MID-ATLANTIC POWER FAILURE OF JUNE 5, 1967

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TUESDAY, JUNE 6, 1967

U.S. SENATE,
COMMITTEE ON COMMERCE,
Washington, D.C.

The Committee met at 10 a.m., in room 457, Old Senate Office Building, Hon. Ernest F. Hollings presiding.

The committee was hearing testimony on S. 1365. Lee C. White, Chairman, Federal Power Commission, at the request of the committee, departed from his statement on the pending bill to present testimony on the mid-Atlantic power failure of June 5, 1967.

Senator HOLLINGS. The committee will hear at this time the Chairman of the Federal Power Commission, Mr. Lee C. White. He will present information on the recent power failure in the mid-Atlantic States.

We are very glad to have you, Mr. White.

STATEMENT OF LEE C. WHITE, CHAIRMAN, FEDERAL POWER COMMISSION, WASHINGTON, D.C.

Mr. WHITE. Thank you, Mr. Chairman and members of the committee.

The committee has expanded this hearing, calling for a brief report on yesterday's blackout, a matter of great interest and concern to the Commission. Although it is rare that all five members of the Commission appear at a committee hearing, we deemed it desirable to appear together. My fellow members of the Commission here at the table with me are Commissioner O'Connor, Commissioner Ross, Commissioner Bagge, and Commissioner Carver.

Seated also with us is Mr. Stewart Brown, the Chief Engineer of the Commission, and the Chief of our Bureau of Power. Mr. Brown is the staffman in charge of the investigation of yesterday's blackout in the Middle Atlantic States.

We have prepared a very brief, updated statement, summarizing what information we have about the blackout as of this morning at about 10 o'clock. I don't know whether the chairman may deem it appropriate that it be included in the record.

Senator HOLLINGS. The statement will be included in the record.

(The statement referred to follows:)

PJM POWER INTERRUPTION, JUNE 5, 1967—PRELIMINARY RELEASE

A widespread power failure affecting customers in four eastern states served by the Pennsylvania-New Jersey-Maryland interconnection (PJM) occurred starting at 10:22 a.m. today. Service was lost in the entire state of New Jersey, in eastern and southeastern Pennsylvania and in a part of the Delaware-Maryland peninsula.

Staff member assigned to this hearing: Donald W. Brodie.

The principal cities in which power was completely interrupted included Newark, Jersey City, Elizabeth, Paterson and Camden, all in New Jersey; Philadelphia, Reading, Chester, Upper Darby, Bethlehem, Allentown, all in Pennsylvania; and Willmington, Delaware.

The total loss in power service is roughly estimated to have amounted to 10 million kilowatts and to have affected some 13 million people in a 15,000 square mile area.

The cause of the power failure has not been determined, but it resulted in widespread separation of transmission lines around the perimeter of the affected area and the early loss of such major generating sources as Brunner Island (700,000 kw); and the Yards Creek (440,000 kw) and Muddy Run pumped storage projects (480,000 kw) respectively.

As the result of separation of systems and imbalance of generation and load, other systems went down under deteriorating system conditions.

Transmission ties from the affected four-state area to surrounding systems, including systems in New York and in Maryland and in western Pennsylvania, opened and power service in the surrounding systems continued unaffected.

The power systems which lost total power supply included: Public Service Electric & Gas Company; Jersey Central Power & Light Company, New Jersey Power & Light Company, Metropolitan Edison Company, Philadelphia Electric Company. Other systems substantially affected included Delaware Power & Light, which lost about 80 percent of its load and Pennsylvania Power & Light Company, which suffered an internal separation of its network causing the eastern portion to lose power.

Service to the center of Philadelphia was restored by 11:10 a.m. and all of Philadelphia Electric's system was restored by 2:30 p.m. Power was restored on the Metropolitan Edison Co. system at 11:45 a.m. Power was restored temporarily on the system of Pennsylvania Power & Light at 12:15 p.m., but system conditions became unstable and service to the eastern section was again lost. Service was essentially restored on the system by 2:00 p.m. except in the Northwest part of the system in the Sunbury-Williamsport area which was completely restored by 6:20 p.m. Nearly all power on the Jersey Central and New Jersey Power & Light Co. was restored at 2:30 p.m. Delmarva Power & Light Co. service was completely restored by 1:00 p.m. At 5:00 p.m. practically the entire area was back in normal service with the exception of the area served by the Public Service Electric & Gas, which at that time had picked up about 70 percent of its normal load. Loads on this system were fully restored about 7:55 p.m.

Although Atlantic City Electric Company is a part of the interconnection and was initially affected by the disturbance, it separated from the network and although significant heavy industrial loads were dropped, the system continued in operation. The PJM interconnection is equipped with only a limited amount of automatic load shedding and was unable to reduce loads quickly enough to prevent collapse of system generation. Jersey Central, which is equipped to drop 30% of its load automatically, is the only one of the twelve members of the PJM Interconnection that is so equipped at present. Two other systems, the General Public Utilities and Pennsylvania Power & Light Co., plan to install automatic load-shedding relays. A 5% reduction in voltage was ordered by the dispatching headquarters of the PJM interconnection as frequency began to decline, but was not done quickly enough to be effective.

Mr. WHITE. I believe copies have been made available to the members of the committee and the staff. The most significant aspect of yesterday's blackout is the clear demonstration of the need for the strongest possible interconnection among systems that are operating in coordinated pools. The ability of a system to meet the needs of its consumers, is of course, the reason for its existence. It can, we believe, better meet these needs and do so on a more reliable basis if systems are so coordinated and interconnected with adjoining systems that whenever there is difficulty energy will be available from the outside to assist. Even though our opinions must be highly tentative, since it is very early to reach any firm conclusions on yesterday's blackout, this appears to be the outstanding lesson from what happened there. Precisely what happened is, of course, a matter of concern and interest to all of us, who are obviously anxious to prevent recurrences. Information now available, was obtained by Mr. Brown from the FPC engi-

neers who are on the scene in Philadelphia. The FPC engineers are working with utility officials and operators to understand as precisely as we can what happened yesterday and why the system collapsed. The following material is the most up-to-the-hour information we have.

On the basis of information that has been assembled to date, it is believed that the trouble started with a fault on a 230 kv line of the Philadelphia Electric Company extending from Nottingham, Pennsylvania, to Plymouth Meeting. What caused the fault on the line has not been determined. The line is back in service and is being patrolled to detect any abnormal conditions. The opening of this line resulted in tripping off the new Muddy Run Pumped storage project on the Susquehanna River which was generating 440 mw at the time.

If I might interpolate: In order to prevent large surges of power from running at random, many transmission lines are triggered so that whenever a fault takes the line out of service, it prevents the passage of power over the line. At the same time this mechanism simultaneously cuts out the generation feeding that line from the system so that whatever energy is being generated at the time will not find another path while such triggering makes sense in the circumstances for which it is designed, so far as we are able to determine today, the cutting out of the generation in this incident created a disturbance that led to system instability and imbalance and ultimate collapse of the eastern section of the PJM system.

(Returning to the statement:)

The control system for the Muddy Run is so arranged that its generation is automatically tripped if one of the 230 kv lines from Nottingham to Plymouth Meeting has opened. This is a temporary arrangement pending the placing of a new 500 kv line in service later this summer between these two general points.

The sequence in the loss of generation of other plants in the vicinity, including Brunners Island—a steam generating plant—and Conowingo—a hydroelectric plant—has not yet been determined. This will require careful matching of oscillograph records of the distrubance, which is now in process.

The wide shutdown of generation over the area resulted in some damage to a number of generating units. Much of the initially observed damage has been found to be minor and repairs and tests are underway which will place these units back in service today or within a few days. Damage to a number of others may take longer periods to repair. Altogether, a total of twelve units were affected in some manner but it is now expected that all but one of these units, which has a capacity of only 80,000 kw, will be operating by the end of this week. The majority are already back in service.

Possible damage to generating equipment of this particular coordinated pool (known as PJM—Pennsylvania, Jersey, Maryland) may be significant. Because operation of two new very large generating units, have been delayed beyond schedule, PJM has recognized that there will be some critical times ahead, especially during this summer when their peak load will be experienced. Without these anticipated new generating units damage to other units could aggravate the situation.

Our information—and this stems from previous meetings in early April with the people who operate PJM—indicates that whereas a reserve capacity for the entire PJM system of approximately 11 or 12 companies should be on the order of 10 to 15 percent, it is unfortunately likely to be no more than three or three and a half percent. This reserve ratio is a critical indicator and one that all utilities, whether operating in concert with others or singly, watch for guidance.

The Commission has scheduled a meeting for this Thursday, June 8, with representatives of the operating utilities that comprise PJM and

the State regulatory commissions of the States involved. We will of course extend the invitation to the Governors of those States to be otherwise represented if that is their wish.

Additionally, we are establishing an ad hoc panel of system reliability experts to explore precisely what occurred in PJM and to make whatever recommendations it believes are worthy of consideration by the Commission, by the industry, by the Congress, and of course, by the public at large.

Senator HOLLINGS. When will the administration present its reliability legislation to the Congress?

Mr. WHITE. The President indicated in the state of the Union message, and again in somewhat more detail in his consumer message, which came to the Congress in mid-February, that legislation would be submitted. The clearing process is very nearly completed. I am hopeful that the legislation will be submitted to the Congress before the end of this week. It will not be a hurry-up drafting job in order to respond to this particular major disturbance but rather acceleration of a few days as a result of submission of a draft which has been worked upon closely for some time.

(The bill, S. 1934, was subsequently introduced. See p. 22.)

Mr. WHITE. Much time and effort and study have gone into the preparation of the Commission's views on the whole question of reliability. Following the Northeast blackout in November 1965, the Commission undertook, with national and regional advisory committees, to understand as fully as humanly possible the character of interconnection and coordination, and how the generation and transmission of electric power can be strengthened and improved to obtain greater reliability of service. Reliability is already excellent in this country, better than in any other nation of the world, and yet not only the Northeast disturbance but the dozen or more that have occurred between that time and today in other sections of the country make it crystal clear that we must much more closely coordinate our planning and our operation to the point where we have reduced to the absolute minimum the possibility of these areawide disturbances and outages.

We are a highly industrialized society. We have come to be almost totally dependent on the availability of electricity, and the industry, which as I say has done a superb job, must do an even better job of having power available when needed and on a continuous basis.

The Commission has had a great deal of cooperation from industry in working with our regional committees to lay the groundwork for the fullest possible understanding.

We are prepared to respond to a question that was heard following the Northeast blackout. I know that in the newspapers this morning it is being asked, as a result of yesterday's blackout, whether the industry has not perhaps unwittingly created a situation in which so many people are tied together in so many systems that there is a danger that ought to be avoided.

Our own view, and I think the unanimous view of the industry—when I use the term "industry" it should be clear that I am talking not only about the privately owned segment that generates about 85 percent of the power generated in this country, but also the cooperatively owned, the municipally owned, and the federally operated systems such as TVA and Bonneville power in the Northwest—the

unanimous view of all of the industry, I believe, holds that interconnection and coordination are indeed highly beneficial. They are beneficial in the sense that they reduce cost, and make it possible for systems to dedicate less of their generating capacity to reserves if they know they are able to call upon the reserves of other systems with whom they are linked.

The Commission is in the final stages of preparing a report which indicates some of the situations in which interconnection, coordination, and the ability to call upon one's neighboring system have prevented interruption of service. In understanding this question of system reliability we must distinguish between the outage of generation or the failure of a transmission line and, on the other hand, an interruption of service to the ultimate user of electricity.

It is hardly newsworthy, that as we sit here the lights continue to shine brightly. But for all we know a major generating unit of one of the systems that serves Washington, D.C., may just have been lost. Yet instantaneously it can call upon the reserves of adjoining systems. This is a great advantage and yet it suffers from the usual difficulty of measuring negative successes. Because a failure didn't occur, this is indeed a success. But how do you measure it? How do you secure attention and appreciation for such success?

I do recall having seen one headline from a California newspaper indicating that there had been a tremendous generating unit lost—I think the total generation lost was somewhere in the order of 400 megawatts, the same as created the disturbance in PJM—without one customer being interrupted in his service. The interconnections made up the generation deficiency in that one system. That rarely is such an item deemed a newsworthy event.

I have, I think, hit the principal points that I had intended to. Let me ask the other members of the Commission if any of them would like to add anything.

Senator HOLLINGS. This PJM system also serves the Washington area. If we had had a power failure yesterday in the Capital, if it had extended to Washington, what would the situation have been?

Mr. WHITE. Many offices in Washington, including the Senate Chamber itself, Mr. Chairman, have no windows and are lighted exclusively by electric lights. Many depend on electricity for ventilation. I believe here as elsewhere the possibility of a citywide or areawide outage has prompted people to focus on emergency or auxiliary equipment. I believe that the Capitol has such equipment itself.

As for the city of Washington: Had power been lost, there would indeed have been considerable difficulty just as there was in New York in November of 1965, and in Philadelphia yesterday. Philadelphia was totally out only for 48 minutes. The city of New York in 1965 was out at least 8 hours.

This is indeed a major concern. In the Commission's report on the Northeast power failure, and on reliability generally, there are some recommendations which are meant to alert public officials, at State and local levels, about the need to focus on auxiliary equipment for vital services that must be constant and continuous.

This, of course, leads people to wonder, very properly, about the immense implications of a situation where power can be cut off in a

city for as long as 13 or 14 hours. We hope that time will be continually reduced if there should be any further areawide outages.

I think that raises a further point. I have spoken at some length about interconnection and coordination. That is really our term for networks of strong transmission lines of sufficient capacity to move large blocks of energy from where it is generated to where it is needed.

In addition to that of strong interties, which I place first because I think there can be no disputing that it is the most important element in providing reliable service, there are two other elements. One relates to a preplanned or perhaps automatic in some cases, method of temporarily dropping major loads in emergencies.

To the extent that a system can, when it realizes it does not have enough generation to meet the demand, disconnect some of the large loads, it has a far better chance to pull through a difficult disturbance.

We have noted, for example, a situation in southern California where the operation of automatic load-shedding equipment, without any manual action, resulted in a reduction of the load to match the deficiency in generation and to permit the system to ride through what would otherwise perhaps have been a very difficult situation for southern California.

Third, there is the need to have rapid restoration if there is a collapse. I think we must be satisfied today that the possibility of collapse is a real one, and it is apparent from the heavy orders placed with manufacturing companies that many utilities are now attempting to put themselves in a position where they can more rapidly restore their generation to meet minimum needs and then build gradually.

We saw yesterday, for example, that even though the system appears to have been put back in order at some time around 2 p.m., it was really not until 7 p.m. that the system was almost totally restored, and about 8:30 when it was 100 percent restored.

So the period of restoration must also be focused upon, if we recognize, as we must, that outages of this consequence can occur.

Senator HOLLINGS. Philadelphia came back on the line much faster than Public Service of New Jersey. Do you know why?

Mr. BROWN. Public Service of New Jersey separated entirely from the rest of the system, and it restored its connection first with Consolidated Edison, in New York.

Philadelphia Electric, however, did not separate from the PJM system and was in position to restore its generation more quickly. Because it did not separate, the period of restoration of getting full power back on the line, was much shorter. The longer a unit is down the more time it takes to restore steam temperature and pressure and begin generation.

Senator HOLLINGS. What would have been the effect if PJM had had a stronger tie with Consolidated Edison of New York? You mentioned the need for stronger ties.

Mr. BROWN. It certainly would have been a step in the right direction. The stability of systems under severely disturbed conditions like these involves a great deal of analysis and therefore it is impossible to answer this question definitely without making a careful analytical check.

I can say it would have been certainly helpful to have had more transmission capacity. Had other ties around the perimeter of the area that failed been stronger, chances are the PJM system would have been sustained by power coming in from neighboring systems.

Senator HOLLINGS. There is a gas turbine plant in the system. Did that play any role in this failure?

Mr. BROWN. The main gas turbine plant is located at Sewaren Station.

I don't know the details of how this particular plant functioned. We intend to get these details on Thursday, but I am sure that this unit was very helpful in energizing the auxiliary equipment required to restore the large generating units.

Mr. Chairman, let me relate this experience to what happened in November 1965. The Commission's report of December 1965, which was a detailed and analytical explanation of what the record demonstrated occurred during that massive power failure, suggested that at the time the PJM system had extra generating capacity which conceivably could have supplied New York City with power to withstand the crisis. When PJM power began instantaneously and automatically to respond to the deficiency in the Con-Ed system in New York power started to pass over the transmission lines—the very same transmission lines that you asked about, Mr. Chairman—but in 1965 the lines tripped out; they were not strong enough—that is, they lacked sufficient capacity—to carry that block of energy into New York City. However, nobody can say for sure that had that line been of a much higher carrying capacity New York would have survived.

It is really impossible to say accurately what would have occurred. But there is at least the possibility that New York could have been assisted to the point where it might have stayed in operation.

By the same token, in yesterday's disturbance, it is clear that Consolidated Edison, which did have some extra generating capacity, could have helped. But that energy could not be delivered into the PJM system because of the limited strength of these same transmission ties.

This, in our view, demonstrates as clearly as anything could the great importance of extra-high-voltage transmission lines with substantial capacity to move power back and forth as the circumstances require.

Senator HOLLINGS. From what you know today, were any of the lessons of the 1965 power failure applicable to the circumstances of yesterday's failure?

Mr. WHITE. It is a little early to say. We certainly intend, as I have suggested, to go into this in great detail with the utilities and with our people who are on the scene. Nevertheless I think we can say yes, to some extent. We have seen that in some respects the operation was a little smoother this time than it was in November of 1965.

I think part of the difference rested in the fact that prior to 1965 it hadn't really occurred to operators who were watching dials in their operating control rooms, that anything of this character could happen.

There were cases where people saw the frequency indicators dropping drastically and assumed that there was something wrong with the metering equipment. It just was not an experience which anyone had lived through before in that magnitude.

Today the operators are far more alert and wary of it. To that extent there have been some lessons learned. In addition, systems have undertaken to refine their metering equipment, to plan and coordinate

and pool their efforts far more thoroughly than had been the case prior to the 1965 blackout. On the other hand I do not want to create the misimpression that the idea of coordination, of linking systems together, is something new.

Its development is an evolutionary process that utilities have pioneered and brought up to the present point. We have seen that there are problems inherent in interconnected systems. I think we are all satisfied that the benefits and the advantages far outweight the disadvantages and the emphasis must be on reducing if not eliminating all of the detriments and disadvantages which can arise out of weaknesses in these regional and subregional groupings.

Senator HOLLINGS. Mr. White, when you complete your investigation, the committee would appreciate any recommendations you have as a result of that investigation, and a list of the damage to equipment that resulted.

Can you tell us generally what kind of damage resulted to equipment?

Mr. WHITE. It is a little early to say. Yesterday the emphasis was all on restoring service as rapidly as possible. The first reports that came in late last night, I believe, made the situation seem more frightening than it proved after the operators examined their equipment.

It does not now appear that there is major, time-consuming damage involved. Mr. Brown may have more information on that than I do.

Mr. BROWN. While there were 12 units that were initially affected, all but two or three of these cases appear to be of minor damage that is easily reparable.

As a matter of fact, most of them are now back in operation. The rest will probably be back in service by the end of the week, with the exception of one, which has a wiped bearing and may take 3 or 4 weeks to repair. This is a small unit of about 80,000-kilowatt capacity.

Senator HOLLINGS. Your release of yesterday reported that the first three plants to go down included two pumped-storage plants. Since they have some of the characteristics of hydrogeneration, shouldn't they have alleviated, rather than aggravated, the situation?

Mr. BROWN. This tripping off of plants doesn't have anything to do with the type of plant. It has to do with the controls that protect the plants and the plants' machinery.

After the system separated, the frequency and voltage declined, and the protective controls of these plants went into action to trip the units off.

I think this would happen regardless of the type of plant involved.

I might add, Mr. Chairman, following up your question, it is quite accurate to suggest that the hydro plant, and the pumped storage plant which is just a variant of the straight hydro plant can be restored to service almost instantaneously as distinguished from the thermal plants where fires have to be rebuilt and temperatures regained.

Senator HOLLINGS. Senator Monroney, do you have any questions?

Senator MONRONEY. The blackout in New York was on November 9 and 10, 1965. It has been about a year and a half since that occurred. Can you tell the committee for the record what the Federal Power Commission has done since then to try to insure against these widespread breakdowns?

Mr. WHITE. I will be delighted to. The first action of the FPC immediately following the blackout was to assemble personnel to begin a very detailed analysis of what happened.

On December 6, less than 30 days following the blackout, the Commission released a quite definitive report analyzing the entire set of circumstances that led to the blackout.

In January 1966 the Commission appointed eight separate groups. One was denominated as a executive advisory committee or national industry advisory group made up of all segments of the industry who had participated in the Commission's national power survey and who were able and ready to move right into the question of reliability.

In addition, the Commission appointed a national Advisory Committee on Bulk Power Supply under the chairmanship of Jack Busby of Allentown, Pa. He had working with him a number of very distinguished systems design analysts from the Federal Government, from private industry and elsewhere.

That Committee, or advisory group, spent a considerable amount of time and came up with a very valuable report submitted to the Commission at the very end of last year.

We had decided to incorporate it as volume II of the Commission's own final and definitive report on the blackout. But we have also decided that its publication need not await the Commission's final report, so the report of the Advisory Committee on Bulk Power is now at the printer's and should be available within a matter of a week to 2 weeks.

The six regional advisory committees were also established in January, 1966.

Senator MONRONEY. Were these by public utilities, the advisory committee you established?

Mr. WHITE. No, they were established by the Federal Power Commission.

Senator MONRONEY. What type of people are involved? Were they industry people?

Mr. WHITE. They are industry people, again meaning all segments of the industry, plus representatives of the State regulatory commissions. Each of these organizations has at least one member of a State regulatory commission serving on it. Each of them has one Federal representative as a member, and whatever other talent exists in that particular area and is willing to devote to it the time and energy that is required.

Additionally, the Commission has worked with some special groups in encouraging computer studies. We have undertaken to put some of the systems on computer programs, particularly the New England-New York system that created the outage, to determine as best we can with a computer having programed into it all of the data about generating equipment and so forth, how best to analyze a system's deficiencies and weaknesses once you have been able to pinpoint those prime areas of weakness.

Obviously this is where attention can then be directed: To urgent construction of transmission line or upgrading of existing transmission lines, or perhaps even rerouting of some of the circuitry.

One of the results, for example, of the blackout of November 1965, was for systems to redesign their flow of power so that they could utilize their hydro power for emergency startup of steam generating

units because of its ability to respond readily, almost instaneously, when its output can be absorbed by the system.

Our final report is now in the last stages of drafting. It, too, should be available within a matter of days; at the most, a week. It is an ambitious effort. It is one that I think will make a substantial contribution to the industry and certainly to the Federal Power Commission and to other regulatory bodies that have responsibilities in this area.

Senator MONRONEY. Do you have any authority to require a more adequate supply of power be put into the grids which have been established, or does that depend on the power supplier?

Mr. WHITE. We have no present legislative authority to do anything more than to require interconnections in certain limited situations. For example, the Commission did require a power company to supply a municipality in Georgia where the evidence was clear that an emergency existed as over a brief period there had been a whole series of community blackouts. The system that the municipality had was simply inadequate.

Under section 202 of the existing Federal Power Act the Commission was empowered and did require the company to interconnect with the municipality.

Senator MONRONEY. That was a municipally owned system?

Mr. WHITE. It was the municipal system's own generating equipment which was inadequate. It had facilities, but they were inadequate.

Senator MONRONEY. They would be included in the emergency grid; is that correct?

Mr. WHITE. They had not been prior to the time that the Commission issued its order.

Senator MONRONEY. The breakdown yesterday apparently resulted in part from the fact that utilities had committed too much power with inadequate reserves to pick up when needed if a power failure might occur in one segment of the line. Are we spreading our generation capacity too thin over too great an area?

Mr. WHITE. I think it is fair to say, Senator, that there are some regions of the country where the problem will be—as it has been in the past—inadequate generation. In part it comes from just the normal time lag in getting very large, expensive, complicated equipment, designed, ordered, delivered, installed, tested and operating.

We know, for example, that last year in the city of St. Louis, the Union Electric Co. had a big plant that was not available when the peak hot weather load hit that system. And rather than going down, the system went into what might be characterized as a brownout where they simply dropped loads on a more or less rotating basis because they did not have adequate generation of their own.

However, had they had strong enough interconnections and transmission lines with others, they would have been able to have overcome their deficiency by borrowing power.

In fairness to the situation you will recall there was a very extended, pervasive heat wave that covered the eastern two-thirds of the country, and a lot of neighboring utilities were also watching their own situation carefully.

I am delighted to say that Oklahoma Gas & Electric did make some power available to Union Electric, and Mr. Kennedy, the president of Oklahoma Gas & Electric, keeps reminding us of that, as he should. It shows that the system can work and does, and has all the potential good which we and the industry believe is inherent in it.

Senator MONRONEY. I am unable to understand, not having the technical background, why, when you have a failure in one section of the line as you did apparently yesterday, why there is not automatic equipment on the line that could cut off that whole segment of the line and prevent it from spreading so rapidly to the multistate system. Why isn't there equipment available to localize your power failure?

Mr. WHITE. Partly it lies in the design of the system so that it doesn't separate. The goal with interconnection is not to localize service interruptions to the area normally served by its generator but to prevent such interruptions by drawing power from neighbors. Yesterday when the transmission line went out, for whatever reason—and as our statement suggests, we do not yet know the precise or proximate cause for the failure of the transmission line—when the transmission line tripped out or a relay operated to cut the line electrically, simultaneously a relay operated to remove the generation of that plant. Four hundred and forty megawatts of power was being generated at the time the line went out. There are technical reasons for installing such a relay. However simultaneously, power from other sources should have fed into that system.

Had it been set up to isolate that one community, or one plant, those who rely on it, would have gone down. Yet there are countless situations where loss of generation is automatically and instantaneously absorbed by spinning reserve—this is reserve which is already moving and can be called upon instantly and nobody loses service.

Senator MONRONEY. That is assuming you have extra capacity in the system to pick up that loss of the line.

Mr. WHITE. Yes.

Senator MONRONEY. But isn't there some equipment available so that if the line lacks the capacity, you can cut off that segment, and not have the whole system break down? This is what worries us. We got used to the old system where one section of a city would go down, but it would come back on. Most of the power companies had standby capacity that they didn't run normally, that they were able to get back on the line, particularly with hydro.

Mr. WHITE. You are absolutely right. You have your finger on a point that I think we will have to explore and unfold very shortly.

If our present information is correct, PJM lost one generating station. Normally a system should be designed so that the loss of one station in a system does not throw it out of balance.

Mr. Brown may have more detailed information than I.

I am sure our engineers will want to explore that question in great detail. It makes sense to prepare for the loss of one station in a system because it doesn't strike anyone as an absurd or impossible type of situation to occur. It is the kind that you must expect and you must plan for and design for, which was your point.

Do you have anything to add, Mr. Brown?

Mr. BROWN. I think that it might be of interest to note that we have obtained in the preparation of our report on power failures, information from the various regions on outages that have occurred in equipment. I don't have the figures with me, but I recall having seen the records obtained from PJM to the effect that over a 10-year period they have had some 150 units suddenly go off the line without any loss of customer loads.

None of those, however, exceeded a capacity of around 300 or 400 megawatts. This indicates that the transmission network for the conditions at that time was adequate to supply the missing power from other neighboring generating units.

We have had examples which have been much larger than this elsewhere.

I think for a fair understanding of this situation in the PJM area we should explain that there are a number of major additions to the transmission network which are nearly completed. And when they are placed in service they will add very much to the strengthening of this whole system.

Senator MONRONEY. You say when you have additional capacity in the system, you can pick up one or two failures of considerable size.

Mr. BROWN. You will have a strengthened network that will be much better than it is today.

I can cite two examples in the near future. One is the energizing of a portion of the new 500-kilovolt system in Pennsylvania, part of which will be placed in service next week, which will greatly strengthen the transmission network.

Another is the strengthening of the interconnection between PJM and Consolidated Edison which will be completed this fall. Except for the misfortune of having an item of equipment that failed in test before it was installed, it would have been operating now at a higher voltage. It is operating currently at 138 kilovolts. It is scheduled to go to 230 kilovolts.

Senator MONRONEY. The New England system, however, was supposed to be a good one. Yet a failure of very small magnitude, at Ontario, threw the whole thing off. A very dangerous situation resulted. It gives you pause if the great engineers of the system for one of the largest concentrations of population in the world can't design a power system that would isolate automatically. There must have been some way to cut off this failure in Ontario until the lines could be adjusted to pick it up.

It is frightening that all of New York City and the whole Northeast could be thrown off by one failure so far away. There must be some engineering way so this can be isolated to a small area and the system continue, so all areas won't suffer too greatly.

With the mass populations in this area so heavily dependent on electricity, I think we need to have some means to cut off these areas and not allow the flow to continue, to then disrupt and spread throughout the whole system.

Mr. WHITE. As far as the magnitude of the problem and the character of our concern, Senator, you couldn't have stated it better. We have recognized that the blackout of 1965 introduced an element of public concern that had previously never existed simply because there had not been a failure of that magnitude and that character, and it was so alarming and so frightening.

We believe that considerable progress had been made up to that date. However, I can't honestly say we believe that everything has been done which should be done.

As I have indicated, we are hopeful that we will have before the committees of Congress, before the end of this week, legislation that we believe will be helpful, if not absolutely essential, to achieving this national objective of reliability of service.

Your concern is certainly shared by us and I think it is fair to say by all elements of the industry, too. Everyone connected with the electric utility industry is anxious to meet their responsibilities. We have had a great deal of cooperation. It would be foolish not to acknowledge it and not to be grateful for it.

As I say, we should have shortly before you legislation which will bring before the committee our ideas as to how this problem can best be met. We are delighted with the committee's interest. We are hopeful that there will be further hearings scheduled on these problems soon.

Senator MONRONEY. If you had adequate, heavy transmission lines, and adequate standby generating power, capable of meeting this response, this would not have spread throughout a system as it did yesterday or as it did in New York; is that correct?

Mr. WHITE. That is certainly our thesis; yes. I think, Senator, this is the basic message that comes from the industry advisory committee on bulk power supply that I spoke of before.

I regret that the report is not yet available for circulation. It is at the printer's and should be out soon.

You have pointed out the central theme that emerges from that report.

Senator MONRONEY. How long will it take, once we commit ourselves to increasing the transmission lines and to having standby generating facilities, including hydro?

Mr. WHITE. Many of the systems which do not happen to be located geographically where there is hydro are moving to gas turbines which do go into operation far more quickly than conventional steamplants.

To answer the basic question about what period of time can we predict for the systems in the various regions of the country to be strong enough that we can all relax, I am sorry to say that it is very difficult to give you a figure.

I think it is not going to be uniform. Some sections of the country have already moved rather rapidly in this area. Others are falling behind. There will not be any single uniform answer that will apply across the Nation. There just can't be any doubt in anybody's mind that yesterday's experience or the one of November 1965, and the interest of the Congress and the press, is going to have a very salutary impact.

The power industry already is the largest industry in the country in terms of investment. Over $80 billion are invested in plant and equipment and facilities. So they are prepared to spend money when they recognize the necessity. It may well be that more money is going to have to be spent. The manufacturing companies are expanding—I noticed in the paper not too long ago that General Electric was opening a plant in South Carolina for the construction of gas turbines, and so it seems evident that the manufacturing industry itself is responding to the clear need to keep moving.

This industry doubles its capacity every 10 years. By the end of this century it is expected that the Nation will consume several times the amount of power it consumed in the year 1965. So there is plenty of built-in growth; plenty of additional investment is required.

This, incidentally, brings us to another point. As we build the transmission network and increase the capacity of transmission lines,

we run into another problem in which public interest is rising. That is land use.

We have a very sharply growing interest in how the landscape looks. There is plenty of research being devoted right now to devising methods of burying these very-high-voltage transmission lines, and in the event that is not possible, to design them so that they will at least harmonize with the areas they traverse.

These are all important and fundamental questions. The power industry in this country, in my view, is in a new phase of development. I think that there is a growing recognition of this.

Senator MONRONEY. What happens when power is going through the line and suddenly we have an outage? Are all the generators cut off or do they go to feeding that system?

Mr. WHITE. This is a fairly sophisticated type of relaying equipment. As I indicated when that major transmission line went out yesterday, it was linked and synchronized with a relay at the generating station. It went out automatically rather than placing the whole load on whatever lines were receiving power at the time.

Senator MONRONEY. So that one particular generator on the one particular line shut down. What happened to the others?

Mr. WHITE. That is part of what we hope to find out.

Senator MONRONEY. How does the power supplying the area disappear?

Mr. WHITE. Simultaneously, within a matter of 2 or 3 minutes, three separate plants, two of them pumped-storage hydroplants and one large conventional steamplant, went out.

Senator MONRONEY. When they go out, what happens?

Mr. WHITE. They stop generating.

Senator MONRONEY. Is water still going through the penstocks?

Mr. WHITE. Probably, but——

Senator MONRONEY. They just turn off the generating switches?

Mr. WHITE. Yes. They cut off the generator from the flow of water.

Mr. BROWN. Governors then come into operation and close the flow of water through the penstock. The turbine wicket gates are closed to stop the flow of water.

Senator MONRONEY. What happens with a steam plant?

Mr. BROWN. The steam valves to the generating units are closed down so that the electrical mechanism, the steam turbine and generator, are coasting, and they coast down gradually.

Senator MONRONEY. They are not generating power, but may be be turning?

Mr. BROWN. Yes.

Senator MONRONEY. To get rid of the excess stream down to a certain point, I presume.

Mr. BROWN. Yes. The fires in the boilers are shut down and if necessary the steam is released through safety mechanisms.

Senator MONRONEY. And then later they would start up again?

Mr. BROWN. Yes.

Senator MONRONEY. What happens to the atomic piles which are working? Is there any extraordinary danger there?

Mr. BROWN. No. They can be shut down very readily, as quickly as any others.

Senator MONRONEY. Do you pull the rods?

Mr. BROWN. Yes. The damping devices in the nuclear reactor go into position very quickly and dampen the generation of heat in the reactor.

Senator MONRONEY. Most of those are boiling water plants anyway, aren't they?

Mr. BROWN. Boiling water and pressurized water reactors. They are relatively low pressure, low-temperature reactors.

Senator MONRONEY. Now that you get all these off the line, they begin to shut down all over the system. Then how do you give the signal of who has charge of starting them up again?

Mr. BROWN. This is a matter that is worked out——

Senator MONRONEY. I am sorry. I don't understand this. But I read the papers and it just says "blackout."

Mr. WHITE. Senator, you are asking the questions that everybody in the room is glad you are asking. Although technical, they certainly help us appreciate precisely what does happen. I think it is a useful discussion.

Mr. BROWN. A good many things happen all at once. First the central dispatchers collect information on what happened, what lines might have opened, what the cause is, and how these lines can be reconnected.

At the same time, the station operators are trying to preserve, in cases where they can, pressures on their boilers so that they can pick up load relatively soon. Of course they are also looking to the safe rundown of their equipment so it will not be damaged.

With the intelligence that is communicated between systems, and between dispatchers and station operators on what has caused the problem, and having cleared the problem, then each station begins to bring up its generation and gradually reconnect segments of the load.

After you have had an extensive power failure of this kind the load must be picked up gradually. It is up to each system to pick up its own load in increments, but all the while staying tied in with the other systems.

This requires a good deal of continuous communication among the systems and monitoring of tie line flows. One system may have to slack off to wait for another to come up before it is able to put all of its force into rebuilding its generation.

It is a complicated problem and is particularly complicated when a widespread, rather complete collapse occurs as it did yesterday, and during the Northeast power failure.

Senator MONRONEY. Two hours is a pretty good record to get it back in action.

Mr. BROWN. Ordinarily when we have a more limited failure, with only a partial loss on a system, loads can be restored within 30 minutes, 45 minutes, or an hour. There have been some restorations quicker than that.

Senator MONRONEY. Do you think there is any chance that maybe we have overcommitted our systems to too great an area, interconnecting with a dozen States? Some of them will transmit power that far, will they not, with interconnections?

Mr. WHITE. If I could respond, Senator Monroney, I think the report of the Industry Advisory Committee, that will shortly be released, comes to the conclusion that we are not presently set up

in such vast combines that there is inherent danger that outweighs the advantages.

For example, in what are characterized as the East Central States, running from Illinois all the way east to Ohio and parts of western Pennsylvania, Maryland, Kentucky, and Virginia, and I think even a part of North Carolina, the utilities operating in that area have come together in a compact. They agree to meet on a continuing basis to determine what each of these utilities contemplate doing by way of committing themselves to new generation, or to new transmission lines.

In this centralized arrangement there is representation from each group. There will be a panel of systems engineers who will tell them whether what they are contemplating doing fits in and makes sense, whether it makes possible any greater efficiency from their arrangements, and whether it strengthens reliability or impedes it.

Hopefully this group will find it is far more able to meet the needs of each system's individual customers.

These systems that come together in that kind of arrangement are not obliged to follow the directives or rules of any one member. This is a situation in which they seek the reaction and the guidance of the others. But they have not yielded their own sovereignty as individual companies.

In PJM, these companies have indeed given up some of their own corporate prerogative to make individual decisions about how their systems will be operated. They have in effect gone into an association in which they entrust the key operators with the day-to-day management of their own systems. So we now see two different varieties of the same fundamental concept of coordinated joint operation and planning.

Senator MONRONEY. The Federal Power Commission doesn't have any authority over these agreements?

Mr. WHITE. No, sir. We encourage the utilities to enter such agreements, but have no authority to require it. The first agreement I spoke of was announced recently by 23 companies that are in the region.

The PJM operation is an agreement among the 12 companies comprising that area.

Senator MONRONEY. That is outside the jurisdiction of the Federal Power Commission?

Mr. WHITE. Yes, sir; we may not require an agreement.

Senator MONRONEY. Do you have the right to inject yourself into this if you feel it is needed?

Mr. WHITE. Yes. In 1935, when parts 2 and 3 of the Federal Power Act were enacted by the Congress—that was a very long time ago—it was recognized then that this whole concept of interconnections and coordination was practicable, viable, and should be encouraged. The Commission was enjoined by the Congress is promote voluntarily this very type of interconnection that we are discussing right now.

Senator MONRONEY. That is all I have, Mr. Chairman.

(The committee then resumed hearing testimony on S. 1365; the following material was subsequently received:)

[Press release, No. 14979 from Federal Power Commission, June 6, 1967]

FPC Chairman White Calls Meeting for Thursday on Four-State Power Failure

Federal Power Commission Chairman Lee C. White announced this morning that the FPC is calling a meeting Thursday in Washington, D.C., of representatives of the utilities involved in Monday's four-state eastern area power failure, with representatives of the four-state Governors and State Commissions, and Federal officials invited to attend.

Chairman White also announced the establishment of an Ad Hoc panel of industry and Government experts to study in depth the problem of bulk power supply reliability in the four-state-area affected by Monday's blackout.

Meanwhile, Chairman White said the FPC is pressing its investigation of the failure which cascaded across the 15,000 square-mile eastern area yesterday morning with the 10 million kilowatt loss affecting about 13 million people in Pennsylvania, New Jersey, Maryland and Delaware.

The failure lasted up to 10 hours in some areas. Power had been completely restored by about 7:55 p.m. last night.

Chairman White said that while it is important to determine the initiating cause of the failure, that the blackout clearly indicates the need for strong interconnection and better coordination to prevent further cascading-type failures. One of the principal tasks of the new panel will be to make recommendations to minimize the possibility of a recurrence.

Chairman White conferred with the White House and with Congressional leaders yesterday. He was scheduled to make an oral report this morning to the Senate Commerce Committee at the request of Chairman Warren G. Magnuson. The Senate Commerce Committee is holding hearings on legislation affecting the Federal Power Act.

FPC staff members were dispatched to Philadelphia yesterday shortly after the failure occurred. The FPC experts are examining the sequence of events with officials of the Pennsylvania-New Jersey-Maryland (PJM) Interconnection, and are studying records of the timing and loss of generating plants and opening of transmission lines. The FPC investigation is under the direction of F. Stewart Brown, Chief of the Commission's Bureau of Power. Staff members on the scene are Paul H. Shore, the FPC's New York Regional Engineer, and Cleve R. Jacobsen, an engineer from the Washington Office.

The four eastern states involved in the outage are served by the PJM interconnection. The power failure started at 10:18 a.m., Monday. Service was lost in the entire state of New Jersey, in eastern and southeastern Pennsylvania and in a part of the Delaware-Maryland peninsula.

The principal cities in which power was completely interrupted included Newark, Jersey City, Elizabeth, Patterson and Camden, all in New Jersey; Philadelphia, Reading, Chester, Upper Darby, Bethlehem, Allentown, all in Pennsylvania; and Wilmington, Delaware.

The power failure resulted in widespread separation of transmission lines around the perimeter of the affected area and the early loss of such major generating sources as the Brunner Island (700,000 kilowatts) steam plant of Pennsylvania Power & Light Company; and the Yards Creek (440,000 kilowatts) and Muddy Run pumped storage projects (480,000 kilowatts) of Public Service Electric and Gas Company and Philadelphia Electric Company, respectively.

As the result of separation of systems and imbalance of generation and load, other systems went down under deteriorating system conditions.

Transmission ties from the affected four-state area to surrounding systems, including systems in New York, Maryland and western Pennsylvania, opened and power service in the surrounding systems continued unaffected.

The power systems which lost total power supply included: Public Service Electric & Gas Company, Jersey Central Power & Light Company, New Jersey Power & Light Company, Metropolitan Edison Company, and Philadelphia Electric Company. Other systems substantially affected included Delaware Power & Light Company, which lost about 80 percent of its load, and Pennsylvania Power & Light Company, which suffered an internal separation of its network, causing the eastern portion to lose power.

Service to the center of Philadelphia was restored by 11:10 a.m. yesterday and all of Philadelphia Electric's system was restored by 2:30 p.m. Power was restored on the Metropolitan Edison Company system at 11:45 a.m. Power was restored temporarily on the system of Pennsylvania Power & Light at 12:15 p.m., but system conditions became unstable and service to the eastern section

was again lost. Service was essentially restored on the system by 2:00 p.m. except in the Northwest part of the system in the Sunbury-Williamsport area which was completely restored by 6:20 p.m.

Nearly all power on Jersey Central and New Jersey Power & Light Company was restored at 2:30 p.m. Delmarva Power & Light Company service was completely restored by 1:00 p.m. At 5:00 p.m. practically the entire area was back in normal service with the exception of the area served by the Public Service Electric & Gas, which at that time had picked up about 70 percent of its normal load. Loads on this system were fully restored about 7:55 p.m. last night.

Although Atlantic City Electric Company is a part of the interconnection and was initially affected by the disturbance, it separated from the network. Although significant heavy industrial loads were dropped, the system continued in operation. The PJM interconnection is equipped with only a limited amount of automatic load shedding and was unable to reduce loads quickly enough to prevent collapse of system generation.

Jersey Central, which is equipped to drop 30 percent of its load automatically, is the only one of the twelve members of the PJM Interconnection that is so equipped at present. Two other systems, the General Public Utilities and Pennsylvania Power & Light Company, plan to install automatic load-shedding relays. A 5 percent reduction in voltage was ordered by the dispatching headquarters of the PJM Interconnection as frequency began to decline, but was not done quickly enough to be effective.

On the basis of information that has been assembled to date, the trouble is believed to have started with a fault on a 230-kilovolt line of the Philadelphia Electric Company extending from Nottingham to Plymouth Meeting, Pa. Cause of the fault on the line has not been determined. The line is back in service and is being patrolled to detect any abnormal conditions.

The opening of this line resulted in tripping off the new Muddy Run pumped storage project on the Susquehanna River which was generating 440 megawatts. The control system for Muddy Run is so arranged that its generation is automatically tripped if one of the 230 kilowatt lines from Nottingham to Plymouth Meeting has opened. This is a temporary arrangement pending the placing of a new 500 kilovolt line in service later this summer between these two general points. The sequence in the loss of generation of other plants in the vicinity, including Brunner Island and Conowingo has not yet been determined. This will require careful matching of oscillograph records of the disturbance, which is now in process.

The wide shutdown of generation over the area resulted in some damage to a number of generating units. Much of the initially observed damage has been found to be minor and repairs and tests are under way which will place these units back in service today or within a few days. Damage to a number of others may take longer periods. Altogether a total of 12 units was affected in some manner but it is now expected that all but one of these units, which has a capacity of only 80,000 kilowatts, will be operating by the end of this week. Most are already back in service.

The FPC will issue further reports on the power failure as its investigation progresses. A more detailed report will follow completion of the FPC's analysis.

[Press release No. 14982, from the Federal Power Commission, June 7, 1967]

Cause of Four-State Power Failure Pinpointed to Short Circuit in High Voltage Line Which Sagged too Close to Distribution Line Crossing Under It

Federal Power Commission Chairman Lee C. White said this morning that Philadelphia Electric Company reported that the power failure which cascaded across four eastern states Monday was touched off by a short circuit when a high voltage transmission line sagged because of a heavy electric load, bringing it too close to a low voltage distribution line crossing under it.

The lines cross at a point midway on Philadelphia Electric Company's 50-mile Nottingham-Plymouth Meeting 230-kilovolt line in southeastern Pennsylvania.

The load on the high voltage line Monday reached 600,000 kilowatts, which was more than it previously had carried. This raised the line's temperature, causing it to sag physically toward the low voltage distribution line, and the resulting "flash-over" shorted out the 230-kilovolt line and the distribution line.

The important question which remains to be answered, Chairman White said, is why the loss of this one line brought about the service interruption throughout the four-state area.

Two additional generating units were placed in service last week at Philadelphia Electric's new Muddy Run pumped storage plant on the lower Susquehanna River, bringing about the increased load. Loss of the Nottingham-Plymouth Meeting line resulted in tripping off the Muddy Run project. The control system for Muddy Run is so arranged that its generation is automatically tripped if the 230-kilovolt line from Nottingham to Plymouth Meeting has opened. This is a temporary arrangement pending the placing in service, probably within another week, of a new 500-kilovolt line generally between these two points.

The sequence in the loss of generation of other plants in the vicinity, including Public Service Electric and Gas Company's Yards Creek pumped storage station and Pennsylvania Power & Light Company's Brunner Island steam plant is still under investigation. Oscillograph records of the disturbance are being studied.

Information which had been assembled as of yesterday morning first indicated that the failure started with a fault on the 230-kilovolt Nottingham-Plymouth Meeting line. Near the beginning of the power failure a fuse was blown on the 4-kilovolt distribution circuit which passes underneath the 230-kilovolt line, and this led to a close examination of the transmission facilities in this area. As a result, inspection crews determined that a "flash-over" had occurred but that damage to the line was not serious. The line is now back in service.

The failure cascaded across a 15,000 square mile area Monday morning with a 10-million kilowatt loss affecting about 13 million people in Pennsylvania, New Jersey, Maryland and Delaware. The failure, which started at 10:18 a.m., lasted nearly ten hours in some areas. Power was completely restored by about 8 p.m. Monday night.

A meeting has been called by the FPC for tomorrow morning in Washington, D.C. of representatives of the Governors and state regulatory commissions of the four affected states and of all the utilities involved in the power failure. The Commission also has established a panel of industry and government experts to study the problem of bulk power supply reliability in this four-state area.

Tomorrow's meeting at the FPC, which will be a working session limited to official participants, will consider all aspects of the power failure, including the reasons for delays in restoring service in some of the affected areas.

FEDERAL POWER COMMISSION,
OFFICE OF THE CHAIRMAN,
Washington, June 8, 1967.

Hon. HUBERT H. HUMPHREY,
President of the Senate,
Washington, D.C.

DEAR MR. PRESIDENT: The Federal Power Commission transmits herewith for consideration by the appropriate committee twenty copies of a draft bill, the proposed Electric Power Reliability Act, which would add a new Part IV to the Federal Power Act. The bill is designed to assist the electric utility industry to meet both the challegnes and opportunities of a dynamic technology which confront America's pluralistic power industry.

The President's message to Congress on consumer protection of February 16, 1967, referred to recent power failures, as well as to the possibility of improvement in electric service. As the President stated:

"* * * power systems must be carefully planned, coordinated, and strengthened to protect the customer against cascading power failures."

The electric industry today has achieved impressive technological progress. Its generators are of immense capacity and its extra-high voltage transmission lines can move large blocks of power over great distances. These improvements have not only made power supply more reliable, but reduced its cost as well. Yet more must be done.

Study of the power industry's occasional failures leads us to propose the Electric Power Reliability Act. We believe it will provide a sound basis for improving our Nation's electric service. Experience has shown that carefully coordinated planning and operation can secure maximum reliability and efficiency without excessive cost. The Electric Power Reliability Act would (1) call for the establishment of regional planning organizations to ensure that plans for bulk power facilities are adequate, (2) authorize the Federal Power Commission to establish planning and operating standards to enhance reliability, (3) provide for Commission review

and approval of extra-high voltage transmission lines and abandonment of bulk power services, and (4) authorize the Commission to require interconnections between bulk power generating utilities.

The electric utility industry, acting voluntarily, has made substantial progress toward the goals of adequate interconnection and coordination. As the President noted in his message on consumer protection:

"Much of this effort is already being voluntarily undertaken by America's great electric power industry. For example, in recognition of the importance of coordination 23 utilities in an eight-state area recently announced the formation of a regional council."

The Electric Power Reliability Act would assist in beneficial undertakings such as this, and would secure similar benefits in areas where progress has been less rapid.

The key to improved coordination under the proposed bill would be the regional councils. The expanding technology of the electric power industry, entailing as it does the use of giant generators and extra-high-voltage transmission lines, has made it imperative that coordination in planning and operation cover a wider area than the service territory of any one utility or small power pool. Effective coordination requires a high degree of cooperation among systems, on a regional scale. The establishment of regional electric power councils throughout the Nation is essential to enable institutions of the power industry, consisting of 3,600 separate utilities, to keep pace with and implement the developing power-system technology. It is equally clear that all segments of the industry—the investor-owned utility companies, the municipal systems, the rural electric cooperatives, and the Federal and State power agencies—must join together in forward-looking cooperation to plan and build safe and reliable systems. Each system must consider as part of its public service responsibility, the needs and desires, the strengths and weaknesses, of its neighbors throughout a broad region. The Electric Power Reliability Act would promote, encourage, and facilitate joint planning for the common good.

The Electric Power Reliability Act would strengthen coordination of the systems making up our pluralistic electric utility industry by adding a new Part IV to the Federal Power Act. The new Part IV would rely heavily on more active coordination of planning by utilities, through the mechanism of regional councils. The Federal Power Commission would be instructed to promote meaningful coordination on a regional scale and to provide a public presence in the work of the regional councils. The bill further provides inducements, including Federal eminent domain, rights-of-way across federally owned lands, and immunity from certain antitrust actions.

The Commission would be authorized to develop, in consultation with experts drawn from the entire industry, planning and operating standards to enhance power reliability. These standards could, for example, embrace criteria for programs of automatic load-shedding in emergencies, and for evaluating the adequacy of existing and proposed transmission systems. They could be nationwide in their application, or could be tailored to the individual requirements of a particular region.

Transmission systems constructed for enhanced reliability must have a proper regard for the public interest in wise land use, including the preservation of scenic and historic areas. The proposed bill includes a procedure for consultation of responsible local, State, and Federal agencies concerned with land use, and requires the Commission to defer to their views when it can do so consistently with the objectives of the Electric Power Reliability Act.

The subject matter of the proposed Act is complex, and the responsibilities it would assign are weighty. Much groundwork would have to be laid following its enactment, and the benefits stemming from the planning it would promote would not all be immediate or spectacular. However, as befits a statute that promises long-term benefits, it has been planned and drafted over a long period. The present bill reflects the Commission's intensive studies in the National Power Survey and its investigations of the Northeast Power Failure of November, 1965. That investigation began with the preparation of the initial report on the Northeast failure, issued in December 1965, and has been usefully supplemented from time to time with studies of power failures in other parts of the Nation. The Commission has drawn upon the ideas of many experts in formulating its own views reflected in this bill. We have had the benefit of Congressional studies of these matters.

The Commission's final report on the Northeast Power Failure and related studies is in the final stages of preparation and printing and should be available for release shortly. We believe that the report will be of assistance to Congress

in considering the proposed Act, as well as indicating guidelines for putting it into effect.

We believe this legislation would be in the public interest. We regard it as a sound and workable plan for assuring to all Americans not only freedom from the danger and inconvenience of power failures and shortages, but all the fullest advantage that can be gained from the widespread employment of the technology which our power industry has developed. Enactment of this measure will strengthen the Nation's ability to meet the challenge of providing the American power consumer with the most reliable and most efficient service possible.

In his statement commenting on the cascading power failure of last Monday which affected over 15 million people in a four-state area, the President expressed the hope that the legislation we are proposing would be considered promptly and favorably by the Congress. We share the President's sense of urgency about this legislation and are appreciative of the continuing interest demonstrated by the President and the Congress in this vital area of reliability of electric power service since the Northeast Power Failure of November, 1965.

The Bureau of the Budget advises that the enactment of this bill would be in accord with the program of the President.

Respectfully,

LEE C. WHITE, *Chairman*

THE ELECTRIC POWER RELIABILITY ACT OF 1967

A SHORT EXPLANATION

The proposed Electric Power Reliability Act of 1967, submitted to Congress by the Federal Power Commission on June 8, 1967, with the support of the President, is designed to enhance the reliability and efficiency of electric bulk power systems. It would do so by creating new mechanisms for coordination among utilities, by assuring that all utility systems are given a chance to take advantage of new technology, and by reviewing proposals to build extra-high-voltage transmission lines to determine whether they are in the public interest. Extra-high-voltage lines are those that transmit power at more than 200,000 volts (200 kilovolts).

The FPC bill would apply equally to all bulk power systems in the country, whether owned by private investors, local or State agencies, the Federal government, or members of a cooperative. A bulk power system comprises facilities which generate power and deliver it to distribution lines, but not the distribution lines or distribution facilities themselves.

Under the bill the electric systems would establish regional councils to coordinate planning for further interconnection and construction of bulk power supply facilities. The councils would review existing facilities and proposed additions, and would propose further plans. Every system in a region would be a member of, or be represented on the regional council. The FPC would have non-voting representatives on each council. Although the FPC would pass on their basic organization to insure fairness, the councils would function independently. As a council formulated a plan for its region, it would submit it to the FPC for approval. If the Commission found a plan to be consistent with the objectives of the Act, limited immunity from antitrust suits could be granted, provided the Commission found the impact on competition insubstantial or clearly outweighed by other public interest factors. Regional councils would conduct studies designed to further reliability of service, and could propose reliability standards for issuance by the FPC as mandatory requirements.

The building of extra-high-voltage lines receives special attention in the FPC bill. All proposals to build these lines would be filed with the Commission. Public notice of the proposal would be published and served on appropriate regional councils, Federal, State and local agencies and other interested persons. After six months, construction on a project could begin unless the Commission disapproved or suspended the proposal. If the proponent intended to take advantage of the Federal eminent domain powers the bill offers, suspension would be automatic. Suspension would be for an initial period of up to a year, but could be extended if the Commission recommended specific modification or scheduled a formal hearing. Projects found, after opportunity for hearing, to be inconsistent with the objectives of the Act could not be constructed. The Commission could allow construction to go forward immediately where it determines that an emergency exists.

Any issues of land use, including preservation of scenic or historic sites, would be specially considered. Responsible Federal, State and local agencies would have the opportunity to file comments, and the Commission would defer to their views on local land-use questions unless doing so would be inconsistent with the objectives of the Act.

Other provisions of the bill would allow the Commission to require interconnections and energy exchanges between utilities where the public interest so required. The Commission already has this power where a complaint is filed with it, but under the new legislation it could initiate such action itself. The bill would require FPC approval before a utility could abandon a bulk power service to another utility system. The bill would also empower the FPC to set up a National Electric Studies Committee with a broad mandate to investigate major reliability, planning and operation problems and stimulate scientific interest in solving them.

Electric Power Reliability Act of 1967 Text of S. 1934

A BILL To amend the Federal Power Act to facilitate the provision of reliable, abundant and economical electric power supply, by strengthening existing mechanisms for coordination of electric utility systems and encouraging the installation and use of the products of advancing technology with due regard for the proper conservation of scenic and other natural resources

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Electric Power Reliability Act of 1967".

Sec. 2. In order to further the National Policy declared by subsection 202(a) of the Federal Power Act, in favor 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," a new Part IV is added to the Federal Power Act, as amended (16 U.S.C. 791–825r), to read as follows:

"PART IV—REGIONAL COORDINATION

"Application and Objectives of Part; Definitions

"Sec. 401. (a) This Part shall apply to all bulk power supply systems in the United States.

"(b) This Part is intended to further the National Policy declared by subsection 202(a) of the Federal Power Act, in favor 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, by enhancing the reliability of bulk power supply; by strengthening existing and establishing new mechanisms for coordination in the electric utility industry; by encouraging the comprehensive development of the power resources of each area and region of the United States, to take advantage of advancing technology with due regard for the conservation of land, scenic and other limited resources; by providing that all utility systems and their customers shall have access to the benefits of coordination and advancing technology on fair and reasonable terms; by assuring to the extent feasible that extra-high-voltage facilities include sufficient capacity to meet area, regional, and interregional needs for transmission capacity, including reserve capacity for reliability; by respecting the territorial integrity of utility service to the extent consistent with the public interest; and by drawing upon the cooperation of all segments of the electric utility industry.

"(c) As used in this Part, 'person' means a 'person', a 'municipality', or a 'State' as defined in section 3 of the Federal Power Act, and any department, agency or instrumentality of the United States. The term includes privately, cooperatively, Federally and other publicly owned persons.

"(d) As used in this Part, 'bulk power supply facilities' means facilities for generation or transmission which furnish power to points of distribution. In the exercise of its authority under section 413 the Commission may classify or exempt facilities which are not material to the objectives of this Part.

"(e) As used in this Part, 'extra-high-voltage facilities' means transmission lines and associated facilities designed to be capable of being operated at a nominal voltage higher than 200 kilovolts between phase conductors for alternating current or between poles for direct current, the construction of which is commenced two years or more after the enactment of this Part.

"Relation to Other Parts

"Sec. 402. (a) This Part supplements Parts I, II, and III in order further to promote the reliability, abundance and efficiency of bulk power supply in the

United States. Nothing herein shall modify or abridge authority granted under Parts I, II, or III unless specifically so provided.

"(b) The administrative, procedural and enforcement provisions prescribed by other Parts shall apply to this Part.

"COOPERATION OF BULK POWER SUPPLY SYSTEMS

"SEC. 403. The purposes of this Part should be achieved as far as possible by cooperation among all persons engaged in bulk power supply, whatever their nature.

"REGIONAL POWER COORDINATION ORGANIZATIONS; ANTITRUST IMMUNITY

"SEC. 404. (a) After appropriate consultation, held under procedures to be prescribed by the Commission, with persons engaged or interested in bulk power supply, appropriate Federal agencies and State commissions, the Commission shall secure the establishment of appropriate and effective regional organizations and procedures to carry out regional and inter-regional coordination. Each regional coordination organization (hereafter 'regional council') shall be open to member ship, direct or indirect, by each electric system in the regional whatever the nature of its ownership. Some electric systems may in appropriate cases be admitted to more than one regional council. The Commission shall designate appropriate staff representatives, who shall participate in the work of the regional councils, except for the ultimate adoption of plans or any other council actions.

"(b) Under such rules as the Commission shall prescribe, each regional council shall file a statement of its organization with the Commission and any amendments thereto. Such statements will be available for public inspection. Within 30 days after adoption by the council, any regional or interregional plans developed by such regional councils shall be submitted to the Commission under such rules as the Commission shall prescribe and shall be made available by it for public inspection, and the Commission shall consider such plans in exercising its responsibilities under this Act, including Parts I, II, III and IV.

"(c) After notice and opportunity for hearing, the Commission may by order determine whether any statement filed under this section is consistent with the objectives of this Part. If the Commission determines that the statement is not consistent with the objectives of this Part it shall modify it or set it aside. If the Commission approves a statement, and finds further that the effect of the statement upon competition will be insubstantial or will be clearly outweighed by other public interest considerations, actions pursuant to such statement shall not be subject to suit under section 4 of the Clayton Act (15 U.S.C. 15).

"(d) After notice and opportunity for hearing, the Commission may determine whether any coordination plan submitted under this section is consistent with the objectives of this Part. If the Commission so finds, and finds further that the effect of the plan upon competition will be insubstantial or will be clearly outweighed by other public interest considerations, actions pursuant to such plan shall not be subject to suit under section 4 of the Clayton Act (15 U.S.C. 15), while the Commission's approval remains in effect. If the Commission determines that the plan is not in the public interest it shall modify it or set it aside.

"(e) The Commission shall require annual reports from each regional council and such additional reports as it may deem necessary or appropriate to carry out the objectives of this Part. The Commission shall annually report to the Congress on the effectiveness of the regional and interregional coordination efforts.

"(f) If the Commission, after notice and after opportunity for hearings, determines that any person engaged in the generation or transmission unreasonably refuses to participate in the creation of a regional council or in effective regional or interregional coordination it may require such person by order to participate in the creation and work of such regional council to the extent the Commission finds necessary to carry out the objectives of this Part.

"NATIONAL ELECTRIC STUDIES COMMITTEE

"SEC. 405. The Commission, after consultation with regional councils, shall establish a national committee representative of all elements of the industry to facilitate interregional exchange of views and experience and to consolidate electric industry efforts to investigate major present and future problems in planning and operating of bulk power supply facilities. The committee shall seek to stimulate vigorous scientific and engineering interest in the challenges to achieving reliable and efficient bulk power supply for the United States.

"ADVISORY BOARDS

"SEC. 406. To assist it in considering matters coming before it under this Part, the Commission may establish one or more advisory coordination review boards and provide for the appointment thereto of experts drawn from the electric utility industry, equipment manufacturers, the academic and research communities, and other persons, not employed by the Commission, drawn from the general public.

"COORDINATION AGREEMENTS

"SEC. 407. Subject to such rules and regulations as the Commission may prescribe, a statement or copy of all oral or written agreements for coordinated planning or operation of bulk power supply facilities (including but not limited to agreements for joint ownership of such facilities) shall be lodged with the Commission by or on behalf of the persons participating in such agreement.

"RELIABILITY STANDARDS

"SEC. 408. Upon the recommendation of a regional council or upon its own motion, and after consultation with the regional councils, and after public notice and opportunity to comment, the Commission may promulgate regulations setting forth reasonable criteria of national or regional applicability to enhance the reliable planning and operation of bulk power supply facilities in accordance with the objectives of this Part, set forth in section 401(b).

"EXTRA-HIGH-VOLTAGE FACILITIES; NOTICE OF PROPOSED CONSTRUCTION; SUSPENSION; EMINENT DOMAIN; RIGHTS OF WAY ON FEDERAL LAND

"SEC. 409. (a) Subject to such rules and regulations as the Commission may prescribe, any person proposing the construction of extra-high-voltage facilities shall file with the Commission, two years before it proposes to commence construction, or such other time as the Commission may prescribe, its proposal which shall include such information, including information as to the routing of the proposed line, as the Commission may require to enable it to determine to what extent the proposed construction and operation of such facilities is consistent with any plan developed by a regional council and is consistent with the objectives of this Part. The filing shall state whether the proponent elects to seek right-of-way pursuant to subsection (e) of this section. Notice of such filing and any subsequent changes shall be given in the Federal Register and shall be served upon appropriate regional councils, Federal, State and local agencies, and such other interested persons as the Commission shall require. The Commission shall afford to any interested persons at least 60 days in which to comment upon such filing.

"(b) No person may commence construction of extra-high-voltage facilities for six months after acceptance of any filing containing the information required pursuant to subsection (a) of this section and for such additional period during which a suspense order of the Commission remains in effect. The Commission shall issue a suspense order whenever the proponent elects to seek right of way pursuant to subsection (e) or when the Commission concludes, in its discretion, within six months after acceptance of any such filing, that the proposed construction and operation of such facilities is inconsistent with an approved plan developed by a regional council or otherwise appears not to be consistent with the objectives of this Part. The suspense order shall summarize the Commission's reasons for its action and shall be effective for an initial period, to be fixed by the Commission in its discretion, of not more than twelve months. The effectiveness of an unexpired suspense order shall be extended by any order of the Commission recommending specific modifications in the proposal and setting forth conditions for its approval or scheduling formal hearings or both until ultimate disposition of the matter by the Commission; *Provided* that the Commission may after public notice and consideration of such comments as are received within 30 days of such notice, terminate the suspense order upon a finding that a construction proposal will be consistent with the objectives of this Part.

"(c) In reviewing extra-high-voltage facilities proposals, the Commission shall use informal procedures, including joint or separate conferences, to the fullest extent feasible. However, the Commission shall not finally disapprove a proposal or confer rights-of-way under this section except after notice and opportunity for hearing.

"(d) At or before the end of the period specified by the suspense order the Commission may issue an order recommending specific modifications in the proposal and setting forth conditions for its approval or setting the matter for hearing. If such modifications and conditions are accepted by the proponent, the Commission shall approve the proposal as modified and terminate the suspense order forthwith. If the modifications and conditions are not accepted by the proponent or if the Commission schedules a formal hearing, the suspense order shall remain in effect until the Commission formally determines whether the proposal is consistent with the objectives of this Part and issues a final order permitting or prohibiting the construction of the proposed facilities.

"(e) If the Commission at any time determines by order, after notice and opportunity for hearing, that the proposed construction of extra-high-voltage facilities is consistent with the objectives of this Part, the proponent may secure necessary rights-of-way over Federal or other lands as provided below.

"(i) If the proponent thereafter cannot acquire by contract, or is unable to agree with the owner of property as to compensation to be paid for the necessary right-of-way or other property to construct, operate and maintain such extra-high-voltage facilities, it may acquire the same by the exercise of the right of eminent domain in the district court of the United States for the district in which such property may be located, or in the state courts. In any such proceeding brought in a district court of the United States, the petitioner may file with the petition or at any time before judgment a declaration of taking in the manner and with the consequences provided by 40 U.S.C. 258a, 258b, and 258d, and the petitioner shall be subject to all of the provisions of said section which are applicable to the United States when it files a declaration of taking thereunder.

"(ii) The construction and operation of such extra-high-voltage facilities located partly or wholly within the lands or reservations of the United States is authorized, subject, in addition to the applicable requirements of this Part, to such reasonable land use conditions relating to nonpower matters as prescribed by the department or agency administering the lands or reservations affected which the Commission shall include in its order. The department or agency administering the lands or reservations affected by such order shall have a period of 60 days after its issuance to protest its terms on the grounds only that it fails to give due regard to the preservation of identified aesthetic or historic values. Such protest shall have the effect of staying the order until the protest shall be withdrawn.

"(f) Whenever the Commission determines that emergency conditions so require, the Commission shall have authority, upon its own motion or complaint, with or without notice, hearing, or report, and upon such conditions as the Commission deems necessary or appropriate, to exempt persons from any requirements of this section. For purposes of this section, emergency conditions shall be deemed to exist by reason of a sudden increase in the demand for electric power or energy, shortage of electric power or energy, a shortage of facilities or materials for the generation or transmission of electric power or energy including a shortage of fuel or water for generating facilities, or other cuases.

"REVIEW AS TO LAND USE

"SEC. 410. Whenever an issue arises, formally or informally, as to land use, including aesthetic considerations, either in the regional planning process under section 404 or the review of extra-high-voltage facilities proposals under section 409, the Commission shall entertain written comments by Federal, interstate, State and local agencies responsible for land use planning in the affected region. The Commission shall defer to the view of the responsible Federal, interstate, State or local agency, if any, to resolve local land use matters unless the Commission determines that a particular resolution would be inconsistent with the objectives of this Part. The Commission may use joint boards, as contemplated by Section 209 of this Act, to resolve land use questions which come before it.

"COMPULSORY INTERCONNECTIONS

"SEC. 411. Whenever the Commission, after notice and hearing had, upon its own motion, or upon complaint, finds such action necessary or appropriate to carry out the objectives of this Part, it may by order direct any person engaged in the generation or transmission of electric energy (if the Commission finds that no undue burden will be placed upon such person thereby) to establish physical

connection of its transmission facilities with the facilities of one or more other persons engaged in the generation, transmission or sale of electric energy, to sell energy to or exchange energy with such persons. The Commission may prescribe the terms and conditions of the arrangement to be made between the persons affected by any such order.

"ABANDONMENT

"SEC. 412. No person engaged in the generation or transmission of electric energy shall abandon or curtail any bulk power supply service, or abandon all or any part of its bulk power supply facilities if it would thereby effect the abandonment, curtailment, or impairment of bulk power supply service, without obtaining the advance approval of the Commission after notice and opportunity for hearing, upon a finding by the Commission that such abandonment or curtailment is consistent with the objectives of this Part.

"AUTHORITY TO EXEMPT

"SEC. 413. In order to avoid excessive burdens upon persons engaged in bulk power supply, upon regional councils and upon the public, the Commission may by rule exempt from any requirement of this Part or any rule or regulation prescribed thereunder, any facilities, activities or persons, whenever it determines after public notice and opportunity for hearing that such exemption is necessary and appropriate to carry out the objectives of this Part. The Commission may attach conditions to any exemption and may by order, after public notice and opportunity for hearing, evoke any such exemption."

ANALYSIS OF PROPOSED ELECTRIC POWER RELIABILITY ACT OF 1967

The principal provision of the proposed Electric Power Reliability Act of 1967 is section 2, which would enact a new Part IV of the Federal Power Act. The new Part would be added in order to promote the policy, expressed in present section 202(a) of the Federal Power Act, of assuring an abundant supply of electric energy with the greatest possible economy and with regard to the proper utilization and conservation of natural resources.

Section 401(a) of the proposed Part IV would make its provisions applicable to all bulk power systems in the United States. Section 410(d) defines "bulk power supply facilities" as facilities for generation or transmission which furnish power to points of distribution.

Section 410(b) would set out the objectives of Part IV; which is intended to further the National Policy, already mentioned, expressed by present section 202(a). This would be accomplished—

by enhancing the reliability of bulk power supply;

by strengthening existing mechanisms for coordination in the electric utility industry and establishing new ones;

by encouraging comprehensive development of power resources of each area and region of the United States so as to take advantage of advancing technology while maintaining proper regard for conservation of land, scenic values, and other limited resources;

by providing that all utility systems and their customers have access to the benefits of coordination and advancing technology on fair and reasonable terms;

by assuring as far as feasible that extra-high-voltage facilities include sufficient capacity to meet area, regional and interregional needs for transmission capacity, including the reserve capacity needed for reliability;

by respecting the territorial integrity of utility service areas to the extent consistent with public interest; and

by drawing on the cooperation of all segments (public private and cooperative) of the electric utility industry.

These objectives are referred to as the criteria for Commission action in several other sections of the proposed Part IV.

Proposed section 401(c) defines the term "person" for purposes of Part IV. The use of that term in Part IV differs from its use elsewhere in the Federal Power Act in that it is here defined to include a "person", a "municipality" or a "State", all as defined in section 3 of the Federal Power Act, and any department, agency, or instrumentality of the United States. This subsection also makes clear that the term covers all "persons", whether privately, cooperatively, Federally or other wise publicly owned.

Proposed section 401(d), already referred to, defines "bulk power supply facilities" as facilities for generation or transmission which furnish power to points of distribution. It further provides that under section 413 the Commission would be empowered to classify or exempt facilities not material to attaining the objectives of Part IV.

Proposed section 401(e) defines "extra-high-voltage facilities", which are subject to the special provisions of section 409. As used in the proposed Part IV, the term means transmission lines and associated facilities designed to be capable of operation at a nominal voltage higher than 200 kilovolts between phase conductors for alternating current, or between poles in the case of direct current, the construction of which is commenced two years or more after enactment of Part IV.

Proposed section 402 relates Part IV to the existing provisions of the Federal Power Act. Subsection (a) states that Part IV supplements Parts I, II and III in order further to promote the reliability, efficiency, and economy of bulk power supply, and provides that nothing in Part IV would modify or abridge authority granted under Parts I, II and III, unless specifically so provided. Subsection (b) would make the administrative, procedural and enforcement provisions of other Parts applicable to Part IV. These include provisions for filing reports, complaints by State agencies and others, investigations, hearings, rules and regulations, staff appointments, publications, judicial review, enforcement and penalties.

Proposed section 403 expresses the policy that the purposes of Part IV should be attained as far as possible by cooperation among all persons engaged in bulk power supply, regardless of their nature.

Section 404 would deal with the organizations that would bear much of the responsibility for electrical coordination. Section 404(a) first provides that, after consultation, under procedures that would be prescribed by the Commission, with persons engaged or interested in bulk power supply, and with appropriate Federal agencies and State commissions, the Commission would secure the establishment of appropriate and effective regional organizations and procedures to carry out regional and interregional coordination. These organizations, or "regional councils", would be open to membership (either direct or indirect by appropriate representation) on the part of each electric system in the region regardless of the nature of its ownership. In appropriate cases, a system could belong to more than one regional council. The Commission would designate representatives from among its staff, who would participate in all aspects of the regional councils' work except the ultimate adoption of plans or any other council actions.

Administration of the provisions of section 404 might vary with the circumstances of time and place, and with the degree to which regional and interregional coordination had progressed. Nevertheless, the following suggests one general pattern by which it might be carried out.

> The Commission, after consulting with persons engaged in bulk power supply, State commissions, Federal agencies having an interest in the matter (e.g., the Bureau of Reclamation, Bonneville Power Administration, and similar bodies), and distributors of electric energy, would establish (and from time to time modify) regions for the interconnection and coordination of bulk power facilities. Consultation would most probably be on an individual basis for major bulk power suppliers and State commissions, with group representatives for the smaller bulk power systems and the distributors. Consultation would cover all bulk power suppliers and distributors in the region and the State commissions of all States wholly or partly within the region.

The persons within each region that were engaged in bulk power supply or distribution of electric energy would be urged to create a regional council, which would be fairly representative of all such persons and be provided by them with sufficient funds to carry out its functions (including the employment of bulk power experts and other permanent staff). Representation on the council might be direct or indirect, but each major bulk power supplier should probably be directly represented while the total number of representatives is kept down to efficient dimensions.

The regional council's statement of organization, required by section 404(b) of the proposed bill, would set forth such matters as the following:

> (1) the number of representatives and the persons or group represented by each;
>
> (2) how the council would arrive at final decisions, and a fair and reasonable method of hearing and publishing minority views;
>
> (3) any other rules or by-laws it might adopt, including provisions for notice to the Commission and to the State commission of any State wholly or partly within the region of meetings of the council or any subsidiary body it might create, in order that the Commission might participate as con-

templated by section 404(a) by designating staff officials to assist in the formulation of agenda, council discussions and council studies and so that the State commissions might participate as they saw fit: and

(4) such other information as the Commission requests

On submission of a statement of organization the Commission could call for consultation on any aspect of the statement it considered inconsistent with the objectives of Part IV or the proper functioning of the council, and could propose alternatives or modifications. The Commission might also determine by order whether the statement was consistent with the objectives of Part IV, and if not, modify it or set it aside. Amendments to a statement of organization would be treated in the same way.

On approval of its statement of organization, the regional council could be expected to undertake the following duties:

(1) to prepare and keep current a forecast of the electrical needs of the region in which it functions covering a reasonable period of years in the future. The forecast should include a determination of the facilities (including generation) needed during such period to achieve the most efficient, economical, and reliable interconnection of the region, as well as appropriate interconnection and coordination between regions.

(2) to conduct stability studies for its region, contemplating both present loads and the loads forecast under the preceding paragraph.

(3) to develop appropriate criteria for reliable planning and operation of bulk power facilities for recommendation to the Commission under section 408 of the proposed bill.

(4) to prepare outline plans for generation, transmission, and interconnection within the region (and to adjacent regions) which are best adapted to the reliability and power needs of the region.

(5) to develop plans for the coordinated operation of generation and transmission facilities of the region (and of future or presently possible coordination with other regions). These plans should include provisions for automatic load shedding and other emergency procedures, regulation and inspection of system control devices, and provisions for restoration of service after an outage, as well as plans for operation under normal conditions.

(6) to encourage and strengthen existing coordinating organizations within the region and new organizations where appropriate.

(7) to provide a forum wherein projects for construction of bulk power facilities can be examined by all persons engaged in bulk power supply or in distribution of electric energy who would be affected by such projects, and modifications and legitimate objections thereto can be suggested and discussed.

(8) to give at least preliminary consideration to land use problems raised by construction proposals, and to consult, where appropriate, with local, State, interstate and Federal agencies having an interest in these problems.

(9) to consult with other regional councils on common problems and possibilities for interregional coordination.

(10) to do all other things necessary and appropriate for the most efficient development, coordination and use of the power resources of the region.

Section 404(b) would provide that each regional council would file an organizational statement with the Commission, together with any amendments later adopted. These statements would be available for public inspection. Within 30 days after adoption by the council, any plan of coordination, either regional or interregional, developed by the council, would be submitted to the Commission under such rules as the Commission prescribed. Submitted plans would have quasi-official status. Since the planning process is continuous, Commission rules and participation in the council work will have to define the stages at which amendments must be filed with the Commission. The Commission would make these plans available for public inspection, and would consider them in exercising its responsibilities under all Parts (including Part IV) of the Federal Power Act. When any plan for bulk power coordination was submitted to the Commission under proposed section 404(b), the council might accompany it with its comments or those of individual members. The Commission might, at any stage in the evaluation of a plan under section 404(e), call upon the council to confer with it on any aspect of the plan that appeared to require modification.

Section 404(c) would permit the Commission, after notice and opportunity for hearing, to determine by order whether any statement of organization filed under section 404 is consistent with the objectives of Part IV (as set out in section 401(b)). If a statement were determined to be inconsistent with those objectives, the Commission could modify it or set it aside. Under this section and the next,

the bill would give the Commission discretion to initiate review or not. If the Commission, having approved a statement, also found that its effect on competition would be insubstantial or would be clearly outweighed by other public interest considerations, actions pursuant to the statement would be immune from private antitrust suits.

Section 404(d) would allow the Commission, after notice and opportunity for hearing, to determine whether a coordination plan was consistent with the objectives of Part IV. If the Commission found that the plan was not in the public interest it could modify it or set it aside. On a finding by the Commission that a plan it had approved would have an insubstantial effect on competition, or an effect clearly outweighed by other public interest considerations, actions pursuant to the plan would not be subject to private antitrust suits as long as the Commission's approval remained in effect.

Section 404(e) would direct the Commission to require annual reports from each regional council, and such additional reports as it deemed necessary or appropriate to carry out the objectives of Part IV. The Commission would in turn report to Congress annually on the effectiveness of the efforts at regional and interregional coordination made by the regional councils.

Section 404(f) would allow the Commission, if it found after notice and opportunity for hearing that any person engaged in generation or transmission of electric energy unreasonably refused to participate either in the creation of a regional council or in effective regional or interregional coordination, it could order such participation to the extent it found necessary to carry out the objectives of Part IV. The Commission would expect to utilize such compulsory powers only after all reasonable attempts at consultation had failed to persuade the party concerned to take part in the creation or work of a regional council.

Section 405 would give the Commission authority, after consulting with the regional councils, to establish a national committee representative of all elements of the electric industry. This committee would facilitate interregional exchange of views and experience, and would consolidate the industry's efforts to investigate major present and future problems in the planning and operation of bulk power supply facilities. It would also seek to stimulate interest among scientists and engineers in the challenges of achieving reliable and efficient bulk power supply.

Section 406 would allow the Commission to establish one or more advisory coordination review boards and to provide for appointment thereto of experts from the electric utility industry, the equipment manufacturers, and the academic and research communities, and of other persons (not Commission employees) drawn from the general public. These boards would assist the Commission in considering matters coming before it under Part IV.

Section 407 would require, subject to such rules as the Commission might prescribe, that all written agreements, and statements of all oral agreements, for coordinated planning or operation of bulk power supply facilities be lodged with the Commission. This would include, but not be limited to, agreements for joint ownership of such facilities.

Section 408 would provide that, on the recommendation of a regional council or on its own motion, and after consultation with the regional councils, and after public notice and opportunity to comment, the Commission could issue rules setting forth reasonable criteria to enhance realible planning and operation of bulk power supply facilities in accordance with the objectives of Part IV. Such rules might apply to a particular region or regions, or be of nationwide scope. As specified in section 402(b), the existing provisions of Part III of the Federal Act would be available to enforce compliance with such rules.

Section 409 deals with extra-high-voltage (EHV) facilities, which are defined in section 401(e). By virtue of that definition, section 409 will not govern EHV facilities whose construction starts within 2 years of enactment of Part IV. Subsection (a) would require any person proposing the construction of such facilities to file with the Commission, two years before it proposed to start construction, or at such other time as the Commission directed, its construction proposal. The proposal would include such information, including information as to the routing of the proposed line, as the Commission required to determine whether the construction and operation proposed was consistent with a plan developed by a regional council and with the objectives of Part IV. The filing would also state whether the proponent elected to seek rights-of-way under section 409(e), which provide for Federal eminent domain and for the securing of rights-of-way over Federal lands. Notice of a filing and of subsequent changes would appear in the Federal Register and be served on appropriate regional councils, Federal, state and local agencies, and any other interested persons, as the Commission required. Any interested person would have 60 days in which to comment on the filing.

Section 409(b) would prohibit the construction of any extra-high-voltage facility within 6 months after acceptance of a filing under subsection (a), and for such additional period during which a Commission suspense order was in effect. The Commission would issue a suspense order whenever the proponent elected to seek rights-of-way under subsection (e) or when the Commission concluded, in its discretion, within six months after the filing, that the proposal was inconsistent with an approved plan developed by a regional council or appeared otherwise not to be consistent with the objectives of Part IV. The order would summarize the Commission's reasons for the finding, and would be effective for an initial period, fixed in the Commission's discretion but not more than 12 months. The effectiveness of a suspense order that has not yet expired by its own terms could be extended by an order of the Commission recommending specific modifications in the project and setting forth conditions for its approval, or scheduling the matter for formal hearings, or both. In such a case, the proposal would remain suspended until ultimate disposition of the matter by the Commission. The Commission could, however, after public notice and consideration of such comments as were received within 30 days, terminate the suspense order on a finding that the proposal would be consistent with the objectives of Part IV.

Section 409(c) would direct the Commission to use informal procedures, including joint or separate conferences, to the fullest extent feasible in dealing with extra-high-voltage facilities applications under section 409. Notice and opportunity for hearing, however, would be required before the Commission could finally disapprove a proposal or confer rights-of-way.

Section 409(d) would permit the Commission, at or before the period of suspension designated by the suspense order, to issue an order recommending specific modifications to the proposal and setting forth conditions for its approval, or to issue an order setting the matter for hearing. (Under the terms of section 409(b), this order would extend the effectiveness of the suspension.) If the modifications and conditions were accepted by the proponent, the Commission would be required to approve the proposal as modified and terminate the suspense order forthwith. If the modifications and conditions were not accepted, or if the Commission itself set the matter for hearing, the suspense order would remain effective until the Commission formally determined whether the proposal was consistent with the objectives of Part IV and issued a final order permitting or prohibiting the construction of the proposed facilities.

Section 409(e) sets forth the procedures which are available for obtaining rights-of-way. These procedures need not be used by the proponent of an extra-high-voltage construction project, but if the proponent did elect to use them a suspense order would be issued automatically. The subsection provides that, if the Commission at any time determined (after notice and opportunity for hearing) that a proposal was consistent with the objectives of Part IV, the proponent could secure rights-of-way over any lands except those owned by the United States by an eminent domain proceeding in the Federal district court of the district in which the land was located. the condemnor would be permitted to use the declaration of taking procedure provided by 40 U.S.C. 258a, 258b, and 258d. Alternatively, eminent domain proceedings could be brought in the state courts. Where a right-of-way over Federal lands was required, the finding that the proposal was consistent with the objectives of Part IV would automatically allow the proponent to have such right-of-way, subject to the applicable requirements of Part IV and such reasonable land-use conditions relating to non-power matters as the Federal department or agency responsible for the lands affected prescribed. The Commission would include these conditions in its order. The administering department or agency would also have the right to protest within sixty days, only on the grounds that the Commission's order failed adequately to protect identified aesthetic and historic values. A protest would, until withdrawn, stay the Commission's order.

Section 409(f) would permit the Commission, when it determined that emergency conditions so required, to exempt persons from any requirements of section 409. It could do so on its own motion or on complaint, with or without notice, hearing or report, and on such conditions as it deemed necessary or appropriate. An emergency, for purposes of this subsection, would exist by reason of a sudden increase in demand for power or energy, a shortage thereof, a shortage of facilities or materials for generation or transmission of power or energy, including a shortage of fuel or water for generation, or other causes. The wording of this subsection is largely based on section 202(c) of the present Federal Power Act.

Section 410 would set up a mechanism for determining questions of land use arising either in the regional planning process under section 404 or in the review of

extra-high-voltage facilities proposals under section 409. Land use questions for these purposes, would include aesthetic considerations. Whenever such a question arises, formally or informally, the Commission would entertain written comments by Federal, interstate, state and local agencies responsible for land use planning in the affected region. The Commission would defer to the views of the responsible agency, if any existed, to resolve local land use questions unless it determined that a particular solution would be inconsistent with the objectives of Part IV. The subsection would also permit the use of joint boards of State and federal officials, as contemplated in section 209 of the Federal Power Act, to resolve land use questions.

Section 411 would permit the Commission, after notice and opportunity for hearing, to direct any person engaged in generation or transmission of electric energy to establish physical connection of its facilities with those of another person or persons engaged in generation, transmission or sale of electric energy, to sell energy to or exchange energy with such person. The Commission could do so on its own motion or on complaint, but would have to find that no undue burden would be imposed on the respondent by the interconnection order. It would also have to find that this action was necessary or appropriate to carry out the objectives of Part IV. The Commission could prescribe the terms and conditions of the arrangement to be made between the parties affected by the order. This section is largely based upon section 202(b) of the present Federal Power Act.

Section 412 would prohibit the abandonment of any bulk power supply service, or of any part of a person's bulk power supply facilities, if the effect would be abandonment, curtailment or impairment of bulk power service, without the advance approval of the Commission. Approval could be granted after notice and opportunity for hearing, on a finding that the abandonment or curtailment would be consistent with the objectives of Part IV. This section is based on section 7(b) of the Natural Gas Act, 15 U.S.C. 717f(b).

Section 413 would give the Commission power to exempt facilities, persons or activities from any requirement of Part IV or from any rule or regulation thereunder, in order to avoid excessive burdens on persons engaged in bulk power supply, regional councils, and the public. It could issue such exemptions, by rule, after notice and opportunity for hearing and on determining that the exemption was necessary and appropriate to carry out the objectives of Part IV. Conditions could be attached to an exemption, and it could, after notice and opportunity for hearing, be revoked.

This section could be the basis for exemption of classes of facilities falling within the terms of the proposed bill, but not material to its objectives. Many lines, for example, that supply power to a single industrial customer having no generation of its own might fall within the definition of extra-high-voltage facilities; yet it might be appropriate to exempt some or all of them.

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