.30	1.00	50.00	-1229.33	1579.57	0.0	0.0	0.0	0.0	4397.63	0.0
53	3219.30	1.00	50.00	-1229.33	3398.98	0.0	0.0	0.0	0.0	4397.63	0.0
55	4540.09	1.00	600.00	-458.54	5218.38	0.0	0.0	0.0	0.0	4397.63	0.0
57	7162.94	1.00	600.00	0.0	5897.01	0.0	0.0	0.0	0.0	6561.94	0.0
59	7778.14	1.00	600.00	573.74	5897.01	0.0	0.0	0.0	0.0	6603.39	0.0
61	7819.93	1.00	600.00	614.53	4749.52	0.0	0.0	0.0	0.0	6603.39	0.0
63	7979.89	1.00	600.00	775.50	3520.46	0.0	0.0	0.0	0.0	6603.39	0.0
65	7748.37	1.00	600.00	543.97	1969.47	0.0	0.0	0.0	0.0	6603.39	0.0
67	7370.21	1.00	600.00	165.82	881.53	0.0	0.0	0.0	0.0	6603.39	0.0
69	6557.67	1.00	600.00	0.0	549.90	0.0	0.0	0.0	0.0	5956.67	0.0
71	5417.68	1.00	600.00	0.0	549.90	0.0	0.0	0.0	0.0	4816.68	0.0
73	3752.91	1.00	50.00	-695.72	549.90	0.0	0.0	0.0	0.0	4397.63	0.0
75	3219.30	1.00	50.00	-1229.33	1579.56	0.0	0.0	0.0	0.0	4397.63	0.0
77	3219.30	1.00	50.00	-1229.33	3398.97	0.0	0.0	0.0	0.0	4397.63	0.0
79	4540.09	1.00	600.00	-458.54	5218.37	0.0	0.0	0.0	0.0	4397.63	0.0
81	7162.94	1.00	600.00	0.0	5897.00	0.0	0.0	0.0	0.0	6561.94	0.0
83	7778.14	1.00	600.00	573.74	5897.00	0.0	0.0	0.0	0.0	6603.39	0.0
85	7819.93	1.00	600.00	614.53	4749.51	0.0	0.0	0.0	0.0	6603.39	0.0

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87	7979.89	1.00	600.00	775.50	3520.45	0.0	0.0	0.0	0.0	6603.39	0.0
89	7748.37	1.00	600.00	543.97	1969.46	0.0	0.0	0.0	0.0	6603.39	0.0
91	7370.21	1.00	600.00	165.82	881.57	0.0	0.0	0.0	0.0	6603.39	0.0
93	6557.67	1.00	600.00	0.0	549.89	0.0	0.0	0.0	0.0	5956.67	0.0
95	5417.68	1.00	600.00	0.0	549.89	0.0	0.0	0.0	0.0	4816.68	0.0
97	3752.91	1.00	50.00	-695.72	549.89	0.0	0.0	0.0	0.0	4397.63	0.0
99	3219.30	1.00	50.00	-1229.33	1579.55	0.0	0.0	0.0	0.0	4397.63	0.0
101	3219.30	1.00	50.00	-1229.33	3398.96	0.0	0.0	0.0	0.0	4397.63	0.0
103	4540.09	1.00	600.00	-458.54	5218.36	0.0	0.0	0.0	0.0	4397.63	0.0
105	7162.94	1.00	600.00	0.0	5896.98	0.0	0.0	0.0	0.0	4561.94	0.0
107	7778.14	1.00	600.00	573.74	5896.98	0.0	0.0	0.0	0.0	6603.39	0.0
109	7818.93	1.00	600.00	614.53	4749.50	0.0	0.0	0.0	0.0	6603.39	0.0
111	7979.89	1.00	600.00	775.50	3520.44	0.0	0.0	0.0	0.0	6603.39	0.0
113	7748.37	1.00	600.00	543.97	1969.45	0.0	0.0	0.0	0.0	6603.39	0.0
115	7370.21	1.00	600.00	165.82	881.50	0.0	0.0	0.0	0.0	6603.39	0.0
117	6557.67	1.00	600.00	0.0	549.87	0.0	0.0	0.0	0.0	5956.67	0.0
119	5417.68	1.00	600.00	0.0	549.87	0.0	0.0	0.0	0.0	4816.68	0.0
121	3793.70	1.00	55.83	-637.57	549.87	0.0	0.0	0.0	0.0	4374.43	0.0
123	3179.51	1.00	50.00	-1246.93	1493.47	0.0	0.0	0.0	0.0	4374.43	0.0
125	2945.88	1.00	50.00	-1479.56	3338.92	0.0	0.0	0.0	0.0	4374.43	0.0
127	3280.86	1.00	50.00	-1135.58	5528.66	0.0	0.0	0.0	0.0	4374.43	0.0
129	4449.69	1.00	600.00	-525.75	7209.31	0.0	0.0	0.0	0.0	4374.43	0.0
131	5307.43	1.00	600.00	0.0	7987.41	0.0	0.0	0.0	0.0	4706.43	0.0
133	5439.63	1.00	600.00	0.0	7987.41	0.0	0.0	0.0	0.0	4837.63	0.0
135	5317.36	1.00	600.00	0.0	7987.41	0.0	0.0	0.0	0.0	4716.36	0.0
137	5176.23	1.00	600.00	0.0	7987.41	0.0	0.0	0.0	0.0	4575.23	0.0
139	5045.04	1.00	600.00	0.0	7987.41	0.0	0.0	0.0	0.0	4444.04	0.0
141	5256.72	1.00	600.00	0.0	7987.41	0.0	0.0	0.0	0.0	4655.72	0.0
143	4802.49	1.00	600.00	-172.95	7987.41	0.0	0.0	0.0	0.0	4374.43	67.05
145	3652.58	1.00	50.00	-772.85	8243.38	0.0	0.0	0.0	0.0	4374.43	0.0
147	3017.54	1.00	50.00	-1407.89	9387.20	0.0	0.0	0.0	0.0	4374.43	0.0
149	2774.99	1.00	50.00	-1650.44	11470.88	0.0	0.0	0.0	0.0	4374.43	0.0
151	2836.63	1.00	50.00	-1588.81	13913.53	0.0	0.0	0.0	0.0	4374.43	0.0
153	3360.43	1.00	50.00	-1065.02	16766.44	0.0	0.0	0.0	0.0	4374.43	0.0
155	3905.05	1.00	147.18	-637.57	17842.66	0.0	0.0	0.0	0.0	4374.43	0.0
157	4115.73	1.00	378.86	-637.57	18796.25	0.0	0.0	0.0	0.0	4374.43	0.0
159	4126.66	1.00	388.79	-637.57	19729.84	0.0	0.0	0.0	0.0	4374.43	0.0
161	4187.29	1.00	449.42	-637.57	20673.44	0.0	0.0	0.0	0.0	4374.43	0.0
163	4389.05	1.00	600.00	-586.39	21617.03	0.0	0.0	0.0	0.0	4374.43	0.0
165	4853.30	1.00	600.00	-122.73	22484.88	0.0	0.0	0.0	0.0	4374.43	117.77
167	4479.45	1.00	600.00	-495.98	22665.77	0.0	0.0	0.0	0.0	4374.43	0.0

GENERAL ELECTRIC COMPANY FUEL
PRODUCTION COST PROGRAM

SYSTEM PLANNING
PRODUCTION COST PGM
ELECTRIC GENERATION PLANNING

Typical Operation July 1980

30CT,74

JUL 7 - JUL 13, 1980 LOAD SUMMARY

	ORIGINAL LOAD (MW)	R-OF-R	HYDOEB	LOAD MODIFIERS (MW) CRNWLL	STORGE					MODIFIED LOAD (MW)	SPINNING RESERVE (MW)
1	5006.35	1.00	432.28	-607.91	22025.54	0.0	0.0	0.0	0.0	4989.97	0.0
3	5369.17	1.00	600.00	-221.80	22629.24	0.0	0.0	0.0	0.0	4989.97	18.20
5	5292.00	1.00	600.00	-298.98	22957.51	0.0	0.0	0.0	0.0	4989.97	0.0
7	6993.70	1.00	600.00	0.0	23399.99	0.0	0.0	0.0	0.0	6322.70	0.0
9	9690.97	1.00	600.00	1292.34	23399.99	0.0	0.0	0.0	0.0	7797.63	0.0
11	10469.72	1.00	600.00	2000.00	20815.30	0.0	0.0	0.0	0.0	7961.72	240.00
13	10716.30	1.00	600.00	2000.00	16815.30	0.0	0.0	0.0	0.0	8115.30	240.00
15	11025.00	1.00	600.00	2000.00	12815.30	0.0	0.0	0.0	0.0	8424.00	240.00
17	10683.22	1.00	600.00	2000.00	8815.30	0.0	0.0	0.0	0.0	8082.22	240.00
19	9591.75	1.00	600.00	1193.12	4815.30	0.0	0.0	0.0	0.0	7797.63	0.0
21	9338.17	1.00	600.00	939.54	2429.07	0.0	0.0	0.0	0.0	7797.63	0.0
23	7982.10	1.00	600.00	0.0	549.99	0.0	0.0	0.0	0.0	7381.10	0.0
25	4531.27	1.00	50.00	-1437.72	549.99	0.0	0.0	0.0	0.0	5918.00	0.0
27	3924.90	1.00	50.00	-2000.00	2477.82	0.0	0.0	0.0	0.0	5873.90	0.0
29	3969.00	1.00	50.00	-2000.00	5637.81	0.0	0.0	0.0	0.0	5918.00	0.0
31	5369.17	1.00	600.00	-1149.82	8597.80	0.0	0.0	0.0	0.0	5918.00	0.0
33	7904.92	1.00	600.00	286.90	10299.54	0.0	0.0	0.0	0.0	7017.02	0.0
35	8544.37	1.00	600.00	926.35	9725.74	0.0	0.0	0.0	0.0	7017.02	0.0
37	8654.62	1.00	600.00	1036.60	7873.05	0.0	0.0	0.0	0.0	7017.02	0.0
39	8820.00	1.00	600.00	1201.97	5799.85	0.0	0.0	0.0	0.0	7017.02	0.0
41	8610.52	1.00	600.00	992.50	3395.91	0.0	0.0	0.0	0.0	7017.02	0.0
43	7993.12	1.00	600.00	375.10	1410.91	0.0	0.0	0.0	0.0	7017.02	0.0
45	7671.40	1.00	600.00	55.38	660.71	0.0	0.0	0.0	0.0	7017.02	0.0
47	6251.17	1.00	600.00	-267.82	549.96	0.0	0.0	0.0	0.0	5918.00	0.0
49	4531.27	1.00	50.00	-1437.72	946.34	0.0	0.0	0.0	0.0	5918.00	0.0
51	3924.90	1.00	50.00	-2000.00	3074.17	0.0	0.0	0.0	0.0	5873.90	0.0
53	3969.00	1.00	50.00	-2000.00	6034.16	0.0	0.0	0.0	0.0	5918.00	0.0
55	5369.17	1.00	600.00	-1149.82	8994.15	0.0	0.0	0.0	0.0	5918.00	0.0
57	7904.92	1.00	600.00	315.21	10695.89	0.0	0.0	0.0	0.0	6988.71	0.0
59	8544.37	1.00	600.00	954.66	10065.46	0.0	0.0	0.0	0.0	6988.71	0.0
61	8654.62	1.00	600.00	1064.91	8156.13	0.0	0.0	0.0	0.0	6988.71	0.0
63	8820.00	1.00	600.00	1230.29	6026.30	0.0	0.0	0.0	0.0	6988.71	0.0
65	8610.52	1.00	600.00	1020.81	3565.73	0.0	0.0	0.0	0.0	6988.71	0.0
67	7993.12	1.00	600.00	403.41	1524.10	0.0	0.0	0.0	0.0	6988.71	0.0
69	7673.40	1.00	600.00	83.69	717.28	0.0	0.0	0.0	0.0	6988.71	0.0
71	6251.17	1.00	600.00	-267.82	549.90	0.0	0.0	0.0	0.0	5918.00	0.0
73	4531.27	1.00	50.00	-1437.72	946.28	0.0	0.0	0.0	0.0	5918.00	0.0
75	3924.90	1.00	50.00	-2000.00	3074.11	0.0	0.0	0.0	0.0	5873.90	0.0
77	3969.00	1.00	50.00	-2000.00	6034.11	0.0	0.0	0.0	0.0	5918.00	0.0
79	5369.17	1.00	600.00	-1149.82	8994.10	0.0	0.0	0.0	0.0	5918.00	0.0
81	7904.92	1.00	600.00	315.21	10695.83	0.0	0.0	0.0	0.0	6988.71	0.0
83	[illegible]	[illegible]	[illegible]	954.66	10065.41	0.0	0.0	0.0	0.0	6988.71	0.0
85	8654.62	1.00	600.00	1064.91	8156.09	0.0	0.0	0.0	0.0	6988.71	0.0

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87	8830.00	1.00	600.00	1230.29	6026.27	0.0	0.0	0.0	0.0	6988.71	0.0
89	8610.52	1.00	600.00	1020.81	3565.70	0.0	0.0	0.0	0.0	6988.71	0.0
91	7993.12	1.00	600.00	403.41	1524.07	0.0	0.0	0.0	0.0	6988.71	0.0
93	7673.40	1.00	600.00	83.69	717.25	0.0	0.0	0.0	0.0	6988.71	0.0
95	6251.17	1.00	600.00	-767.87	549.88	0.0	0.0	0.0	0.0	5918.00	0.0
97	4531.37	1.00	50.00	-1417.73	946.25	0.0	0.0	0.0	0.0	5918.00	0.0
99	3924.90	1.00	50.00	-2000.00	3074.08	0.0	0.0	0.0	0.0	5873.90	0.0
101	3949.00	1.00	50.00	-2000.00	6034.08	0.0	0.0	0.0	0.0	5918.00	0.0
103	5369.17	1.00	600.00	-1149.83	8994.07	0.0	0.0	0.0	0.0	5918.00	0.0
105	7904.92	1.00	600.00	315.21	10695.80	0.0	0.0	0.0	0.0	6988.71	0.0
107	8544.37	1.00	600.00	954.66	10065.38	0.0	0.0	0.0	0.0	6988.71	0.0
109	8854.42	1.00	600.00	1064.91	8156.06	0.0	0.0	0.0	0.0	6988.71	0.0
111	8830.00	1.00	600.00	1230.29	6026.24	0.0	0.0	0.0	0.0	6988.71	0.0
113	8610.52	1.00	600.00	1020.81	3565.67	0.0	0.0	0.0	0.0	6988.71	0.0
115	7993.12	1.00	600.00	403.41	1524.05	0.0	0.0	0.0	0.0	6988.71	0.0
117	7673.40	1.00	600.00	83.69	717.22	0.0	0.0	0.0	0.0	6988.71	0.0
119	6251.17	1.00	600.00	0.0	549.84	0.0	0.0	0.0	0.0	5650.17	0.0
121	4476.15	1.00	50.00	-564.77	549.84	0.0	0.0	0.0	0.0	4989.92	0.0
123	3781.57	1.00	50.00	-1259.35	1385.70	0.0	0.0	0.0	0.0	4989.92	0.0
125	3627.32	1.00	50.00	-1413.70	3349.54	0.0	0.0	0.0	0.0	4989.92	0.0
127	3957.97	1.00	50.00	-1082.95	5341.80	0.0	0.0	0.0	0.0	4989.92	0.0
129	4192.77	1.00	600.00	-398.15	6944.56	0.0	0.0	0.0	0.0	4989.92	0.0
131	5953.50	1.00	600.00	0.0	7533.82	0.0	0.0	0.0	0.0	5352.50	0.0
133	5953.50	1.00	600.00	0.0	7533.82	0.0	0.0	0.0	0.0	5352.50	0.0
135	5867.35	1.00	600.00	0.0	7533.82	0.0	0.0	0.0	0.0	5286.35	0.0
137	5867.35	1.00	600.00	0.0	7533.82	0.0	0.0	0.0	0.0	5286.35	0.0
139	5876.32	1.00	600.00	0.0	7533.82	0.0	0.0	0.0	0.0	5275.32	0.0
141	5964.52	1.00	600.00	0.0	7533.82	0.0	0.0	0.0	0.0	5363.52	0.0
143	5369.17	1.00	600.00	-221.75	7533.82	0.0	0.0	0.0	0.0	4989.92	18.25
145	4222.57	1.00	50.00	-818.35	7862.01	0.0	0.0	0.0	0.0	4989.92	0.0
147	3516.97	1.00	50.00	-1523.95	9073.16	0.0	0.0	0.0	0.0	4989.92	0.0
149	3329.55	1.00	50.00	-1711.37	11330.59	0.0	0.0	0.0	0.0	4989.92	0.0
151	3384.47	1.00	50.00	-1656.25	13861.42	0.0	0.0	0.0	0.0	4989.92	0.0
153	3913.87	1.00	50.00	-1127.05	16312.66	0.0	0.0	0.0	0.0	4989.92	0.0
155	4465.12	1.00	50.00	-575.80	17980.69	0.0	0.0	0.0	0.0	4989.92	0.0
157	4608.45	1.00	50.00	-432.47	18832.87	0.0	0.0	0.0	0.0	4989.92	0.0
159	4608.45	1.00	50.00	-432.47	19472.92	0.0	0.0	0.0	0.0	4989.92	0.0
161	4685.62	1.00	102.55	-407.86	20112.98	0.0	0.0	0.0	0.0	4989.92	0.0
163	5193.77	1.00	600.00	-398.15	20716.60	0.0	0.0	0.0	0.0	4989.92	0.0
165	5512.50	1.00	600.00	-78.42	21305.86	0.0	0.0	0.0	0.0	4989.92	161.58
167	4994.32	1.00	411.26	-407.86	21421.92	0.0	0.0	0.0	0.0	4989.92	0.0

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EXHIBIT C



ANALYSIS OF
THE NPCC 1985
TRANSMISSION SYSTEM

Northeast Power Coordinating Council
Working Group #17
of the
Task Force on System Studies

June, 1976

5. LOAD FLOW TESTING OF POSSIBLE BUT IMPROBABLE (PBI) CONTINGENCIES

The Study Group considered a total of fourteen incidents selected for their potential of effecting adjacent areas from studies conducted by various companies and/or pools. Thirteen of these were tested on the base systems at base transfers. The fourteenth was reserved for future transient stability testing as discussed in the Future Study Activity Section. The incidnets were:

New Brunswick

Loss of Coleson Cove Plant @ 960 MW

Loss of Keswick 345 kV Substation

New England

Loss of Ludlow 345 kV Substation and Stonybrook generation @ 400 MW

Loss of Maxcy's 345 kV Substation

Loss of Millstone Plant and Switching Station @ 2632 MW

Loss of West Portland 345 kV Substation

New York

Loss of Astoria Plant and Switching Station @ 1990 MW

Loss of Jamesport Plant and Switching Station @ 2300 MW

Loss of Right-of-Way South of Kent and rejection of 1000 WM of Cornwall generation and 78 MW of load

Loss of Massena Right-of-Way and rejection of 800 MW of Quebec generation and 400 MW of Moses generation

Loss of Niagara Plant and Switching Station @ 2400 MW generation and 175 MW load

Loss of Volney Substation and Nine Mile Pt. #2 @ 1100 MW

Ontario Hydro

Loss of Milton 500 kV Switching Station

Loss of Nanticoke Generating Station @ 2940 MW

The results of these tests are summarized by area in the

following pages with the detail of the facilities outaged and a comparison of pre- and post-disturbance power flows and voltages provided in Appendix H.

In all but two cases, loss of Keswick and loss of the right-of-way South of Kent, the Study Group determined that the system would sustain these PBI incidents without serious loss of load or cascading outages. Additional testing and analysis is recommended for these two severe incidents. In several other situations, additional MVAR support was added to the system(s) to assist in achieving a load flow solution.

The Study Group also considered incidents which would cause complete separation of a part of the system thus precluding load flow testing. Transient stability testing for one of these incidents loss of West Portland 345 kV Substation is also recommended. These are discussed in the following sections.

5.1 NEW BRUNSWICK

Two PBI load flow cases were tested as follows:

5.1.1 Loss of Coleson Cove Plant @ 960 MW

New Brunswick Analysis

This test simulated loss of the Coleson Cove Plant at 960 MW with a pre-disturbance export from New Brunswick (NB) to New England (NE) of 350 MW. The impact of the plant loss was reduced further by the assumption of a rapid increase in the flow on the DC tie at Eel River from Quebec into NB to replace an additional 300 MW of the plant loss. This resulted in a net inflow of 310 MW from NE to NB. The test ran successfully and no line overloads or serious voltage deviations were observed. A diagram of the facilities outaged and comparison of pre- and post-disturbance power flows and voltages is provided in Appendix H.

deviation was approximately 10% at the Riverhead 345 kV bus. A flow occurred on the East Garden City (LILCO)-Farragut (Con Ed) 345 kV tie of approximately equal to the STE rating of the line.

Therefore, the base system was capable of sustaining the loss of the Jamesport plant without adverse system effects.

A detailed description of the facilities outaged and a comparison of pre- and post-disturbance power flows and voltages is provided in Appendix H.

New England Analysis

No adverse system effects were seen in New England due to the PBI loss of Jamesport plant.

5.3.3 Loss of Right-of-Way South of Kent and Rejection of 1000 MW of Cornwall Generation and 78 MW of Load

New York Analysis

The PBI test, loss of the right-of-way South of Kent, entails the loss of four 345 kV circuits between Pleasant Valley and New York City along with associated transformers. This resulted in the loss of 78 MW of load at Pleasantville. Several attempts at solving this PBI resulted in the approach of rejecting 1000 MW at Cornwall.

The first attempt at load flow solution was unsuccessful and it was necessary to add 1500 MVARS of support to the Mid-Hudson River Valley. Significantly low voltages were still experienced in this area which may result in local loss of load. There were some significant circuit overloads also experienced in the paths that parallel the four 345 kV circuits lost. The Ramapo-Rock Tavern 345 kV circuit had a flow of approximately 2300 MW. It has a third zone relay setting of 2199 MVA. The Northport-Norwalk Harbor 138 kV circuit had a flow of approximately 625 MW versus an over-current relay setting of 574 MVA. This indicates a possibility of system cascading.

This incident is one of those identified by the Study Group as requiring more thorough analysis by use of transient stability testing to assess the extent and severity of the disturbance.

A detailed description of the facilities outaged and a comparison of pre- and post-disturbance power flows and voltage is provided in Appendix H.

New England Analysis

The largest voltage deviation was on Norwalk Harbor 115 kV bus in the order of 6.8%. The flow on the Norwalk-Norwalk Harbor 115 kV exceeded its STE rating by approximately 2%. While such conditions alone, may not be indicative of a severe system disturbance, the Study Group believes the effect of this PBI on the New England system cannot be determined without performing the additional testing suggested.

5.3.4 Loss of Massena Right-of-Way and Rejection of 800 MW of Quebec Generation and 400 MW of Moses Generation

New York Analysis

This test considers the loss of two Moses-Adirondack 230 kV circuits along with rejection of 400 MW of generation at the Moses 230 kV station and the loss of the Massena-Marcy 765 kV circuit with the rejection of the 800 MW of generation from Quebec.

The first attempt at solving a load flow for this outage was unsuccessful. In order to obtain a satisfactory solution with all line loadings and all voltage levels within an acceptable tolerance, in both Ontario and New York, approximately 500 MVAR of support was needed in the underlying system in the Massena area.

A detailed description of the facilities outaged and a comparison of pre- and post-disturbance power flows and voltage is provided in Appendix H.

APPENDIX H

NPCC #17 ANALYSIS OF THE NPCC 1985 TRANSMISSION SYSTEM

ANALYSIS OF THE PBI LOSS OF RIGHT-OF-WAY SOUTH OF KENT AND REJECTION OF 1000 MW OF CORNWALL GENERATION AND 78 MW OF LOAD-CASE #50

Thermal Analysis

From Bus #	To Bus #	Circuit Name	Base Flow Case #15 (MW)	(MVAR)	PBI Flow Case #50 (MW)	(MVAR)	Summer STE (MW)	Loading As % of STE Greater Than 90%
125	337	Leeds-Hurl 345	568	+j61	1324	+j149	1828	-
312	4	Rockt-Ramp 345	1171	-j126	2300	-j71 (1)	1873	123
672	360	Norwh-Northp 138	0	+j0	647	+j4 (2)	424	153
1252	304	Hudson-Fargt 345	250	+j8	490	-j42	918	-
1269	302	Lind-Goeth 230	150	+j3	524	-j47	788	-
4	260	Ramp-Buch N. 345	143	+j65	979	-j46	2500	-
10	289	Laden-Buch S. 345	650	+j297	1644	+j258	2500	-
271	759	PV-Lng Mt. 345	77	-j53	703	+j58	1210	-
677	676	Norwh-Norwalk 115	-2	-j56	237	+j70	234	101

Notes: (1) This circuit has a third zone relay setting of 2199 MVA
(2) This circuit has an over current relay setting of 574 MVA

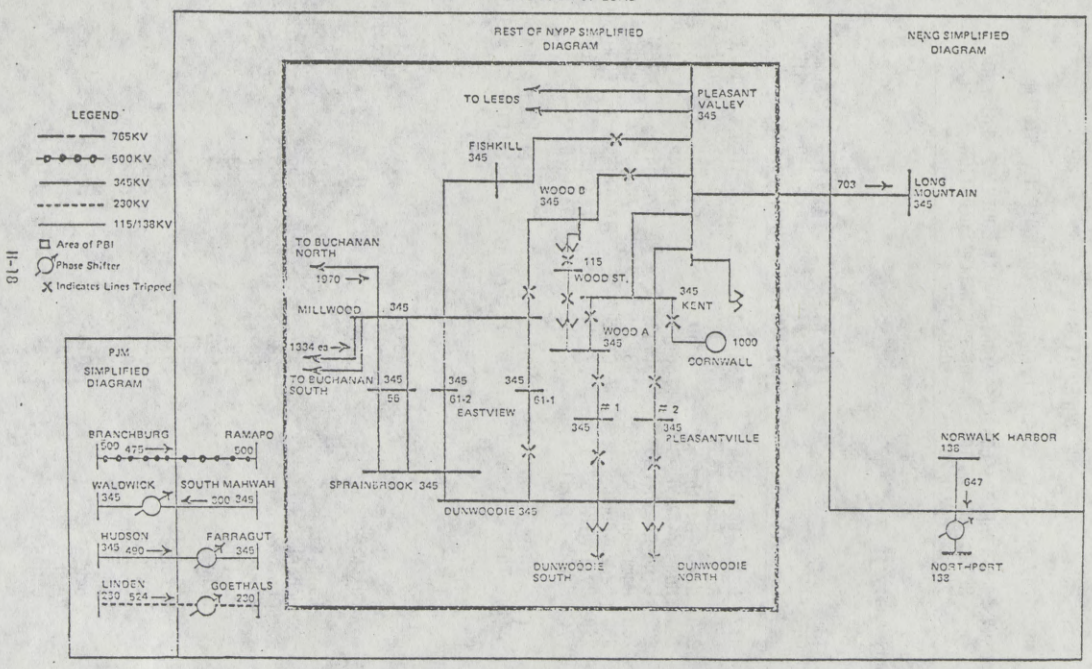
Voltage Analysis

Bus #	Bus Name	Base Voltage Case #15 (P.U.)	PBI Voltage Case #50 (P.U.)	Voltage Deviation Greater than .05 (P.U.)
248	Wood St.	1.002	.757	-.245
249	Mohansic	.997	.755	-.242
250	Croton	.995	.763	-.232
251	Carmel	1.001	.757	-.244
252	Pawling	.992	.833	-.159
253	Sylvan	.995	.894	-.101
254	Tilly	.994	.777	-.217
255	Katona	.995	.758	-.237
677	Norwalk	1.049	.988	-.061
359	Northport	1.030	1.030	-
271	PV	.996	.922	-.074
312	Rock Tav	1.018	.990	-
4	Ramp	1.035	1.026	-
125	Leeds	1.022	1.016	-

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APPENDIX H
NPCC# 17 ANALYSIS OF THE NPCC 1985 TRANSMISSION SYSTEM
ELECTRICAL ONE-LINE DIAGRAM OF PBI
NEW YORK

LOSS OF RIGHT-OF-WAY SOUTH OF KENT AND
REJECTION OF 1000MW OF CORNWALL GENERATION
AND 78MW OF LOAD



Rev. 5/27/76

Mr. DINGELL. The Chair recognizes Mr. Kitzmiller.

Mr. KITZMILLER. Thank you very much, Mr. Chairman.

Mr. Curtis, you said that you felt that the authority of the Commission in the area of reliability should be residual. This raises a very interesting question. It seems that these issues of reliability only come to the attention of the Federal Government and of State government in many cases when you have a catastrophic failure.

My question is: If your authority is residual, how is it possible to arrive at an issue that is about to happen before the whole system tumbles down? Is it possible?

Mr. CURTIS. The theory of residual authority is that you work under section 202(a), for example, for the voluntary cooperation and coordination. If that is not forthcoming, then the Commission should have the authority to act on its own motion. When I am talking about residual powers, I mean the steps that one goes through in order to accomplish a result. There is no sense in the Federal Government determining to take action which may be voluntarily agreed to if it would only pose the question to the parties. That is what the planning council, sir, is all about.

Mr. KITZMILLER. Let me particularize my question to the ConEd case. We have had testimony today that indicated that ConEd had failed to conform to its agreement, its binding agreement, to notify the power pool which in fact was the only recording agency involved, to notify the power pool of major changes in its reserve generating capacity and this was a very significant contributing factor to the collapse. But at the time of the collapse, neither the ConEd system operator, nor the pool, nor the New York State Public Service Commission, nor apparently the Federal Power Commission knew that these changes had been made.

What I am saying is that if you are dealing with a deck that is completely hidden from you until it collapses, don't you have to have some more direct authority that will require a certain system of reporting that will require maybe the activation of the auditing procedures that the pool was supposed to go through? The pool, I think, conceded that there had been very lax auditing, if any auditing, since 1973.

Mr. CURTIS. Yes, Mr. Kitzmiller, I think you do. If you will note on page 39 of my prepared statement, in our attempting to respond to the phase angle regulating transformer being out, resulting in Farragut being down, we have indicated that we have developed such a reporting mechanism for notification of any major bulk power supply equipment failure and its expected return to service as a part of a new respondent reporting system, for example.

Yes, you have to be informed and you have to have audit programs to assure that your regulatory requirements are being complied with.

Mr. KITZMILLER. To belabor the point, there is a difference, I think, between the hidden problems of the energy control center, the failure of the generation to be reported and Farragut. When Farragut went out, it was a very noticeable thing. When the phase angle regulator came out, it was not hidden from the power pool. It showed up on their dynamic mimic board. Everybody knew it. Apparently nobody but ConEd knew that they had made these dramatic changes with the generator and apparently they did not

notify anybody until 8:45 the night of the catastrophic consequences.

There seems to be a possibility of a gap. It may only apply to this one case, I don't know, but there seems to be a possibility of a gap unless you have a procedure for getting in and auditing their performance as against the passive procedure of counting on them to report to you. Can that be addressed?

Mr. CURTIS. Surely. Not only in this circumstance, but in any circumstance where you propose to impose obligations, then you have to have a mechanism for assuring that those obligations are being complied with, otherwise you have no means to rely on the system. Here I am talking about a governmental system.

Mr. DINGELL. That appears to be wholly lacking in the system which we have before us.

Mr. CURTIS. Well, the system that you have before you, Mr. Chairman, is one that relies essentially on contractual relationships where the power pool itself has no mechanism to enforce them or to adjudge their compliance.

Mr. DINGELL. You have indicated something that concerned me greatly. You said, where the power pool has no power to compel conformance. That is a statement which we ran into in connection with reliability of the New York power pool.

Is that a feature which is common to all power pools?

Mr. CURTIS. I think they are all grounded on the contractual relationships of the parties and the parties accede to those requirements that they wish to. I cannot speak from my own knowledge as to what the relationships are, whether these are relationships common to all power pools.

Mr. LINDSAY. Every power pool is a contractual arrangement essentially voluntary.

Mr. DINGELL. But the pool relies on its members for not falling below certain reliability standards.

Mr. LINDSAY. They will very often have agreements among themselves concerning certain standards that they have to meet. For example, they have to maintain a certain amount of operating reserve or certain amount of spinning reserve. That kind of arrangement is quite common.

Mr. FOWLKES. There are also economic penalties if one of the parties does not meet a certain obligation.

Mr. DINGELL. That is all?

Mr. FOWLKES. That is all.

Mr. KITZMILLER. To move to another area, there has been some question raised by the various investigating parties as to the extent to which 202(b), the extent to which it has been effective and invoked.

Does the Federal Power Commission have a record of the number of times that a private utility has invoked 202(b) in a case involving another private utility and where the public service commission or a State regulatory commission has invoked the provisions of 202(b) with regard to another private utility?

Mr. CURTIS. By private utility you mean public utility as that term is defined under the Federal Power Act?

Mr. KITZMILLER. Yes.

Mr. CURTIS. I think the chairman would want me to note that there is not a Federal Power Commission today. We are talking historically.

Mr. KITZMILLER. Yes, well this had to be in the past.

Mr. DINGELL. The habit is hard to break.

Mr. CURTIS. To my understanding there have been no instances in which the Federal Power Commission had been requested by a public utility to order an interconnection with another public utility. There have been a number of instances when 202(b) has been used and those are all circumstances in which the request came from a municipality or a cooperative.

I do not know from memory, maybe someone else does, whether it was ever triggered by a State commission request which is also possible.

Mr. LINDSAY. To the best of my knowledge it has not. Section 207 has, but not 202.

Mr. KITZMILLER. Do you have any information on the importance of the upgrading of the Linden-Goethals interconnection and the new line from Ramapo to the Farragut station and the importance of their reliability on the Consolidated Edison system?

Mr. FOWLKES. Based upon a study that we obtained as part of our present investigation of the July 13 circumstance, it was noted in one study—and if you would like the name of it, I will read it into the record.

Mr. KITZMILLER. Please do.

Mr. FOWLKES. It was dated December 1975. It was called "A Comparison of AC and DC Transmission Plans for Delivering Power from Ramapo to New York City in the 1980 to 1985 Period."

Therein one of the recommended options was that a second Hudson-Farragut 345 kV interconnection be installed along with some other transmission reinforcements. That reinforcement was to provide access to an additional 1,000 megawatts of power. That was to be done by 1980.

I can't give you a specific number as to what the impact on reliability would be other than the fact that you would have the capability to transmit 1,000 megawatts more into the ConEd area and you would also have the capability to transmit power in the opposite direction to assist the Public Service Electric and Gas Company, if need be.

Mr. KITZMILLER. The two witnesses this morning, the witness from the Governor's Commission and the witness from the Mayor's Commission of Special Inquiry, both stressed that given the vulnerability of the north-south corridor through Westchester, they placed the highest priority on interconnections in the south end of the ConEd system which would be from Farragut down that would plug into the west and the PJM system.

They also indicated that the reliability council made a statement, Mr. Millstein indicated the reliability council made a statement on this. Do you agree and are you familiar with that statement?

Mr. FOWLKES. I am not familiar with the statement. Because of the fact that the ConEd load area is primarily at the southern end, it would be beneficial that additional interconnection enter at that point.

I might further mention that in this study I previously referred to, they also provide for a third Hudson-Farragut interconnection in 1985 which, along with other transmission reinforcements, would increase the transfer capability to 1,600 megawatts.

Mr. OTTINGER [presiding]. I have a question.

Mr. KITZMILLER. May I complete?

I wanted to confirm that it is one of the recommendations in your old report. Do you have the page number?

Mr. CURTIS. That is page 4.

Mr. KITZMILLER. So that in fact it is now generally confirmed by the PSC, by the Mayor's Commission and by the Federal Power Commission that these southern lines are of vital importance to the reliability of the ConEd system.

On the part of the Federal Power Commission, what has been done to assist ConEd in developing those interconnections? If you can't answer now, we would like to receive it for the record.

Mr. FOWLKES. As the Chairman previously mentioned, our involvement in terms of planning activities and maintaining the adequacy and reliability for future systems has been through cooperative efforts with the National Electric Reliability Council and in particular the Northeast Power Coordinating Council of which Con Edison is a member.

So that our efforts in that regard have followed therefrom and also from our review of their advance planning as reported in order 383-4.

Mr. CURTIS. Mr. Kitzmiller, I think I tried to give you that statement. I asked that question and we have gone through our files and talked to those who may have some institutional memory and we cannot construct a record for you as to what steps were taken in those discussions, there being no transcript of the records and the people, we having suffered a turnover of people, we cannot respond to it.

Mr. OTTINGER. Do you have the names of the people who would have made those contacts if there were any made?

Mr. LINDSAY. Stewart Brown is no longer alive who would have been the first.

Mr. OTTINGER. I said that we might contact.

Mr. CURTIS. We are not willing to assume limitations on the part of the Congress.

Mr. LINDSAY. The next Chief of the Bureau of Power was T. A. Phillips who is retired but living nearby. Then Chairman Nassikas. Former Chairman Nassikas would have been the only other one that might have knowledge of this sort of thing.

Mr. KITZMILLER. Could I maybe lay to rest by summarizing a statement and see if you agree with it?

On the basis of the record of what happened, volunteerism was a flop. We do not have the upgraded ties.

Mr. CURTIS. I think it is fair to say that the noted deficiencies have not been adequately dealt with, yes. Of course, the Hudson-Farragut tie was in but down because of the phase angle regulating transformer.

Mr. KITZMILLER. I think there is a recommendation for the additional Hudson tie. That is the one we had reference to. In other words, volunteerism did not work on this case.

Mr. CURTIS. I think everybody concedes that had Hudson-Farragut been operative, it would have helped, if not indeed prevented a total close down of the system.

Mr. KITZMILLER. What jurisdiction do you have over the Norwalk-Northport line? That is the one that goes from Connecticut Light and Power to Lilco?

Mr. Fowlkes, you mentioned that that would have been one of the avenues for power in the ConEd system from the north, but in fact it was a badly damaged line at that time and the separation of Lilco was as much to keep that line from being destroyed as it was to have anything to do with the ConEd system.

That Lilco line raises interesting questions about how you go about constructing lines and where you put them. I wondered who has the jurisdiction over that line, if anybody?

Mr. CURTIS. I can only say that we don't. We have jurisdiction over interconnection facilities, but not over lines.

Mr. KITZMILLER. Would you clarify that, please?

Mr. CURTIS. You are talking about a transmission line that was damaged.

Mr. KITZMILLER. It was improperly installed. I think it was under your jurisdiction.

Mr. CURTIS. I am informed that it was not. We have jurisdiction only over primary lines to hydro facilities.

Mr. KITZMILLER. So this you have no jurisdiction over whatsoever? We reviewed it and I won't go over it again, but the story of the construction of that line is amazing.

Mr. OTTINGER. Would you have any jurisdiction under the legislation that is proposed and passed by the House?

Mr. CURTIS. Upon a finding that it was necessary to assure adequacy of reliability, yes, sir.

Mr. KITZMILLER. That is all I have. Thank you.

Mr. OTTINGER. Mr. Curtis, I only have one other question.

On page 12 of your statement you say that:

> Under section 202(b), the Commission has, in a number of instances, directed public utilities to interconnect with and exchange power and energy with electrically isolated or otherwise inadequately interconnected systems.

I wonder if now for the record you could give us chapter and verse on those and also any incidence of the exercise of power in the last 10 years under 202(a)?

Mr. CURTIS. Yes, sir.

Mr. OTTINGER. You prefer to supply that for the record I assume?

Mr. CURTIS. Yes.

When you say "the exercise of power under 202(a)," that is voluntary coordination. The only mandatory part is our ability to divide the United States into districts.

Mr. OTTINGER. What I would like to do is find out what applications were made to you under 202(b).

Mr. CURTIS. Yes, that is 202(b). You want to know each case in which the Commission has received an application for a mandatory interconnection or other activity under 202(b) and what was the disposition of those applications. We will be happy to provide that for the record.

[The following material was received for the record:]

Summary of Applications Filed Under Section 202(b) of the Federal Power Act For the Period 1962-1977

Docket No.	Case Name	Complainant	Disposition
E-7021	New England Pwr. Co.	Shrewsbury, Mass.	Filed 1962. U.S. Ct. App. for 1st Circuit affirmed Commission Opinion: directed NEPCO to sell energy direct to Shrewsbury and to provide firm service.
E-7120	Georgia Power Co.	Crisp County	Filed August 1963. Resolved by Settlement Agreement in 1969 under which Crisp County was treated as an interconnected utility system rather than as a firm power purchaser. The agreement provided for the coordinated operation of Crisp County's system with that of Georgia Power and for an operating committee to handle the day-to-day operating matters arising under the interconnection.
E-7250	Illinois Power Co.; Central Illinois Pub. Service Co.; Union Electric Co.; Central Illinois Power & Light Co.	Springfield, Ill.	Filed October 1965 asking for physical connection with Illinois-Missouri Pool or Central Illinois Light Co. - Complaint withdrawn February 1967.
E-7243	Florida Power & Light Co.	Clewiston, Fla.	Filed September 1965 asking for physical connection of facilities. Complaint withdrawn July 1966.
E-7248	Pacific Gas & Electric Co.	Truckee PUD	Filed October 1965 relating to transmission service. Complaint withdrawn March 1967.

Docket No.	Case Name	Complainant	Disposition
E-7249	Kentucky Utilities Co.	Paris Kentucky	Filed 1965. The Commission ordered an interconnection between the City of Paris and Kentucky Utilities, but declined to require Kentucky Utilities to provide transmission service.
E-7257	Florida Power Corp.	Gainesville, Fla.	Filed November 1965. The U.S. Supreme Court affirmed the Commission's 1968 opinion which orders Florida Power Corp. to interconnect its facilities with Gainesville.
E-7267	Otter Tail Co.	Hankinson, Minn.	Filed February 1966 - request for a order directing Otter Tail to wheel power. Complaint withdrawn May, 1969.
E-7278	Otter Tail Power Co.	Elbow Lake	§202(c) request filed in 1968. The Commission ultimately ordered an interconnection of Otter Tail's transmission facilities with the facilities of Elbow Lake under Section 202(b). Further, it allowed Elbow Lake to elect whether to take its full energy requirements from Otter Tail.
E-7283	Indiana & Michigan Electric Co.	Constantine, Mich.	Filed April 1966. Application of physical connection of transmission facilities. Complaint withdrawn August 1967.

Docket No.	Case Name	Complainant	Disposition
E-7306	Colorado-Ute Electric Association, Inc.	Salt River Project Agricultural Improvement and Power District et al.	Salt River invoked all sections of Part II and Part III of Federal Power Act (which includes §202(b)) to request that Colorado-Ute be considered subject to F.P.C. jurisdiction as a public utility. The Commission declined jurisdiction. Affirmed by D.C. Cir. 391 F.2d 470.
E-7393	Appalachian Power Co. and American Electric Power Co., Inc.	City of Danville	Filed January 1968. Commission opinion denied Danville 202(b) relief because it did not request an interconnection but rather a modification of its existing interconnection agreement with Appalachian Power Company.
E-7346	Central Vermont	Village of Hyde Park	Filed March 1967. Settlement agreement reached as to interconnection and transmission service rate.
E-7410 & E-7426	Public Service Co. of Indiana	Bartholomew County Rural Electric Membership Corp., et al. (Indiana Cooperatives)	Filed June 1968. Request to maintain physical connection. Initial Decision - ordered physical connection, but complaint was ultimately withdrawn October 1973.
E-7514	Central Illinois Public Service Co. Illinois Power Co., & Union Electric Co.	Illinois Municipal Utilities and 11 municipals	Filed December 1969. Proceedings terminated August 1976 as a result of filing of settlement agreement providing for interconnections.

Docket No.	Case Name	Complainant	Disposition
E-7547	Duquesne Light Co.	Pitcairn	Petition for 202(b) Interconnection filed July, 1970, later changed to a request for emergency interconnect under 202(c). Emergency interconnect was effected. Complaint withdrawn March, 1972.
E-7631, E-7633, E-7713	Cleveland Electric Illuminating Co.	City of Cleveland	Filed May, 1971. Originally a 202(c) application. Commission ordered a permanent interconnection under 202(b) authority. Opinion affirmed on appeal.
E-9480	Indiana & Michigan Electric Co.	City of Mishawaka	Filed June, 1975. Application dismissed pursuant to Motion filed by Mishawaka. The parties agreed to the installation of a physical connection between I&M's sub-transmission facilities and the City's substation.
E-9559	Niagara Mohawk	Massena	Filed February, 1976. Commission denied request for interconnection by order in July, 1976 on ground that Commission lacked jurisdiction since Massena had not yet taken possession of Niagara Mohawk 's distribution facilities.
E-9503	Town of Norwood v. Boston Edison Co. New England Pwr. Co.	Town of Norwood, Mass.	Application filed by Norwood in June, 1975 for 202(b) relief. Commission issued order dismissing application on ground that Norwood failed to state a claim upon which relief can be granted. October, 1976.

Docket No.	Case Name	Complainant	Disposition
E-9558	Central Power & Light Co., et al.	Central Power & Light Co., et al.	Filed May, 1976. Commission dismissed the Application as it related to the request for Commission action under 202(b) by order dated July 21, 1976.
E-7740	Indiana & Michigan Electric Co.	City of Richmond, Ind,	Part of I&M electric tariff rate case. Request for interconnection. Commission, in an opinion issued August 2, 1977, denied request for interconnection on ground that complete interchange of power would not be necessary when Commission rejected I&M's 100% ratchet provision.

Mr. OTTINGER. We thank you very much for your appearance and for your help to the committee. We would very much appreciate receiving as quickly as we can the answers to the questions which pertain to the current legislation so that we may use that in conference with the Senate.

Mr. CURTIS. May I ask whether you are asking for my personal views or for the Commission's position?

Mr. OTTINGER. We would be delighted to have both.

Mr. KITZMILLER. He doesn't have time.

Mr. CURTIS. I would have to notice a meeting of the Commission for 7 days to get the position of the Commission.

Mr. OTTINGER. I think we would be best off getting your personal views.

I thank you and your colleagues. If there is no further business coming before the committee, the hearings are adjourned.

[Whereupon, at 4:20 p.m., the hearing was adjourned.]