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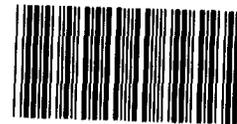
United States General Accounting Office

Report to the Chairman, Subcommittee
on Oversight and Investigations,
Committee on Energy and Commerce,
House of Representatives

April 1992

ELECTRICITY SUPPLY

Efforts Under Way to Improve Federal Electrical Disruption Preparedness



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**Resources, Community, and
Economic Development Division**

B-247385

April 20, 1992

The Honorable John D. Dingell
Chairman, Subcommittee on Oversight
and Investigations
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

This report responds to your February 19, 1991, request concerning the federal government's plans and policies for meeting major disruptions in the supply of electricity,¹ such as those caused by severe hurricanes, other natural disasters, or sabotage. As agreed with your office, we reviewed (1) to what extent the Department of Energy (DOE) includes other federal, state, local, and utility organizations in its preparedness planning; (2) how sufficient the statutory authorities available to federal agencies are for responding to major electrical disruptions; and (3) whether emergency plans incorporate restoration priorities and measures to help ensure adequate supplies of electrical equipment.

This report provides an update of issues discussed in earlier GAO reports on federal electrical disruption preparedness efforts. In a 1981 report² and a 1982 follow-up report,³ we stated that, in general, federal electrical emergency plans had not been developed. These reports discussed the lack of coordination between federal agencies and the electricity industry needed to respond to electrical disruptions, DOE's failure to develop an electrical emergency preparedness program, and insufficient training of the industry executives that could help them to respond to major disruptions. This review focused on the federal government's efforts to improve emergency preparedness and response procedures since our 1982 report.

Results in Brief

Because major electrical disruptions could be caused by a variety of circumstances, including natural disasters, sabotage, or war, DOE coordinates its preparedness planning with agencies, such as the

¹In this report, we use the term "major disruption" to signify an event that exceeds the utilities' collective ability to adequately respond to an electrical disruption.

²Federal Electrical Emergency Preparedness Is Inadequate (EMD-81-50, May 12, 1981).

³The Federal Government Is Still Not Adequately Prepared to Respond to Major Electrical Emergencies (EMD-82-125, Sept. 13, 1982).

Department of Defense (DOD) and the Federal Emergency Management Agency (FEMA). DOE has improved such coordination since our 1982 report. DOE involves electric utility executives in preparedness planning through the National Defense Executive Reserve (NDER) program, which can draw upon the expertise of designated electric utility officials when needed to respond to major electrical disruptions affecting national security. DOE also involves executives by maintaining a liaison with several industry organizations, including those representing investor-owned, publicly owned, and rural cooperative utilities and the North American Electric Reliability Council (NERC).⁴

On the basis of discussions with federal agency and industry officials, we believe that statutory authorities are generally sufficient to enable the federal government to supplement industry's response to major electrical disruptions. Clarifying certain conflict-of-interest and other provisions for using the expertise of industry executives following major electrical disruptions could enhance, but is not essential to, the federal government's preparedness and response efforts. The Office of Government Ethics has recommended such clarifications to existing legislation. An interagency committee led by FEMA has recommended similar refinements in a proposed executive order, which it plans to send to the White House for review.

Although the federal government has not adopted an electrical restoration plan as we recommended in 1981, DOE and industry organizations have taken steps to address this weakness. First, a working group led by DOE and composed of federal government officials is developing an electrical service restoration priority system similar to an established nationwide system for restoring telecommunications services. According to DOE, the priority restoration system for electrical service would be available for full implementation in the event of a major electrical disruption around 1994, if approved by participating agencies. Second, the Edison Electric Institute (EEI)⁵ and NERC maintain lists of certain critical equipment that can be made available to help restore power during electrical emergencies.

⁴NERC, a nonprofit corporation, was created to help utilities provide a reliable and adequate generation/supply and transmission network in North America. NERC issues voluntary operating guidelines and encourages utilities to implement them.

⁵EEI is an association of investor-owned utilities. According to EEI, its members account for about 78 percent of the electricity generated in the United States and serve about 74 percent of all electricity customers in the nation.

Background

Electrical power is vital to the nation's economic and social well-being. Although electrical systems are designed and operated to provide a reliable energy source, and under most conditions do so, government and industry officials recognize their vulnerability.

Several federal agencies, including DOE and FEMA, share responsibilities that relate to energy emergency preparedness planning. FEMA is responsible for establishing federal policies for the executive agencies and coordinating the civil defense and civil emergency planning, mitigation, and assistance functions of those agencies. DOE is the primary agency for electrical and other energy-related emergencies. (App. I provides more information on DOE's organization and mission.)

Because, with few exceptions, the federal government does not own or operate energy assets and because the electric utility industry is capable of handling routine restoration procedures on its own, DOE relies on the industry to respond to electrical supply disruptions. Utilities assist each other on an as-needed basis, with little federal government intervention, when an area needs help during a power disruption or natural disaster. Partly because of the way that the U.S. bulk power system is structured, the electricity industry may be able to handle routine disruptions. However, concerns exist over the industry's ability to respond to major, catastrophic disruptions. (App. I provides more information on the nation's bulk power system.)

Federal Coordination Is Improving

In 1981 we reported that federal guidance and coordination with respect to electrical emergency preparedness was lacking. Again in 1982, we reported that the federal government had made little progress in this area. Since 1982 federal coordination has improved. FEMA, the federal agency with principal responsibility for coordinating the federal government's response to major disasters, has developed a comprehensive Federal Response Plan. The plan establishes guidance for the 27 federal agencies with emergency preparedness responsibilities and the American Red Cross to assist states and affected local governments after the President declares a major disaster or emergency. According to the plan, DOE is the lead federal agency for responding to severe energy disruptions as part of the overall federal response effort activated by the federal coordinating officer. The federal coordinating officer coordinates the overall delivery of federal response assistance. DOE, FEMA, and state and local government agencies have conducted joint planning and emergency simulation exercises to help determine how best to implement DOE's responsibilities.

In addition, DOE is updating internal procedures to monitor and/or respond to emergencies that are not disasters declared by the President.

To address any terrorist threats to the electrical system, the Federal Bureau of Investigation (FBI) coordinates with DOE. The FBI has established a list of critical electrical facilities and has procedures to notify DOE, NERC, the threatened utility, and local law enforcement officials of any threats of sabotage to these facilities.

In relation to electrical disruptions, DOE involves electric utility officials in preparedness planning by administering the NDER program, by conducting preparedness exercises, and by maintaining a liaison with the American Public Power Association,⁶ EEI, the National Rural Electric Cooperative Association,⁷ and NERC. For example, DOE relies on NERC to help prepare the nation's utilities to respond to the threats of sabotage or natural disaster. Utilities' implementation of NERC guidelines for emergency preparedness is voluntary. However, NERC has several ways of monitoring that could detect major shortcomings in utilities' performances. (App. II contains more information on improvements in federal coordination.)

Clarification of Authority Could Enhance Federal Preparedness

We believe that statutory authorities are generally sufficient to enable DOE and other federal agencies to supplement the industry's response in the event of major electrical disruptions. Government and industry officials responsible for responding to electrical disruptions are generally satisfied with the federal government's ability, including sufficient authority, to provide assistance when needed. Proposed refinements in legislation and a new executive order would clarify conflict-of-interest provisions and revise provisions for using the expertise of industry executives following major electrical disruptions. These refinements, while not essential, could enhance the federal agencies' preparedness and response capabilities.

The Defense Production Act of 1950 authorizes the President "to provide for the establishment and training of a nucleus executive reserve for employment in executive positions in Government during periods of emergency." FEMA coordinates the NDER program for 11 federal agencies that have NDER units under the program and delegates responsibility for

⁶The American Public Power Association is an association of publicly owned utilities. According to the association, its member utilities account for about 15 to 20 percent of the electricity sold to ultimate customers in the United States.

⁷The National Rural Electric Cooperative Association is an association of consumer-owned rural electrical systems that generate about 5.5 percent of the nation's electricity.

administering the program to each of these agencies. DOE's NDER program provides a reserve of highly qualified individuals from industry to assist DOE during emergencies with duties such as assessing damage to energy assets, determining remaining energy resources, and recommending initiatives to respond to problems. DOE, which is responsible for the operation of its NDER program, would mobilize electric utility executives into the Emergency Electric Power Executive Reserve to respond to electrical emergencies only if the NDER were activated by the President.

Conflict-of-interest provisions in the Defense Production Act applicable to NDER members lapsed in 1962, and since then, NDER members have been covered by conflict-of-interest provisions in title 18 of the U.S. Code, according to the Office of Government Ethics. Some industry representatives believe that these provisions might cause problems in an actual NDER activation because members perceive them as being too restrictive. For example, although executive reservists may be activated for only a short period of time, the conflict-of-interest provisions require that reservists (1) cannot take any action as reservists that would affect a financial interest of theirs or their private employers without individually obtaining a waiver and (2) upon return to the private sector, cannot represent their employers to the government on matters in which they had substantial involvement while serving as reservists.

The Office of Government Ethics, supported by DOE and FEMA officials, has recommended a national interest waiver authority for the conflict-of-interest provisions in the U.S. Code that would be available under certain emergency circumstances to NDER members, as well as all others. The Congress has recently held a hearing on such a waiver; testimony included discussions of how the waiver would apply to NDER units, such as those of DOE.

FEMA officials said that authority could also be enhanced by clarifying the circumstances under which national security emergency authorities may be used for peacetime emergencies. Presently, no existing executive order specifically addresses major electrical disruptions that are not national security emergencies. The activation of NDER units must occur pursuant to executive orders that authorize the use of resources during national security emergencies. Therefore, for federal agencies to use the statutory authorities available during national security emergencies for electrical disruptions caused by natural disasters or other peacetime emergencies, such electrical disruptions must come within the definition of national security, as defined in the pertinent authorities.

According to a FEMA official, an interagency group recommended a new executive order to replace the two existing orders that cover resource management under the Defense Production Act and authorize the NDER program. This new order would allow more flexibility in determining national security emergencies by adopting the definition of such emergencies contained in Executive Order 12656 of November 18, 1988, which assigns detailed emergency preparedness responsibilities to the various federal agencies. Executive Order 12656 defines a national security emergency as "any occurrence, including natural disaster, military attack, technological emergency, or other emergency, that seriously degrades or seriously threatens the national security of the United States." (App. III provides more information on clarification of federal response authorities.)

DOE and FEMA officials stated that DOE emergency preparedness and response efforts may need additional staff and/or funding. DOE has taken steps to augment its resources. Specifically, DOE is currently restructuring its emergency management system, including DOE's emergency response procedures. DOE is also expanding its emergency operations center used to monitor and respond to various incidents, including electrical power emergencies. Furthermore, as of February 1992, DOE was considering adding emergency response officials to its field staff but had not allocated funds for this purpose.

Measures to Enhance Power Restoration Are Being Developed

Because of the importance of restoring electrical power to customers that are vital to national security and/or emergency preparedness, as of February 1992, an interagency working group led by DOE was developing an electrical service priority (ESP) system. This system would be used to (1) assign priorities for the restoration of electrical power and (2) distribute fuel necessary to restore these priority customers after a major emergency. The ESP priority categories are (1) national leadership and federal management of a national security emergency; (2) support of mobilization and national defense; (3) federal support of public health, safety, and law and order; and (4) federal support of public welfare and the maintenance of national economic posture. Similarly, states identify and prioritize essential state/local functions. State agencies and/or utilities would then identify specific facilities that meet the federal and state/local functional priorities. According to the draft ESP plan, the federal priorities of the ESP system are consistent with those of the telecommunications service priority (TSP) system. The TSP system is intended to prioritize

telecommunications service restoration and the provision of new service to customers following serious service disruptions.

Under the proposed ESP system, utilities would be requested to voluntarily add service restoration priorities for federal national security interests to the priorities that the utilities already established for the public health and safety facilities that state and local governments identified as critical. If adopted, the ESP system should enable essential facilities to receive power restoration on a prioritized basis when a disruption occurs. (App. IV provides more information on measures being developed to enhance power restoration.)

Another measure to expedite power restoration involves the maintaining of data bases of available electrical equipment by either government or industry. DOE does not maintain a data base of equipment that would be critical to recovery from a major disruption, but industry groups do. For example, NERC maintains a data base of high-voltage electrical power transformers, which are used to change the voltage level of electricity for power transmission and distribution, that could be critical to the timely restoration of damaged electrical systems. EEI maintains a data base of other equipment and supplies that can be made available if needed by utilities to respond to a major electrical power disruption.

Should additional equipment be needed following a major disruption, DOE, working through the Department of Commerce, could arrange for utilities to obtain equipment. The equipment would be obtained on a first-priority basis from domestic manufacturers, even if foreign-owned, under the authority of the Defense Production Act. However, this would not necessarily result in a quick response because of the extended time needed to build critical equipment, such as high-voltage power transformers. Responding to this issue, a 1990 Office of Technology Assessment report suggested that a stockpile of such transformers be maintained to reduce the vulnerability of electrical systems to natural disasters and sabotage.

Officials from DOE and other entities noted that several factors have been considered in establishing a stockpile of transformers, whether owned by the federal government or others. These factors included the high cost of the stockpile, the question of where to store the stockpile so that it would not be subject to damage, and the number likely to be needed to meet an emergency. Officials stated that it is difficult to justify the purchase of additional spare equipment since, for example, no U.S. utility has ever

been the target of a terrorist attack and the probability that such an occurrence would happen is uncertain. Also, a National Electrical Manufacturers Association official told us that because many high-voltage power transformers are custom designed to maximize efficiency, a stockpile of generic transformers may not be feasible. The industry has considered, but has not adopted, a standardized design for such transformers. Standardization could expedite the replacement of damaged units by reducing the types of transformers that would be needed and allowing transformer manufacturers to provide new units without the need for or the delays attributable to custom design.

Conclusions

We believe that the actions taken by the federal agencies and the electricity industry since our 1982 report have improved the nation's ability to respond to major electrical disruptions. Furthermore, we believe, on the basis of discussions with federal agency and industry officials, that statutory authorities are generally sufficient to enable the federal government to supplement industry's response to major electrical disruptions; suggested refinements, while not essential, could enhance the government's capabilities. Other major improvements to the federal government's preparedness and response efforts, such as the adoption and implementation of the ESP system and finalization of DOE's emergency response procedures, have not been fully implemented. The completion of these additional actions over the next several years should further enhance the federal government's ability to respond to disruptions of the nation's bulk power system in a timely and effective manner.

Agency Comments

We discussed the factual information contained in this report with DOD, DOE, FEMA, NERC, and Office of Government Ethics officials, who expressed general agreement with the information presented. We have incorporated their comments where appropriate. However, as requested, we did not obtain written comments on a draft of this report.

To respond to your request, we reviewed legislation, executive orders, and federal regulations relevant to emergency preparedness and response procedures. We interviewed officials of various federal agencies, including the Department of Commerce, DOD, DOE, FEMA, the Federal Energy Regulatory Commission, the Nuclear Regulatory Commission, and various trade associations regarding their emergency preparedness plans as well as their responsibilities and procedures concerning emergency response

and coordination. We spoke with FBI officials regarding the vulnerability of electrical systems to sabotage and the FBI's efforts to address such vulnerabilities. We also discussed with DOD and several industry and research associations the issue of standardized electrical equipment and/or maintaining inventories of reserve equipment to have adequate supplies available during major power disruptions. We also attended a DOE/FEMA-sponsored energy emergency simulation exercise and attended a DOE-sponsored program for training energy industry executives in emergency response measures. Our work was performed between June 1991 and January 1992 in accordance with generally accepted government auditing standards. (App. I provides more information on our objectives, scope, and methodology.)

As arranged with your office, unless you publicly release its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to appropriate congressional committees, federal agencies, and other interested parties. We will also make copies available to others on request.

Please contact me at (202) 275-1441 if you or your staff have any questions. Major contributors to this report are listed in appendix V.

Sincerely yours,



Victor S. Rezendes
Director, Energy Issues

Contents

Letter		1
Appendix I Background	The Bulk Power System DOE Responsibilities for Electrical Emergencies Objectives, Scope, and Methodology	12 12 15 15
Appendix II Federal Coordination Is Improving	DOE Has Improved Emergency Response and Coordination Efforts Other Federal Agencies Have Improved Preparedness Efforts Industry Actions to Improve Electrical Disruption Preparedness	18 18 22 25
Appendix III Clarification of Authority Could Enhance Federal Preparedness		28
Appendix IV Measures to Enhance Power Restoration Are Being Developed	Developing the Electrical Service Priority System Establishing Telecommunications Service Priority for Electric Utilities	30 30 31
Major Contributors to This Report		33
Related GAO Products		36
Figure	Figure I.1: A Simple Electrical System	13

Abbreviations

DOD	Department of Defense
DOE	Department of Energy
EI	Edison Electric Institute
ESP	electrical service priority
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
GAO	General Accounting Office
NDER	National Defense Executive Reserve
NERC	North American Electric Reliability Council
TSP	telecommunications service priority

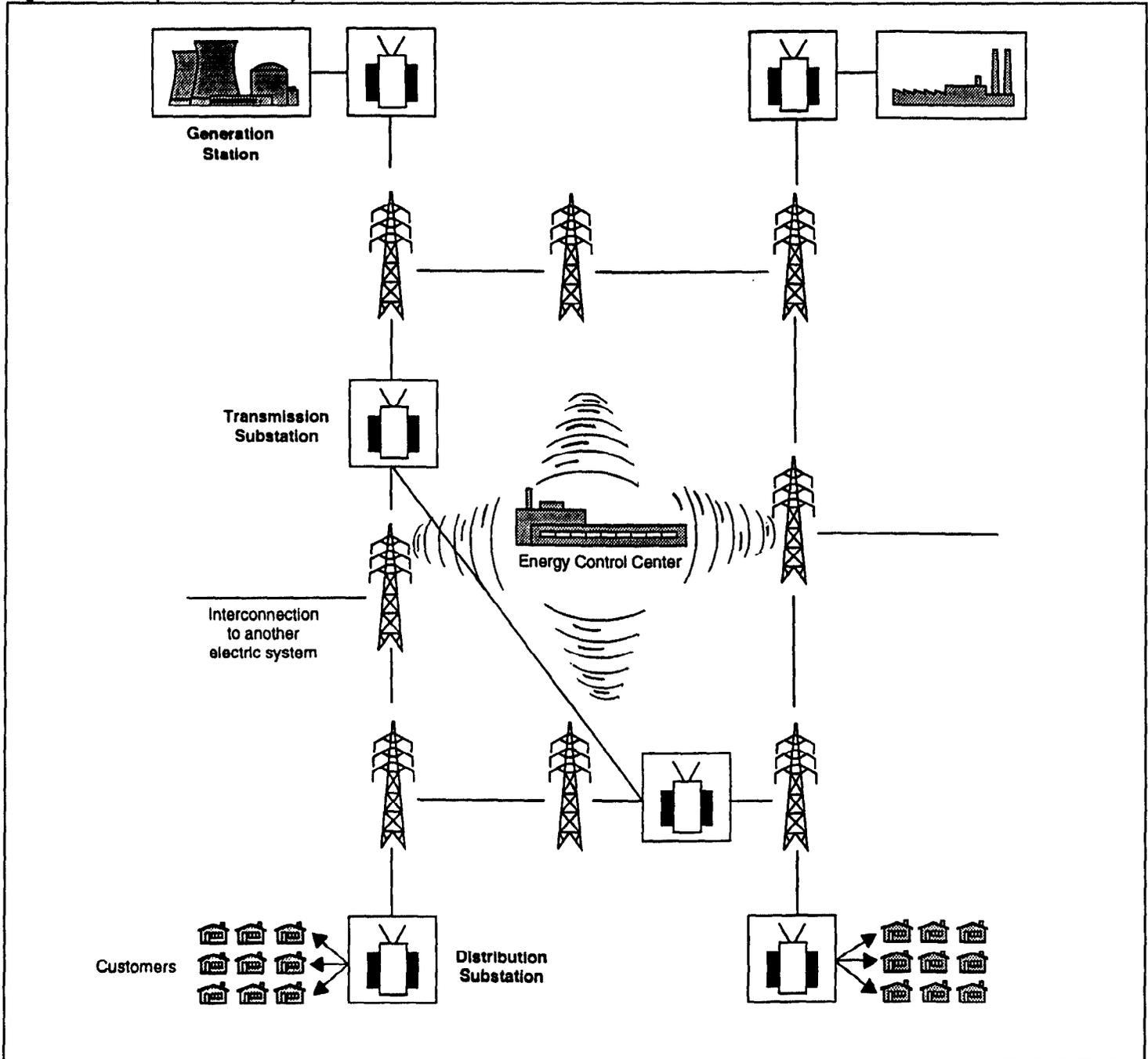
Background

The Bulk Power System

The nation's bulk electrical power supply system is very complex. The supply of electricity to the ultimate consumer generally involves three steps: generation, transmission, and distribution. Generating units produce electricity; transmission lines transport electricity long distances over high-voltage lines; distribution lines deliver the electricity to individual customers over low-voltage lines. Substations, where power transformers are used to either increase voltage to transmit electricity or decrease voltage to distribute power, tie the pieces of the system to each other. Energy or utility control centers coordinate the operation of the components. (See fig. I.1.) The electric utility industry consists of about 3,200 interconnected entities that supply power to millions of residential, commercial, institutional, and industrial customers.

Appendix I
Background

Figure I.1: A Simple Electrical System



Generally, a single electric utility provides power to specific geographical areas authorized by the states. While many utilities perform all three steps in supplying electrical power, many others do not. Some utilities only distribute electricity that they purchase from other utilities. Some rent high-voltage transmission lines from other utilities in order to have electricity transmitted from the source of generation to their service area. Other utilities generate and transmit electricity but do not distribute it.

U.S. electric utilities are interconnected into three large transmission networks or grids. These are (1) the Eastern Interconnected System, consisting of the eastern two-thirds of the United States and eastern Canada; (2) the Texas Interconnected System, consisting of most of the state of Texas; and (3) the Western Interconnected System, consisting of the western part of the contiguous United States and Canada. Within each of these interconnected grids are the utility control areas, typically designated by geographic boundaries, within which one or more utilities are located. Within each of these three systems, all connected generators must be synchronized.

The North American Electric Reliability Council (NERC) has taken steps to ensure the coordinated operation of the electrical system by establishing voluntary operating guidelines for the nation's bulk power system (basically, all facilities except local distribution systems). The guidelines specify certain technical standards and operating procedures to ensure system reliability and control. For example, system operators are required to (1) maintain transmission voltage levels within ranges established by NERC and standards approved by the American National Standards Institute and (2) coordinate the operation of all power plants within a specific control area. In addition, NERC's guidelines for incorporating wholesale suppliers into the nation's bulk electrical system call for utilities to consider a number of factors, including interconnection requirements between the facility and the utility system and the information and communication agreements needed between the utility and the wholesale supplier. When the systems are interconnected, utilities should be able to import electricity from adjoining systems in the event of a bulk power disruption.

DOE Responsibilities for Electrical Emergencies

Pursuant to several pieces of legislation and executive orders, Department of Energy (DOE) is responsible for developing plans and response strategies for energy emergencies. DOE's Office of Emergency Planning and Operations is primarily responsible for the Department's response to major electrical disruptions that would affect the general public.

DOE's role is to supplement the electricity industry during power disruptions when the industry cannot respond satisfactorily using its own resources. The electric utilities maintain voluntary mutual assistance agreements between themselves to enable them to respond to routine electrical service disruptions without calling on the federal government for assistance. According to DOE, the utilities themselves are the first and best responders to electrical disruptions. However, when major disruptions occur that would cause large numbers of customers to be without electrical service for extended periods of time, the utilities may request assistance from DOE or other federal agencies, such as the Department of Defense (DOD).

Federal agencies, such as the Federal Emergency Management Agency (FEMA), can assist DOE in fulfilling its responsibilities. FEMA is responsible for establishing federal policies for the executive agencies and coordinating the civil defense and civil emergency planning, mitigation, and assistance functions of those agencies.

Objectives, Scope, and Methodology

Concerned about the adequacy of federal preparedness planning for major electrical disruptions, the Chairman, Subcommittee on Investigations and Oversight, House Committee on Energy and Commerce, asked us to review (1) the sufficiency of statutory authorities available to federal agencies for responding to sustained, widespread electrical disruptions;¹ (2) the extent to which DOE includes other federal, state, and local utility organizations in its preparedness planning; and (3) whether plans incorporate restoration priorities and measures to help ensure adequate supplies of electrical equipment.

To review the statutory authorities available to federal agencies for responding to electrical disruptions, we examined legislation, executive orders, and federal regulations relevant to emergency preparedness and response procedures. We asked representatives of specific agencies and

¹We contacted officials at several federal agencies and industry associations and found that no standard definitions of "sustained" or "widespread" disruption exist. In this report, we use "major disruption" to signify an event that exceeds the utilities' collective ability to adequately respond to an electrical disruption.

associations whether additional authority was needed to enable the federal government to supplement the industry's response to major electrical disruptions. The agencies we interviewed included the Department of Commerce, DOD, DOE, the Department of Transportation, FEMA, the Federal Energy Regulatory Commission, the Nuclear Regulatory Commission, the Office of Government Ethics, and the Office of Technology Assessment. The associations included the American Public Power Association, the Edison Electric Institute (EEI), the National Association of Regulatory Utility Commissioners, the National Association of Rural Electric Cooperatives, and NERC.

To review the coordination between DOE and other federal, state, and local government agencies and utility organizations with preparedness planning responsibilities, we interviewed Department of Commerce, DOD, DOE, FEMA, and National Communications System staff to discuss their current and future emergency preparedness plans as well as responsibilities and procedures regarding emergency response and coordination. We contacted officials at the Federal Bureau of Investigation (FBI) to discuss the vulnerability of electrical systems to sabotage, and the FBI's efforts to reduce such vulnerabilities. We reviewed agencies' internal directives and guidance regarding the implementation of their respective responsibilities. In addition, we contacted officials from the American Public Power Association, EEI, the National Association of Regulatory Utility Commissioners, the National Electrical Manufacturers Association, NERC, the National Rural Electric Cooperatives Association, and the Office of Technology Assessment to discuss the roles of these organizations and coordination between the electric utility industry and federal government during electrical emergencies.

We attended an orientation course at DOE's Central Training Academy in Albuquerque, New Mexico, to observe one way that DOE interacts with the industry when it trains its National Defense Executive Reserve members to respond to energy disruptions. We also attended a DOE/FEMA-sponsored regional energy emergency preparedness seminar/exercise in Seattle, Washington, that included a response to a simulated attack on the electrical grid. This exercise was one of the federally sponsored exercises that allows the industry and federal, state, and local government the opportunity to participate in civil emergency preparedness, mitigation, response, recovery, and coordination activities.

To review whether plans incorporate restoration priorities and measures to help ensure adequate supplies of electrical equipment, we interviewed

DOE and FEMA officials responsible for developing and implementing a potential electrical service restoration program. We also contacted DOE, the Federal Communications Commission, and the National Communications System officials regarding similarities in the telecommunications service restoration program and the proposed electricity restoration program. Additionally, we interviewed officials at DOD, EEI, the Electric Power Research Institute, the Institute of Electrical and Electronics Engineers, the National Electrical Manufacturers Association, and NERC to discuss the issue of standardized electrical equipment and/or maintaining inventories of reserve equipment to increase the likelihood of sufficient supplies of needed electrical equipment during major power disruptions.

We discussed the factual information in this report with officials from DOD, DOE, FEMA, NERC, and the Office of Government Ethics, who expressed agreement with the information presented. However, as requested, we did not obtain written agency comments on this report. We conducted our work between June 1991 and January 1992 in accordance with generally accepted government auditing standards.

Federal Coordination Is Improving

Since our last review of electrical disruption preparedness in which we found that appropriate federal coordination was lacking, numerous changes have occurred within the federal government and the electricity industry. These changes have strengthened coordination efforts between these entities as well as their ability to respond to major electrical disruptions. These changes should improve response to disruptions resulting from natural causes, such as earthquakes or hurricanes, as well as those resulting from man-made causes, such as sabotage or war.

Various federal government agencies, including DOD, DOE, the Department of Transportation, the FBI, FEMA, and the National Communications System, have taken actions since our 1982 report to improve the federal government's ability to assist the electric utilities industry in responding to major electrical disruptions.

DOE Has Improved Emergency Response and Coordination Efforts

DOE has undertaken several efforts to improve emergency response procedures and coordination with other federal agencies. These efforts include developing new energy emergency response procedures, conducting outreach, and strengthening its National Defense Executive Reserve (NDER) program.

Developing New Emergency Response Procedures

DOE has initiated several actions to improve its electrical emergency response procedures and assist utilities with related operations. DOE's new Office of Emergency Planning and Operations is developing proposed revisions to DOE's energy emergency management plans that are used to monitor and respond to large-scale energy emergencies. Under the proposal for the Energy Emergency Management System, incident monitoring would be followed by the establishment of a DOE Emergency Management Team, if needed. The Office of Energy Emergency's Duty Officer will serve as the initial point of contact for all DOE energy emergencies. The Duty Officer would develop an energy incident monitoring group at the initial stages of a potential emergency for situation assessment and response monitoring.

As the seriousness of an event increases, the Under Secretary of Energy may decide to activate an Emergency Management Team, which consists of an executive cadre and one or more Technical Energy Cadres or Technical Operations Cadres. The executive cadre is a DOE Assistant Secretary-level group that determines how to tailor emergency response alternatives for the specific incident. The appropriate Technical Energy

Cadre or Technical Operations Cadre, composed of energy experts or technicians, respectively, from DOE and possibly other federal agencies, such as DOD or FEMA, provides technical support, guidance, and oversight to the executive cadre. A DOE official told us that a similar alignment worked very well during the Persian Gulf War early in 1991. As of March 1992, DOE planned to finalize the new procedures sometime this year.

In July 1991, DOE began developing a follow-up system to enable it to monitor recommendations for DOE actions developed following both exercises, such as those conducted to test the Federal Response Plan, and responses to actual emergencies, such as DOE's response to Hurricanes Bob and Hugo and the Loma Prieta earthquake. A DOE official said that this system, which DOE continues to revise, should allow DOE to systematically track whether identified weaknesses are being addressed so that the same deficiencies do not resurface in the future.

Conducting Outreach

DOE has an outreach effort designed to facilitate state and industry responses to major electrical disruptions and explain the role of DOE and the federal government in responding to such disruptions. This effort includes the following:

- Conducting regional seminars. Since 1988, DOE has sponsored a series of 18 seminars—the last 4 of which FEMA cosponsored. DOE estimates that as many as 1,200 federal and state officials and industry representatives—including some NDER members—and others have attended these seminars. Five more seminars are planned for 1992. One of these will address the special needs of insular jurisdictions, such as Hawaii and Guam, which do not have ready access to the resources of neighboring areas.
- Issuing an energy emergency planning handbook. DOE had the Oak Ridge National Laboratory review states' energy plans and prepare a Handbook for State Energy Emergency Planning, which contains an outline that a state can use to revise its energy emergency plan. The states are able to use this plan as a checklist to determine whether their individual plans address all the relevant issues. DOE distributed this handbook to the states and territories in December 1991.
- Providing technical assistance to improve states' energy emergency plans. DOE has recently hired a contractor to assist two states in developing or improving their plans for energy emergency preparedness. DOE is sending a contractor to assist one additional state in fiscal year 1992 and plans to offer assistance to other states whose plans were identified as needing

improvement by the Oak Ridge National Laboratory. According to a DOE official, all states but one now have an energy emergency preparedness plan.

- Disseminating a DOE report on disaster response. DOE prepared the report, Major Natural Disaster Afteraction Assessment, following Hurricane Hugo and the Loma Prieta earthquake and issued it in August 1991. It contains a detailed description of how DOE would interact with other federal and state agencies in responding to electrical disruptions under various scenarios. In addition, the report provides recommendations to DOD, DOE, and the National Communications System for improving emergency response efforts. A DOE official told us that DOE had distributed several hundred copies of the report to other federal and state agencies, electrical trade associations, and others.
- Reviewing utilities' contingency plans. Since April 1991, a DOE representative has been reviewing selected electric utilities' contingency plans and suggesting improvements, such as specific steps for addressing terrorist threats. As of January 1992, the DOE representative had visited four utilities, and others may be scheduled in 1992. Officials from two of the utilities visited told us that the assistance provided has fostered a closer relationship between the industry and the government. These officials believe that an improved interpersonal relationship with DOE is far more important to improving the industry's emergency response operations than is DOE's issuance of response procedures to the industry.¹
- Participating in states' emergency preparedness exercises. In addition to regional exercises, some states, including Alaska, California, Hawaii, Maryland, North Carolina, and Ohio, have held their own exercises. In attending these exercises, DOE assumes the role that it would perform during an actual emergency. For example, in September 1991 a DOE contractor facilitated a preparedness exercise in Hawaii. During the exercise, representatives from private industry and local, state, and federal government discussed (1) restoring Oahu's electrical system following heavy damage by a hurricane and (2) responding to other energy-related emergencies.

Strengthening the NDER

DOE has strengthened its NDER program since our 1982 report. Under the authority of the Defense Production Act of 1950 and Executive Order 11179, DOE and other federal agencies can use executive reservists to provide expertise that is not available from federal employees when the President activates the NDER to respond to national security threats. In

¹We did not contact the other two utilities visited because DOE officials told us that the visits were classified.

1982 we reported that FEMA and DOE had done little to correct problems in the NDER program that we cited in our 1981 report. For example, we reported that DOE had not developed or conducted NDER training and had not revised the NDER handbook.

DOE has increased the number of reservists in its NDER program. DOE has three reserves—petroleum and gas, electric power, and solid fuels (coal). According to DOE, its electrical power and solid fuels reserves and the gas portion of the petroleum and gas reserve were fully operational and had a total of 158 members in January 1992, an increase in membership from 94 in January 1983. DOE's Emergency Electric Power Executive Reserve had 73 members in January 1992, an increase in membership from 47 in January 1983. DOE expects the petroleum portion of its petroleum and gas reserve to be fully operational by the spring of 1992. We believe that it is important that expertise from all sectors of the energy industry be available to DOE because the sectors are interdependent. For example, electricity-generating plants may be fueled by petroleum or natural gas, so expertise from these sectors may also be needed to help restore the capacity of generating plants following a major disruption.

DOE's reservists are offered a variety of training courses. These include a DOE-sponsored orientation course at the Central Training Academy that DOE established in Albuquerque, New Mexico. According to DOE, as of January 1992, over 100 reservists and reservist candidates have received training at the Academy since the orientation classes started in 1988. To enable them to comply with the requirement for annual training, DOE reservists can attend other training, including

- interagency emergency response exercises,
- NDER training workshops sponsored by FEMA, and
- other conferences and symposiums conducted by DOD.

DOE is also developing an advanced training course that will include classified subjects for members of its three NDER units. DOE expects to begin offering this course at the Central Training Academy in April 1992 to reservists who have obtained security clearances.

A DOE official noted that NDER members have been useful to the government even though the President has never formally activated them. DOE has consulted with some of its reservists when it needed specialized expertise to assess the effect of natural disasters—such as a Midwestern drought and Hurricane Gilbert—on energy-related facilities.

Other Federal Agencies Have Improved Preparedness Efforts

Several other federal agencies have taken steps to enhance the federal government's ability to effectively respond to major electrical disruptions and address the vulnerability of the nation's bulk power system. These agencies include FEMA, DOD, the Department of Transportation, and the FBI.

Federal Response Plan Serves as Coordination Mechanism Between Federal Agencies

FEMA, working with other federal agencies, is developing a Federal Response Plan, which expands on an earlier catastrophic earthquake plan, that could be used to respond to any type of significant disaster—natural or man-made. The plan divides the federal response into 12 emergency support functions, such as energy, with lead agencies assigned to each function and other agencies designated to support the lead agency. FEMA can activate all or selected portions of the plan to address the particular needs of a given disaster if the President declares it to be a major disaster or emergency.

If the energy emergency support function were activated, DOE, as the designated lead agency for energy, would be responsible for coordinating the provision of emergency power and fuel to support immediate response operations. DOE would also be responsible for coordinating the provision of power and fuel, if needed, to normalize community functioning. Actions in the field would be coordinated with the federal coordinating officer. DOE would work closely with state energy offices; energy suppliers, including electrical utilities; and distributors. Nine other agencies, including DOD, the Department of Transportation, and the Nuclear Regulatory Commission, would support DOE as necessary. In performing its role, DOE, acting as the federal government's energy resource facilitator, could supplement the electric utilities' service restoration efforts. For example, DOE may arrange for DOD to fly replacement circuit breakers to the scene of an earthquake, as was done for California in connection with the Loma Prieta earthquake, or to fly electrical-repair equipment to the scene of a hurricane, as was done for the Virgin Islands in the aftermath of Hurricane Hugo.

According to FEMA officials, the federal government's ability to respond to major electrical disruptions was enhanced when the Disaster Relief and Emergency Assistance Amendments of 1988 were enacted. The amendments renamed the Disaster Relief Act of 1974 the Robert T. Stafford Disaster Relief and Emergency Assistance Act. They also amended the newly named act to expand the scope of the federal assistance program to include any occasion in which the President determines that federal assistance is needed to supplement state and local

efforts to save lives and protect property, public health, and public safety. According to FEMA officials, until the Disaster Relief Act of 1974 was amended and became the Stafford Act, FEMA and other federal agencies could have only responded if the disruption were coincidental with a natural disaster.

During 1991, DOE, FEMA, and other federal, state, and local government agencies, as well as the electricity industry, participated in exercises that tested a draft of the plan. Participating federal agencies expect to finalize the plan in April 1992. DOE has had to send headquarters staff to perform the Department's role in the field, as outlined in the plan. Although DOE has eight support offices in the United States, staff responsibilities have dealt primarily with matters related to oversight of the DOE conservation grant programs. Support office staff are not responsible for coordinating emergency response activities. Some elements of DOE and FEMA question whether DOE should have regional staff to strengthen its field role or, alternatively, whether DOE should strengthen its national role as facilitator between utilities and the government. DOE is evaluating the need for regional staff that could participate in training exercises, respond to actual disasters, and provide more extensive outreach to the energy industry, regional offices of federal agencies, and state agencies.

DOD Has Updated Procedures

DOD is developing or updating procedures that affect its disaster response efforts, according to DOD officials we interviewed. In January 1992, DOD issued an updated Defense Energy Program Policy Memorandum that updates energy security policy for DOD organizations and installations. As part of this process, DOD incorporated recommendations addressed to DOD in DOE's Major Natural Disaster Afteraction Assessment. Revisions include a specific requirement for annual management training in emergency recovery procedures; an expansion of the definition of facilities that would have priority for power restoration to include environmental systems such as water and sewage facilities on military installations; and improved coordination between military installations and other federal, state, and local agencies for recovery from energy disruptions.

DOD is also revising its procedures on military support to civil authorities to more fully address its support to civilians during major disasters, which could include assistance to civil agencies to help restore electrical service. A DOD official told us in March 1992 that these procedures, which were coordinated with FEMA, should be issued later in fiscal year 1992. These procedures refer to a \$100 million emergency response fund that the

Congress created in 1989. DOD is revising procedures for the use of this fund. According to a DOD official, if DOD concludes that it would be reimbursed for the service by another federal or state agency, this fund could be used, for example, to facilitate FEMA-requested assistance by DOD to utilities in recovering from a major electrical disruption. DOD plans to issue revised procedures on the use of the fund during 1993.

Finally, a DOD official told us that DOD will revise its procedures on military support to civil disturbances. By January 1993, these procedures should be issued and could be used, for example, to deploy troops to protect electrical facilities—which DOD has determined are critical for national security purposes—to prevent electrical disruptions in the event of a terrorist threat.

The FBI Establishes a Critical Facility Data Base

In the fall of 1990, the FBI, which is the lead agency for counterterrorism in the United States, conducted a survey to identify critical assets within the infrastructure networks of electrical power, gas and oil, telecommunications, banking and finance, transportation, and water supply systems. In the survey, the FBI included electrical power generation, transmission, and distribution facilities that would pose attractive targets for terrorists. Using the information provided from various sources, including the electricity and telecommunications industries and information provided by its field offices, the FBI compiled a National Key Asset List in January 1991. To keep this information confidential and help prevent its unauthorized use, the list will not be disseminated outside the agency. The FBI has contacted the facilities included on the list to establish liaison links that it would use in the event of an actual threat. According to FBI officials, the list is constantly updated.

In addition, the FBI participates in the interagency Asset Protection Subworking Group formed by the Policy Coordinating Committee on Emergency Preparedness and Mobilization Planning.² This group, chaired by FEMA, is to develop clearly defined federal guidance to assist departments and agencies in identifying essential national assets, which would include electrical facilities, and to develop approaches for determining and reducing asset vulnerability. As of February 1992, the group planned to issue draft procedures on such guidance later in fiscal year 1992.

²The National Security Council's Policy Committee on Emergency Preparedness and Mobilization Planning is an interagency group that addresses relevant policy issues on national security subjects such as the vulnerability of U.S. energy systems.

**Department of
Transportation Revises
Motor Vehicle Regulations**

In May 1991, the Department of Transportation's Federal Highway Administration proposed regulations to address problems that utility crews have experienced in crossing state borders while trying to respond to recent natural disasters. For example, utility repair crew vehicles from Pennsylvania had difficulty in traveling to South Carolina to help restore power following Hurricane Hugo in September 1991. According to DOE officials, these vehicles were forced to stop at the Maryland state border because of regulations that require drivers to hold special records when crossing state borders. Proposed changes would include waivers, not to exceed 30 days, of the maximum driving and on-duty requirements for commercial motor vehicle operators providing direct relief for publicly declared disasters. Federal government and electricity industry officials we interviewed generally support these changes as a means of facilitating the abilities of emergency responders, including electric utilities, to respond to future disasters. The Department of Transportation expects to publish the final regulations by October 1992.

**Industry Actions to
Improve Electrical
Disruption
Preparedness**

The electric utility industry is implementing procedures to improve its electrical disruption preparedness. For example, NERC and its member councils have initiated actions to improve electrical disruption preparedness. NERC has enhanced its emergency guidance for utilities that would be applicable to nearly all of the nation's bulk electric power system and established a data base of spare power transformer equipment.

**NERC Revises Emergency
Guidance and Establishes
Reserve Inventory**

As a result of federal government initiatives in 1986 designed to address the rise in sabotage and terrorism worldwide, NERC has taken steps to improve the preparedness of the bulk electrical systems to withstand and recover from unexpected disruptions. These initiatives resulted from deliberations by a task force, headed by then-Vice President Bush, that reviewed the United States program to combat sabotage and terrorism. NERC's improvements include revising its operating guides and developing a data base of spare high-voltage power transformers.

NERC has expanded and clarified its operating guides. NERC develops these guides to promote coordinated operation between interconnected electrical systems to achieve high levels of reliability and control. Changes included adding or strengthening requirements or recommendations in several areas, such as

- utilities' coordination with the FBI for sabotage reporting;

- sabotage awareness training for system operators;
- planning and training for multi-site contingencies, such as sabotage at more than one key transmission facility;
- updating security contact checklists; and
- coordinated planning for long- and short-term emergency conditions.

Although NERC officials told us they do not have a system to routinely monitor how quickly member utilities adopt specific NERC recommendations, NERC has several ways of monitoring that could detect major shortcomings in the performances of utilities. These include monitoring visits to control areas,³ reviews of system performance by monitoring the power generation/demand match of control areas, and reviews of disturbance reports. For example, a NERC working group annually reviews selected system disturbances, voltage reductions, and unusual occurrences. NERC then annually publishes the group's findings to share the experiences and lessons learned by utilities to (1) suggest ways that utilities can apply the NERC operating criteria to their operations and (2) determine if the operating criteria adequately address the normal and emergency conditions that occur in the bulk electrical systems.

Pursuant to an October 1988 report of its National Electric Security Committee, NERC established a confidential data base of spare high-voltage power transformers that is available to utilities if transformers are destroyed or made inoperable. Although a utility may borrow a transformer to help restore its system, if the design characteristics of the borrowed transformer do not match those of the transformer it is intended to replace, operating efficiency could be compromised. High-voltage power transformers are generally custom designed to a specific utility's system to achieve maximum operating efficiency. NERC compiled this inventory by asking utilities to list and describe spare transformers that were either generally available or available only under national emergency conditions. The replacement of high-voltage power transformers is of concern because of (1) the long time to manufacture replacements—6 to 12 months if the utility is willing to sacrifice efficiency and shorten the life expectancy of the unit, according to the National Electrical Manufacturers Association; (2) the cost—up to \$5 million, according to EEI; and (3) the difficulties in shipping them. High-voltage power transformers may weigh up to 500 tons and require specially designed rail cars to transport them. One of the nine regional councils that compose NERC also maintains a data base of smaller transformers.

³A control area is a region with an energy control center responsible for operating the power system within that area.

**NERC Councils Implement
Preparedness Efforts**

Individual NERC councils are also taking steps to improve emergency preparedness at the regional level. For example, according to NERC's 1990 Annual Report, one regional council was installing a regional emergency communications network that will handle emergency voice communications among its member utilities during catastrophic bulk electrical network outages. This council was also developing a guide on emergency communications to be used for the new network.

Clarification of Authority Could Enhance Federal Preparedness

On the basis of discussions with federal agency and industry officials, we believe that statutory authorities are generally sufficient to enable the federal government to supplement industry's response to major electrical disruptions. These officials, who are responsible for responding to electrical disruptions, are generally satisfied with the federal government's ability, including sufficient authority, to provide assistance when needed. Clarifying certain conflict-of-interest and other provisions for using the expertise of industry executives following major electrical disruptions could enhance, but is not essential to, the federal government's preparedness and response efforts.

First, the Office of Government Ethics, supported by DOE and FEMA officials, has recommended revisions to the conflict-of-interest provisions applicable to NDER members. Conflict-of-interest provisions in the Defense Production Act applicable to NDER members lapsed in 1962 and since then, NDER members have been covered by conflict-of-interest provisions in title 18 of the U.S. Code, according to the Office of Government Ethics. Some members perceive these provisions as too restrictive. For example, although executive reservists may be activated for only a short period of time, the conflict-of-interest provisions require that reservists (1) cannot take any action as reservists that would affect a financial interest of theirs or their private employers without individually obtaining a waiver and (2) upon returning to the private sector, would be restricted from representing their employers to the government on matters in which they had substantial involvement while serving as a reservist.

The Congress is considering amending the conflict-of-interest provisions in title 18 of the U.S. Code to provide for waivers from these provisions, according to DOE and FEMA officials. The U.S. Code contains conflict-of-interest provisions applicable to both federal employees and private citizens who may be called to assist in an emergency. Although DOE officials said that the current provisions have not prevented DOE from enrolling members in the coal, electricity, and natural gas executive reserves, some NDER candidates may be reluctant to fulfill their duties in the event of an activation because they could potentially be prosecuted for conflict-of-interest violations.¹

¹We referred to this issue in testimony on the impacts of an oil supply disruption. See Energy Security and the World Oil Market (GAO/T-RCED-90-12, Nov. 8, 1989).

Second, in August 1991, the Interagency National Defense Executive Reserve Committee prepared an interim report on the future of the NDER program.² According to FEMA officials, the interagency group recommended a new executive order to replace two existing orders that cover resource management under the Defense Production Act and authorize the NDER program. This new order would allow more flexibility in determining national security emergencies by adopting the definition of such emergencies contained in Executive Order 12656. Executive Order 12656 defines a national security emergency as "any occurrence, including natural disaster, military attack, technological emergency, or other emergency, that seriously degrades or seriously threatens the national security of the United States." The report also concludes that the activation of the NDER units should be delegated from the President to the department and agency heads.

In January 1992, this committee submitted a summary of relevant issues to the Policy Coordinating Committee on Emergency Preparedness and Mobilization Planning, including a proposal to change the Defense Production Act so that the NDER program would not lapse. As of March 1992, the Policy Coordinating Committee had not presented a recommendation to the White House for changing the NDER program. According to a FEMA official, however, the administration will not complete efforts to revise or replace Executive Order 10480 until the Congress finalizes revisions of the Defense Production Act, which it is now considering.

²The Interagency NDER Committee consists of representatives from 11 agencies and is chaired by FEMA. The committee advises the Director, FEMA, on policies, procedures, and activities of the NDER program and promotes standard recruitment, training, and program administration activities among the agencies.

Measures to Enhance Power Restoration Are Being Developed

The federal government has a major effort underway to address the vulnerability of the electric utilities to major disruptions—the electrical service priority restoration system. A somewhat similar effort called the telecommunications service priority restoration system would help restore service to predesignated customers, which could include key electrical facilities.

Developing the Electrical Service Priority System

Because of the importance of restoring electrical power to national security/emergency preparedness (national security) customers, an interagency working group led by DOE is developing an electrical service priority (ESP) system. The Chairman of the Policy Coordinating Committee on Emergency Preparedness and Mobilization Planning tasked a working group of one of its subcommittees to develop a nationwide electrical priority restoration system. This system, entitled the ESP system, proposes to merge national security electrical priorities with those already established by individual utilities at the state and local levels and filed with the state public utility commissions. After individual agencies identify their national priorities, an interagency group coordinated by FEMA would be responsible for ranking all national priorities. Subsequently, states and utilities opting to participate in the voluntary ESP program would then identify national security electrical facilities at the state and local levels. The goal of ESP is to develop and implement restoration procedures that electric utilities would invoke at their own discretion with minimal need for federal intervention. According to the draft plan, the ESP system could be fully implemented by 1994.

A DOE official also explained that under ESP, a list of all of the national security priorities identified through ESP would not be created, but rather, each utility participating in ESP would be responsible for knowing the priorities in its area. The absence of a comprehensive, nationwide list would help keep these priorities confidential. DOE officials told us that utilities may be more willing to participate if priorities are kept confidential. Confidentiality decreases the likelihood that unauthorized users could gain knowledge of these national security functions and target these facilities for sabotage.

The second part of ESP involves developing priority resupply programs for petroleum products. This system could be used to resupply fuel for back-up generation for national security facilities. Such facilities could be identified using the same policies and processes of step one of the ESP system in states that have programs that set-aside petroleum supplies

during emergencies. Procedures for implementing such a resupply program in states that do not have petroleum set-aside programs have not been finalized but could involve Defense Production Act priority allocation orders to direct fuel supplies to national security customers during national security emergencies.

Recognizing that electrical service is critical to the effective operations of the telecommunications industry, ESP would also establish a “fast track” for telecommunications facilities. This distinctive part of ESP would create a list of telecommunications facilities to receive priority electric power restoration during an emergency.

A DOE official told us that most utilities will want to participate in the voluntary ESP program. During an emergency, nonparticipants could be subject to orders imposed by DOE under procedures it has adopted to implement the authority of section 202(c) of the Federal Power Act (16 U.S.C. 824a), as amended, and the Defense Production Act.¹ Because arbitrary use of these authorities could be disruptive to utilities’ operations, DOE would use this authority only if absolutely necessary, according to DOE officials.

Establishing Telecommunications Service Priority for Electric Utilities

Electric utilities depend on reliable telecommunications service to coordinate the operation of generating plants, control centers, and other electrical system components. The telecommunications service priority (TSP) system allows service users, such as eligible electric utilities, with critical needs to either receive prompt restoration of existing telecommunications services or acquire a new service when necessary. The National Communications System established the TSP system to prioritize telecommunications service restoration for specific customers that support national security/emergency preparedness functions following serious service disruptions.²

¹Although the Federal Power Act specifies that this authority belongs to the Federal Power Commission, the Congress transferred this authority to DOE in 1977 in the DOE Organization Act (42 U.S.C. 7151 & 7172).

²The National Communications System consists of representatives from 23 federal departments, agencies, or entities that lease telecommunications facilities significant to national security or emergency preparedness and other government agencies involved in national security or emergency preparedness. Its mission is to coordinate and restore national security or emergency preparedness telecommunication services. Since 1984, the System’s National Coordinating Center has coordinated industry and government telecommunication resources during a broad range of crises and emergencies and provides day-to-day monitoring of essential telecommunications facilities nationwide.

**Appendix IV
Measures to Enhance Power Restoration
Are Being Developed**

Under the TSP system, nonfederal users must pass their request to use the system through a sponsoring federal agency. Although any user can apply directly to NCS, NCS prefers that users apply through a federal agency with which the user has an existing relationship. DOE and FEMA can sponsor electric utilities to use the TSP system. All electric utilities can apply through DOE. Public utilities, such as municipal power agencies, can apply through FEMA because FEMA can handle the applications of state and local government entities. Unlike the ESP system, the TSP system has application procedures and maintenance fees and may require application fees. DOE plans to issue its final TSP regulations by March 1992 so that it can begin soliciting TSP applications from electric utilities and others by March 31, 1992. FEMA is accepting applications, but as of March 1992, none had been approved for electric utilities.

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