

North American
Electric
Reliability
Council



RELIABLE POWER: Renewing the North American Electric Reliability Oversight System

Prepared by:

Electric Reliability Panel

Final Prepublication Copy
December 22, 1997

NERC ELECTRIC RELIABILITY PANEL MEMBERS

Richard Drouin (co-chair)
Vice Chairman
Morgan Stanley Canada Limited

Charles G. Stalon (co-chair)
Oliver, Oliver, & Waltz, P.C.

Leonard S. Hyman
Senior Industry Advisor
Smith Barney

Vernon L. Smith
Regents' Professor of Economics and
Director of Research and Education
Economic Science Laboratory

Mary L. Schapiro (Panel Advisor)
President
National Association of Security
Dealers Regulation, Inc.

Alex Radin
President
Radin & Associates, Inc.

Victor Gilinsky

Richard Hemstad
Commissioner
Washington Utilities and
Transportation Commission

George L. Edwards
President and Chief Executive
Officer
Alliance for Telecommunications
Industry Solutions

Hazel O'Leary
President
O'Leary and Associates, Inc.

William H. Clagett
Summit Energy

Richard E. Balzhiser
President Emeritus
Electric Power Research Institute

FACILITATION AND DESIGN TEAM (Florida Conflict Resolution Consortium)

Stuart Langton
Robert M. Jones

Paul O'Brien
Thomas Brady

TABLE OF CONTENTS

Section I	Executive Summary Introduction Overview
Section II	Recommendations
Section III	Special Concerns
Appendix 1	Panel Members and Staff Information
Appendix 2	Press Releases
Appendix 3	Opinion Survey

I. EXECUTIVE SUMMARY

The introduction of competition into the electric industry and its consequent restructuring are recasting the long-established arrangements that reliably provided electricity to North America's homes and businesses. The flow of electricity throughout the continent's interconnected electric networks is a complicated, technically sophisticated matter and requires cooperation by all network participants. For three decades, the North American Electric Reliability Council (NERC) and member Regional Reliability Councils have worked in cooperation to provide the essential reliability standards and guidelines for electric utilities. The non-competing utilities voluntarily applied the standards and made sure the lights stayed on.

In August 1997, NERC assembled the Electric Reliability Panel for a specific task: to recommend the best ways to set, oversee, and implement policies and standards that ensure the continued reliability of North America's interconnected bulk electric systems in a competitive and restructured industry. NERC imposed no limits on our advice about what kind of reliability organization for the future will be needed.

This report offers our recommendations.

The panel believes that the introduction of competition within the electric industry and open access to transmission systems require creating a new organization that has the technical competence, unquestioned impartiality, authority, and the respect of participants necessary to enforce reliability standards on the bulk electric systems. We believe that the voluntary system through which NERC and the Regional Councils have ensured reliability will not suffice in the restructured future when a larger group of competitors replaces today's vertically integrated utilities. We believe also that a self-regulating organization for setting and enforcing reliability standards will be more flexible, more effective in marshaling technical competence, and more open to new technology than government agencies. Finally, we believe that in order to assure compliance with and enforce reliability standards and to collect funds to support a self-regulating organization, the new organization should require general oversight approval from appropriate agencies of governments with relevant oversight authority. Our recommendations reflect this belief.

Independent Standing Currently, ten Regional Reliability Councils own, fund, and direct NERC. We recommend that the new electric reliability organization be independent in governance and funding. Thus, two-thirds of the members of the organization's board of directors should have no current ties to the electric industry and represent the public interest on the board. Remaining board members would provide a balanced representation of the participants in the electric supply industry.

Stakeholder representatives should be heavily represented in standing committees of the board and thus have the opportunity to participate in setting reliability standards. In this manner, we struck a balance between the public interest in impartial judgment by the board and the need to involve those with the most knowledge and experience if reliability standards are to be sound and command respect.

The organization, which we call the North American Electric Reliability Organization (NAERO), should be funded independently, from multiple sources. The board's functions should include setting policies, approving standards for grid reliability, and ensuring fair enforcement of mandatory standards. NAERO's membership should elect a board of directors from a slate selected by a nominating committee. The chair should be selected from among the independent members of the board.

Inclusive Membership We recommend that NAERO be as inclusive as possible in serving electric reliability. Thus, all organizations which have either a direct physical or commercial interaction with the bulk electric transmission system should be eligible to join NAERO and participate in setting standards and other functions under conditions prescribed by the board of directors. Given their pivotal role in ensuring reliability, all system operator organizations must belong to NAERO and follow its rules.

Mission and Functions NAERO's formally declared mission should be "to develop, promote, and enforce standards for a reliable North American bulk electric system" and it should be the only industry self-regulating organization with that responsibility. NAERO's primary purpose should be to set rules for grid security, making sure that commercial power flows do not cause grid instability or failure. The secondary purpose should be to assess and encourage the system's "adequacy," the sufficiency of the grid resources. NAERO should address all technical, operational,

commercial, or regulatory matters that affect reliability. It should build on the existing NERC with the help of the Council's Board and staff.

Compliance Enforcement We recommend that NAERO develop a mandatory compliance enforcement program that is clear, objective, fair, and immune from manipulation from any industry sector. The program should be organized as an independent unit within NAERO. To foster compliance, NAERO should develop and administer a certification licensing program for system operators.

Self-regulating Organization NAERO should have sufficient authority to enforce compliance with reliability standards. Thus, it should obtain recognition as a self-regulating organization (SRO) by government bodies that approve permits, licenses, and tariffs in the bulk electric industry in Canada, the United States, and applicable parts of Mexico. It should also have authority to collect funds to support its SRO function.

Regional Relationships The panel believes that regional organizations are essential for exercising oversight of the reliability system, and that reliability standards must take account of regional differences. NAERO should have strong, positive working relations and shared responsibilities with regional organizations, spelled out in memoranda of understanding.

Industry Participation and Excellence The panel believes the current reliability system's voluntary participation by technical personnel and technical excellence are indispensable to a self-regulating organization in this field. NAERO should strongly encourage the voluntary efforts of the industry's best technical experts whose contributions will be needed to develop the best solutions to industry challenges.

Public Participation We believe transparency, openness, and accessibility are essential to NAERO's success. The new organization should maximize participation among members and the public. Its board and committee meetings should be open to the public. Minutes of these meetings should be available in a timely fashion.

The following sections provide the full set of our recommendations and the framework within which we reached them.

INTRODUCTION

In 1965, a blackout darkened the northeastern United States and southeastern Canada, affecting the lives of 30 million people. It raised many questions about the reliability of the continent's bulk electric network. In response, the electric industry established the North American Electric Reliability Council (NERC). The Council, a voluntary, nonprofit corporation owned by ten Regional Reliability Councils, sets operating standards and monitors compliance with rules designed to ensure the operating reliability of the electricity network. For 30 years, this industry-guided system of voluntary peer supervision has provided a reliable supply of electricity to North America with a success rate admired world wide. It is a landmark achievement in the history of industry self-regulation.

Now forces for change at least as consequential as the 1965 Blackout have gathered. They include the prospect of more efficient delivery of electricity through increased competition and consumer choice and the promise of unregulated profits for some participants in the electricity market. The new market forces have prompted the restructuring of the electric power industry. These changes mean an end to the monopoly power of vertically integrated utilities that have cooperated in providing a reliable bulk electric system. The question becomes, how can a transformed industry ensure a reliable bulk electric network in the future?

To assist in answering this question, NERC, in August, appointed the Electric Reliability Panel. We were asked to recommend the best ways to set, oversee, and implement policies and standards that ensure the continued reliability of North America's interconnected bulk electric systems.¹ No limits were set on what we might conclude. Because the pace of industry transformation is rapid, NERC requested that we complete our report before the Council's Board of Trustees meeting in early January 1998.

To develop our recommendations, we held meetings in Toronto, San Francisco, and Austin, Texas, met by means of conference calls, examined a wide range of materials, and conducted a survey of many leaders in the electric supply market. All

¹ "Bulk electric system" refers to the long distance flow of electric power at high voltage as distinct from the local delivery to homes and businesses.

meetings were open to the public and attended by industry participants, observers, and the news media. The panel actively solicited the viewpoints of those in attendance and incorporated many of their suggestions into the deliberations.

The Florida Conflict Resolution Consortium, based at Florida State University, designed and managed the process, facilitated the deliberations, and furnished staff for the panel. The consortium specializes in applying facilitation and consensus-building techniques to public policy matters.

This report consists of three Sections. Section I provides a brief overview of the continent's bulk power system, reliability matters, the deregulation and transformation of the electric industry, and key factors affecting future reliability. Section II presents our recommendations. Section III discusses the special considerations that affected our conclusions. Appendices include an edited version of the opinion survey and a list of those surveyed and biographical sketches of panel members.

OVERVIEW

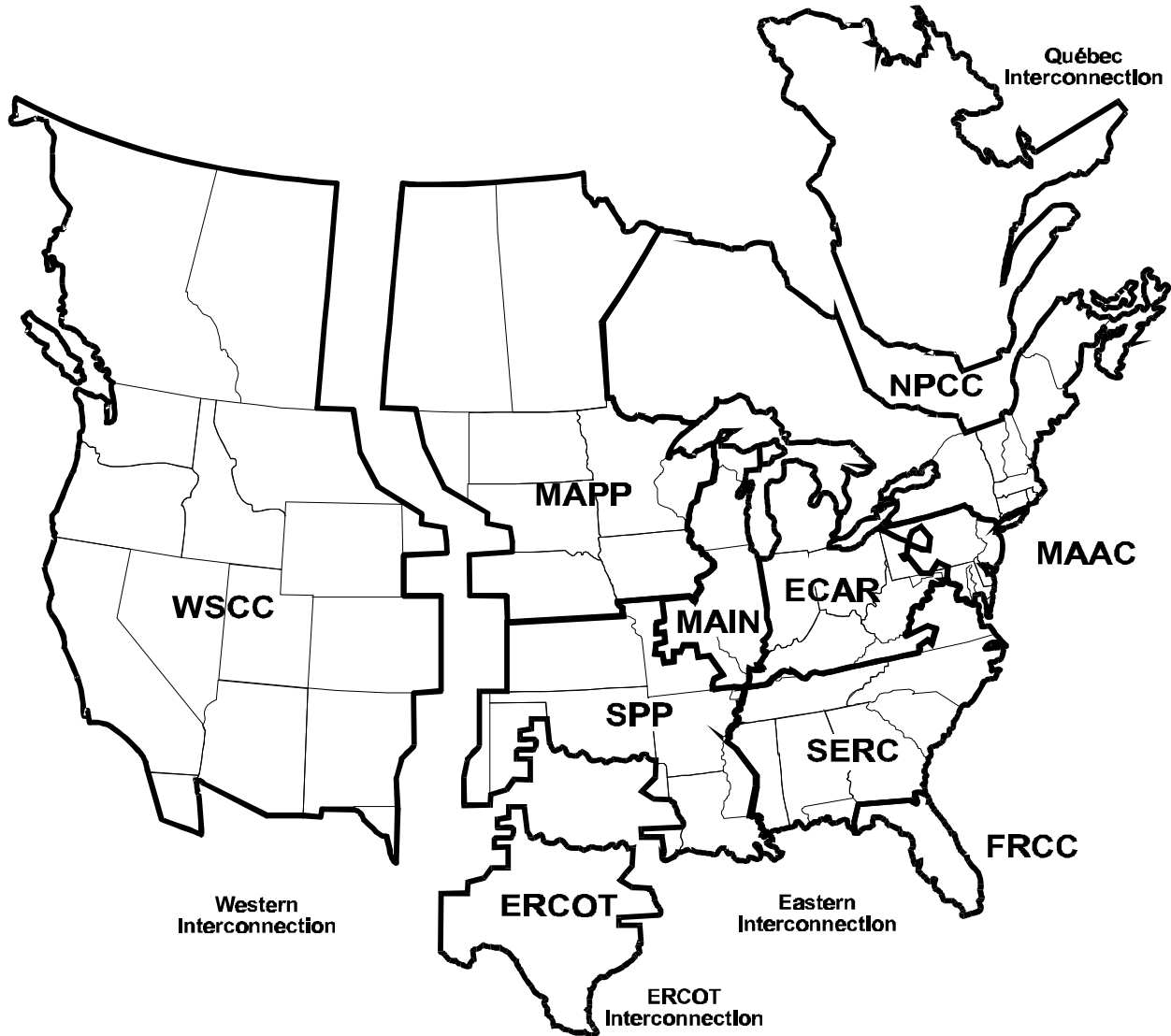
1. Electricity's Delicate Balance

Most current discussions and business-page reporting about electric industry deregulation focus on the bulk power market, the sale of huge amounts of electric energy on a wholesale basis, and the benefits that individual consumers may derive from buying electric energy from suppliers other than the local electric utility. The essential precondition to all aspects of the electric business is reliable operation of complicated, interconnected high voltage grids, the main arteries of the system, so to speak.

Electricity travels along transmission lines at nearly the speed of light and, with few exceptions, cannot be stored. It thus holds those who make, sell, and use it hostage to its nature. The electric generators and the "loads" in homes and businesses that use it have to be in delicate balance at all times to maintain system stability, that is, to keep the frequency of the alternating current nearly constant. And the peaks and valleys of alternating current and voltage must be in suitable relation to each other to maintain line voltages at desired levels. The primary purposes of electric reliability standards for system operators are to maintain these frequency and voltage conditions and, ultimately, to keep electricity flows from overheating lines. That aspect of reliability that concerns meeting these conditions on a real-time basis is termed "system security." Setting such reliability standards involves highly sophisticated technical matters, as well as sensitivity to the commercial consequences.

Most of the United States, Canada, and a small area in northern Mexico get electricity from one of four interconnected synchronous grids called Interconnections (see map outlining the boundaries of each grid). Within each of the Interconnections, hundreds or thousands of alternating current generators operate synchronously (that is, in time), almost as one vast machine. The four Interconnections have limited direct current links between each other.

Four Interconnections in North America



Each Interconnection has system control organizations that schedule exchanges of electric power. They must do this in accordance with the requirements of system security, for example, making sure the system can, at all times, withstand certain kinds of equipment failures. It is important to understand that the electric grid has essentially no switches for routing power and, therefore, controlling the grid means mainly controlling the operation of generators attached to the grid. The flows of electricity from all the generators are superimposed on each other so that the constraints on each system controller are determined, to some extent, by the actions of all the others. To keep grids operating within desired limits, and to avoid, in the extreme, cascading failures and blackouts, the operators must follow a set of common rules that set boundaries within which commercial transactions can take place. Because electric current shifts instantaneously to other lines when one line fails, the system must always have sufficient margins to accommodate such failures.

The continent's electricity system has been characterized as the largest, most complicated machine ever devised. Up to now, the many components were owned and operated by separate but cooperating companies that shared information freely. In the future, they may be owned by hundreds of competing firms, which will want the machine to handle well all their transactions, but not necessarily the transactions of others. These competing companies, thus, may be less willing to share information than is now the case among industry participants.

The system operators who manage the network in a competitive mode must ensure not only that transactions take place, but also that the new conditions do not trigger failures like the Northeast Blackout of 1965 or the Western outages of 1996.

2. The Current Reliability System

In addition to setting operating standards and monitoring compliance with reliability rules, NERC also collects, publishes, and analyzes information about the adequacy of the electricity network — the sufficiency of the resources. NERC's staff is small. The Regional Reliability Councils, with their many committees of volunteers, handle much of the work. In the past, the Regional Councils' membership consisted almost entirely of electric utilities. The large utilities contributed the bulk of the expertise and money needed to make the reliability system run.

Utilities have voluntarily accepted NERC rules, which they helped to shape through the committee process, and cooperated with each other in running the interconnected networks. They accepted that, although one utility would occasionally take advantage of others, the noncompliance would even out over time. The regulatory process was such that utilities would have had a hard time keeping for their shareholders the profits of suspect operating procedures. The regulatory process was also such that it encouraged investments that enhanced reliability because utilities could earn returns on those investments. Finally, it encouraged operations that left little to chance because regulators tended to cover all prudently incurred capital and operating costs in rates.

The four synchronous grids that make up the continent's power system operate under NERC rules that the ten Regional Reliability Councils augment to deal with regional conditions. Power pools, independent system operators, or other operating organizations dispatch power plants, often in areas smaller than the NERC regions. Today, there are 143 control areas (areas that individually balance electric flows), operating in conformance with NERC rules, make reliability decisions on a local basis. (See chart: NERC's Reliability Assurance Infrastructure.)

NERC Reliability Assurance Infrastructure	Western Interconnection	Texas Interconnection	Eastern Interconnection								Totals
			NPCC	MAAC	Possible ISO		MAPP	SPP	SERC	FRCC	
WSCC	ERCOT	ECAR			MAIN						
Regional Reliability Councils	WSCC	ERCOT	NPCC	MAAC	ECAR	MAIN	MAPP	SPP	SERC	FRCC	10
Security Coordinators	4	1	5	1	3	1	1	1	5	1	23
Independent System Operators	1 (2)	1	1 (2)	1	← (1) →		(1)	—	—	—	4 (6)
Control Areas	33	9	5	1	16	13	16	21	14	15	143



() – ISOs in various stages of consideration, development, and approval

3. The Arrival of Competition

The arrival of competition is having many consequences. Increasing numbers of nonutility generators sell into the market. Customers look for new power suppliers. Power marketers buy and sell electricity as if it were just one more commodity.

Industry restructuring is beginning to separate the functions of vertically integrated utilities into different parts: generation, transmission, distribution, and sales. Some utilities have begun selling off parts of their operations to others. Single entities no longer control the production, quality, and delivery of the product.

The vertically integrated utilities cooperated with each other to deliver power in bulk from place to place, in a relatively non-commercial, regulated manner. That arrangement promises to fray quickly as power producers compete for customers and for a place on the transmission grid. The traditional utilities also cooperated to furnish all the physical requirements needed to keep the system running in a stable, reliable manner, following operating standards set out by NERC and the Regional Councils. But now operators of the power network increasingly have to seek reliability services from many providers. Demand arises for rules of the road for all system users that do not commercially disadvantage any group of participants.

It is true that the current electric reliability system, encouraged and overseen by NERC, has worked well for three decades. Why not keep it? Because the electricity supply business is changing rapidly with deregulation and the onset of competition among utilities and the introduction of new market participants. The reliability system has to change to take account of the new market incentives and the new technical realities of the emerging industry.

In all, three factors — technological advances, other new factors in electricity markets, and the general trend toward the infusion of competition into regulated industries — have spurred and accompanied industry transformation.

One Revolutions in generation and information technologies have facilitated the development of a competitive electricity supply industry.

Generation For roughly 80 years, the electric industry enjoyed steadily increasing economies of scale in generation, which meant, in effect, that one large generator could serve consumers at a lower cost than many smaller, competing generators. Regulators prohibited competing generators from entering the market in order to assure that the large generator could achieve

scale. But they also regulated the profitability of the monopoly utilities in order to make certain that consumers received the benefits of economies of scale.

Previous improvements in the economies of scale began to diminish as large, new, steam generating stations reached efficiency limits inherent in the technology. At about the same time, manufacturers introduced gas turbine generators, an offshoot of airplane engine technology. The turbine plants, generally smaller than utility generating units, and their offshoot, the combined cycle generator, have demonstrated dramatic increases in efficiency over time. Now, these smaller facilities can produce electricity more efficiently than many existing, conventional utility-owned stations. This advance in technology causes many to question whether the public is served by attempting to maintain a utility monopoly over the generation market. Current policy allows many firms to enter the generation market by installing small, efficient units. Until now, few of the new entrants in the power-generating market have played a role in NERC.

Information Major and continuing advances in communications, computer, and control technologies allow market participants to understand customer needs, provide for them on a real-time basis, and keep track of a multitude of transactions. Soon these advances will permit control of the electric transmission grid in a manner that increases its efficiency. The reliability system of the future will have to design rules that take into account the many transactions and real-time nature of an increasingly competitive market.

Two The new system will have to accommodate other new factors:

- The desires of both individual consumers and aggregators of demand such as utilities and marketing firms.
- Generating companies which, without any entitlement to profit based on investment or guarantees of sales based on contract, will insist on an operating system that gives them reliable access to the marketplace.

- Energy marketers which make no profit and risk substantial penalties unless they can consummate transactions and, thus, will insist on not only predictable and reliable but also the most economical service possible.

Every reliability decision has commercial consequences for someone, and the new reliability organization will have to consider the needs of whole sets of new customers.

Three The trend to infuse competition into regulated industries, which began with transportation and moved on to telecommunications and natural gas, has finally encompassed electricity. Advocates of deregulation may think of electricity deregulation as nothing unusual. But it will be the biggest deregulation, involving the largest interconnected network and the most regulatory agencies and many new significant market players. Electricity is unique among these industries in its critical real-time coordinated requirements.

Electric industry deregulation was spurred by the energy crisis of the 1970s which fostered support for increased efficiency in the production and use of energy. In response, Congress passed the Public Utilities Regulatory Policies Act (PURPA) in 1978. The legislation opened up electric generation to nonutilities and forced utilities to buy from them. It also created a market for new generating technologies.

Deregulation was substantially accelerated with the Energy Policy Act of 1992. Congress passed the legislation after more than a decade of debate about the introduction of competition into the electricity supply business. The Act opened the doors to increased generation by nonutilities and removed barriers to usage of the long distance transmission network. Since 1992, the number of energy marketers and others entering the electricity business has exploded. For example, NERC's regional councils had 70 nonutility members in 1995, a figure that grew to 300 in 1997.

The Act did not require states to allow competition for sale of electricity at the retail level, but it did not prevent states from doing so, either. Several states subsequently have approved the competitive retail sale of electricity, with phased-in introduction over several years. Provinces in Canada are grappling with much the same matters as their U.S. counterparts.

4. Reliability Factors

Deregulation, as noted, is breaking up familiar, vertically-integrated utilities. The new organizations that replace them may not have the resources in place, or the motivation to devote the resources needed, to support reliability efforts as before. Formerly cooperative electric generating companies may not share information as freely in the future. Competitive pressures may weaken incentives to comply voluntarily with all standards. Operators may feel pressure to push transmission systems to the maximum in order to satisfy commercial pressures. After all, transmission is more than the vehicle to enable the development of a competitive generating market. To complicate matters, it is unclear, in the new world, who will pay for running or enhancing parts of the system.

What will it take to ensure that an increasingly fragmented industry delivers electricity as reliably as before deregulation? In answering that question, decision makers have to deal with a number of matters:

Preserving Reliability The preservation of reliability has two basic components. First, system operators make real-time decisions that clear transactions, dispatch loads, and take steps to deal with sudden failures. Second, prior decisions about maintenance of plant, installation of the correct equipment, training of system operators, and promulgation of rules affect the ability of the system to function reliably in the longer term.

Expert Judgment In a complex, real-time system, system operators must apply expert judgment, often deciding in an emergency that one transaction preserves reliability better than another, or that certain customers must endure inconvenience to protect grid reliability. In the new system, the operators will know that each alternative has commercial as well as reliability consequences. Moreover, the electric system is so complicated that the basic reliability standards also ultimately rely on the judgment of technical experts. It is important that these judgments be respected throughout the industry as technically sound and fair. To gain that respect, the standard-setting body that makes the decision must be seen as devoted to the public interest rather than to narrow private interests.

Competitive Pressures In the new environment, buyers and sellers will have incentives to influence decisions that limit power flows. To dispel suspicions that the system operator favors one participant over another (in absence of bidding for use of lines), the operator must be independent from market participants. Even an independent operator, however, may find it difficult to resist pressures from its customers, without a fallback to common standards instituted by an industry-wide body.

Transactions on electric grids are increasing at an exponential pace. Meanwhile, legislators in some states have forced reorganizations of the industry, while the U.S. Congress continues to consider action, and little or nothing has happened in Canadian or Mexican legislatures. However the legislative outcome, the events already taking place in the industry require a prompt and substantive transformation of the means by which electric reliability is supported. It is within this context that we developed the recommendations in the following section.

II. RECOMMENDATIONS

Introduction

The challenge for the Electric Reliability Panel has been to envision a North American Electric Reliability Organization for the future that adapts to existing and emerging changes in the bulk electric industry. To address this challenge, the panel has been guided by two general propositions that provide a context for our recommendations.

Proposition One: A New Electric Reliability Oversight System is Needed

NERC and the Regional Reliability Councils (RRCs) were designed to reflect and serve the reliability interests of the electric utility industry of the past. To remain effective, they will need to be redesigned as, or replaced by, organizations that can manage competitive dynamics among many market players in ways that are timely, fair, transparent, and technically excellent. This redesign implies changes in board composition and structure, membership, financial support, and legislative authority from government to enforce reliability standards and practices.

The introduction of competition within the electric industry and open access to transmission systems gives rise to pivotal challenges affecting the reliable operation of interconnected electric systems. These challenges include dealing with the following changes:

- An increasing number and complexity of electricity interchange schedules;
- Significant increases in electricity transfers and their resultant loadings on transmission lines;
- Coordination and administration of available transfer capability;
- Provision and purchase of generating and transmission services by all market participants, instead of only by traditional, regulated utilities.

A final, fundamental challenge is the expected decline in voluntary compliance with reliability standards.

If these new challenges are not met in forthright, prompt, systematic, and effective ways by industry and government bodies, then it is possible that serious disruption of the continental power system would occur. This would undermine public safety and economic capacity. The industry also may undergo a gradual deterioration of system reliability, or evolve in an uneconomic manner owing to system constraints.

The transformation of the bulk electric industry will require substantive changes to ensure future reliability. These changes will require a new reliability paradigm and strategies, different ways of organizing, new functions, and new arrangements with the government. The NERC and its Regional Reliability Councils will need to be transformed in major ways.

Given the accelerating deregulation and restructuring of the electric industry, time is essential in reinventing an electric reliability oversight system that will serve the short-term and long-term needs of North America's electricity customers. While governments have created conditions and opportunities for change in the electric industry, they have provided little guidance for ensuring reliability. Governments at all levels must do more in concert with each other and with industry to support reliability needs while the industry reorganizes itself, as it has in the past, to apply the best practices of self-governance.

The current system of voluntary industry peer supervision of the reliability of the bulk electric system is one of the great success stories in the history of industry self-regulation. But the introduction of competition is changing many characteristics, forces, rules, and incentives within the industry.

Proposition Two: Essential Competencies Should be Preserved

The current electric reliability system has many good features that should be preserved. These include the presence and use of regional organizations to adapt to regional differences. While it is not clear that the current configuration of regions is appropriate for the future, the need for regional organizations is without question.

Despite the need for mandatory compliance to ensure reliability in the future, the tradition of peer pressure that has worked notably well in the past should not be discounted. All of the participants in tomorrow's electric system need to be encouraged to support the spirit as well as the

letter of the law. This should require much conversation and negotiation within the industry. Technology will require continuous re-interpretation of the rules of the road.

The reliability system of the future, in operational practice, should continue to display two of the most important features of the present: volunteer participation and technical excellence. These qualities are the *sine qua non* of a self-regulating system. Therefore, the North American electric reliability organization of tomorrow will need to attract the industry's best technical experts to develop the best solutions to industry challenges. The most essential resource of the reliability system should continue to be technical experts from the industry and elsewhere including academia and the public sector. The new or renewed reliability regime must assure that such participation is possible and effective.

To ensure necessary changes, while preserving valuable features of today's bulk electric reliability system, will require many decisions. The panel's goal is to offer enough suggestions and proposals to provide clarity and an adequate sense of direction while avoiding excessive details that might inhibit the process of planning and implementation. To this end, the following recommendations are offered.

A. Mission and Functions

The mission, name, and qualities of the new North American electric reliability organization should reflect how the organization will preserve the most appropriate features of the past while being re-designed for future leadership challenges. The following recommendations are made concerning mission and functions.

A.1. The name of the new electric reliability organization should be the North American Electric Reliability Organization (NAERO).

A.2. The proposed mission of the NAERO is as follows: The NAERO mission is to develop, promote, and enforce standards for a reliable North American bulk electric system.

A.3. The primary purpose of the NAERO is to maintain security or short-term reliability. The secondary purpose of the NAERO is to assess and encourage adequacy.

A.4. The NAERO should be the only industry self-regulating organization with responsibility for oversight of wholesale bulk electric reliability for the interconnected electric grids in North America.

A.5. The major guiding principles of the NAERO are to:

- Address any matters that may affect reliability be they technical, operational, commercial, or regulatory.
- Be a fair, impartial, inclusive, and transparent organization.
- Reflect technical excellence in all activities.
- Provide an international perspective in all of its work.

A.6. The NAERO and regional organizations should perform several functions in ensuring electric reliability. The panel proposes the following categories and functions:

A.6.1. Policy and Standards

- Establish and periodically update operating, planning and engineering policies, and standards for reliability.
- Provide guides that interpret standards.

A.6.2. Implementation

- Review security coordination.
- Monitor and assess system performance, provide feedback to update standards.
- Conduct adequacy forecasts.
- Provide training and accreditation for system operators.
- Identify lessons learned and best practices from incident reviews and industry data.

A.6.3. Market Interface

- Evaluate the market impacts of new standards and the reliability impacts of new or evolving market practices and develop alternative ways to meet reliability standards.
- Sponsor issue forums and exchanges.

A.6.4. Compliance Enforcement

- Develop standards for regional compliance action plans and oversight of their Implementation.
- Monitor entities that affect reliability.
- Audit entities that affect reliability.
- Review events and incidents.
- Study complaints.
- Utilize alternative dispute resolution (ADR) as appropriate to support enforcement.
- Impose sanctions as necessary.

A.6.5. Organizational Services

- Provide information and public education.
- Manage government relations and interagency cooperation.
- Publish materials relevant to its mission.
- Provide and coordinate ADR services as needed.

A.7. The Board should review and study the possibility of using the American National Standards Institute and international standard-setting processes to build credibility in establishing technical standards.

A.8. All of the above functions should be managed within the NAERO; however, the compliance/enforcement function should be independent from the other activities of the organization to guarantee impartiality.

A.9. The NAERO should build upon and displace the existing NERC. The existing Board and staff should guide the transition by developing an implementation plan and new bylaws with appropriate participation in the process by its members, interested parties, and the public.

B. Governance

Governance is one of the most critical challenges for the NAERO because it represents how power and authority should be exercised within the organization. Historically, power has resided among the large utilities. A restructured industry now gives rise to demands for the sharing of power

with the many new entrants into the industry. In light of the convergence of these forces, a governance system is needed that is fair and manageable in addressing an industry that has become much more complex and includes many more market players who are in competition.

The panel proposes that a system of governance is needed that combines the best features of stakeholder participation and the capacity for ultimate decision-making that is independent of stakeholder bargaining. The ultimate authority should reside in a board of directors that is dominated by directors who have no vested interest in any particular entity or sector within the industry, but the board should include other directors representing those with a stake in the industry. The virtues of such a board are the capacity to be judicious and trusted in making timely decisions because of its unfettered commitment to the public interest, while also being sensitive to practical industry concerns.

At another level, through a group of standing committees, opportunities should be available for stakeholder representatives to seek consensus regarding important functional issues. The board should look to these committees to develop policies and proposals to work out differences, and to bring to the board recommendations for their ratification. When this is not possible, the board should look to the committees to present information, arguments, and options to help focus board action.

Among the issues addressed by the panel, none has received more attention than the question of whether board members of the new organization should represent stakeholder interests or be independent of them. The following recommendations are the result of extended deliberations before consensus was reached. Throughout its deliberations, the panel recognized the potential value of NAERO having an independent board as well as industry representation on the board and on NAERO committees. The panel balanced these competing needs by proposing the board membership formula suggested in B.1. below.

B.1. The NAERO should be governed by a board of directors, the number of which should be established in the NAERO bylaws. The board should include no more than 21 members, two-thirds of whom should be independent and one-third of whom should provide a balanced representation of the electric industry. Until the new NAERO board is seated, the NERC and its member Regional Reliability Councils should remain responsible for the reliability of the North American bulk electric system. Upon the NERC Board's adoption of the panel's recommendations, the NERC Board should set a date certain by which the new NAERO board should assume office. The existing NERC Board should serve until that time.

B.2. To ensure and maintain the quality of the board members, a nominating committee should be appointed by the board of directors. The nominating committee should be composed of board members, industry representatives, and independent persons able to represent the public interest. The nominating committee should encourage suggestions for potential candidates from the industry. It may engage a search firm to assist it in identifying prospective candidates.

B.3. The NAERO board should address in its bylaws the question of what “independence” means relative to the bulk electric industry.

B.4. All board members are expected to serve the public interest and represent the reliability concerns of the entire North American electric grid system. The board should reflect in its membership commitment to the public interest as well as expertise in the following areas: technical electric reliability and legal, market, financial, and regulatory matters. Members should reflect geographic diversity as well as the international nature of NAERO. The board may decide to appoint additional ex-officio non-voting members. The board members should receive adequate and reasonable compensation. The Chair should be selected from among the independent members of the board. The President should serve as a voting member of the board.

B.5. Members should serve staggered four-year terms.

B.6. The NAERO board should include at least two members from Canada and the board should consider providing a seat for Mexico when it plays a significant role in the North American bulk electric industry.

B.7. The board of directors should have the following specific functions:

- Establish policy.
- Approve standards for reliability of the North American grid.
- Assure fair enforcement of its standards.
- Oversee the evaluation of the reliability impacts of new or evolving market practices.
- Oversee the evaluation of the market impacts of new or revised standards.

The board should also exercise all other normal corporate board functions.

B.8. The board should establish standing committees consistent with the functions set forth in Section A.6. that are representative of members, interested parties, and the public. All committees should include members with outstanding technical knowledge and experience.

C. Regional Arrangements

Regional organizations are and should continue to be essential as vehicles through which oversight of the bulk electric reliability system is carried out. Until now, the Regional Reliability Councils have been the members that controlled the NERC. This arrangement would change with the creation of the NAERO with its independent board that is elected by its members and with other changes in industry structure. Nonetheless, the NAERO should require strong and positive working relations with regional organizations even though the number and configurations of those regions may be altered in the future as a result of changes within the industry.

The panel proposes that the relationship between the NAERO and regional organizations should be conceived as a series of constructive partnerships organized into a highly functional and interactive network. To create such partnerships and to manage such a network, the following recommendations are made.

C.1. Regional organizations should continue to be used as vehicles for members, interested parties, and the public to participate in the NAERO. The regions should assure adequate communications between the NAERO and its members.

C.2. The panel supports the NERC Board resolution of May 1997 that encourages the Regional Councils to ensure that they are not dominated by any single industry interest group. The regional organizations should actively involve volunteer representatives in their work from all segments of the industry. Those Regions with Canadian membership should continue to assure adequate representation of Canadian interests in their governance.

C.3. The NAERO should develop standards to maintain and enhance the reliability of interconnected electric grids in North America to be implemented by all regional organizations. As necessary, regional organizations may need to develop additional standards for their region that are consistent with those of the NAERO.

C.3.1. Regional organizations may request a variance from one or several requirements of a NAERO standard. NAERO should review and approve or disapprove such requests. Subregional organizations may also request variances. Any such variances must be approved by both the regional organization and the NAERO.

C.3.2. Regional organizations should develop and file Regional Compliance Action Plans according to NAERO guidelines. The NAERO should review and approve all such plans. The regional organizations should implement the approved plans and report the results to NAERO as required.

C.3.2.1 NAERO should monitor results of the regional plans. NAERO should also conduct compliance audits, either independently or in cooperation with a regional organization, at its discretion, or on request by another regional organization or by an entity within the region such as a control area, independent system operator, regional transmission association, or market participant. NAERO should provide an appeals process for cases where judgments of non-compliance are disputed.

C.4. A Memorandum of Understanding (MOU) should be developed between the NAERO and each regional organization that describes the relationship and mutual responsibilities of the NAERO and the regional organization. The MOU should include standards for performance and evaluation measures.

C.5 Regular meetings should be held between the NAERO and regional organization staff to review issues of mutual concern, agreements and responsibilities, plan, resolve conflicts, and coordinate activities.

D. Participation in NAERO

NAERO should be as inclusive as possible in serving the reliability interests of the bulk electric industry. Accordingly, the NAERO is conceived as a "big umbrella" organization. Membership should be open to any and all companies within the industry who comply with membership standards. Widespread opportunities should be available for representatives of member companies to participate in committees and events, although no one company or segment of the industry should dominate.

The following recommendations address NAERO membership issues.

D.1. All organizations which have either a direct physical or commercial interaction with the bulk electric transmission system should be eligible to join NAERO and participate in the setting of standards and other functions under conditions prescribed by the board of directors. System operator organizations must be members of NAERO.

D.2. Pending adoption of legislation establishing the statutory foundation for NAERO to serve as a self-regulating organization (see Section H.), NERC and the Regional Councils should pursue as diligently as possible the alternative being formulated by the Western Systems Coordinating Council (WSCC Reliability Management System) or other possible alternatives which would not require federal legislation. Regardless of whether and when legislation is enacted, this process should advance NERC/NAERO toward the goal of promulgating and enforcing reliability standards for the entire bulk electricity industry.

D.3. The NAERO board shall establish a dues structure. Members who pay dues should be eligible to vote and participate in organizational activities as approved by the board.

E. Finances

To carry out its mission effectively, the NAERO must be independent from undue influence from any industry sector or special interest. As this must be the case in its governance, so it must also be in regard to funding the NAERO. The panel offers the following recommendations on finances.

E.1. Long-term goal. The NAERO should be funded independently from multiple sources other than the Regional Reliability Organizations within three years of establishing the NAERO. In order to accomplish this, NAERO will have to collect fees or charges from users and members.

E.2. Interim approach. The Regional Reliability Organizations should continue to be responsible for funding the NAERO in the interim.

F. Compliance and Enforcement

One of the great challenges that deregulation imposes upon the bulk electric industry is how to provide adequate authority and control to assure reliability. In this regard, the panel has been guided by two key conclusions. First, the existing system through which the NERC and the Regional

Reliability Councils assure reliability through voluntary peer compliance is not adequate to deal with the nature, volume, and variety of issues arising in the future. A major factor leading to this conclusion is the transformation of the industry from predominantly vertically integrated monopolies to a much larger group of disaggregated competitors. The competitive dynamics among a much larger universe of players is not at all conducive to a system of voluntary peer compliance. Given this situation, a more realistic and manageable system is needed in which compliance with policies and rules to assure reliability is mandated among all industry participants.

The second conclusion of the panel is that a self-regulating organization (SRO) that includes industry representatives is preferable to one or several government agencies in managing a system of compliance and enforcement. This conclusion is consistent with what has taken place in other industries including accounting and securities trading. The major arguments in support of this conclusion are that an industry SRO is more able than government agencies to attract and retain sufficient technical expertise and to make sufficiently timely decisions necessary for compliance management. As will be discussed in Section H., government agencies will remain critical partners with key roles in the process.

In proposing a compliance and enforcement process, the panel believes the process must be clear, objective, fair, and immune from manipulation from any sector of the industry or special interest and supported by government entities in Canada, the United States, and Mexico. Moreover, the NAERO should promote compliance through professionalism in addition to enforcement. What follows are the panel's recommendations on compliance and enforcement issues.

F.1. The Compliance Enforcement Program (CEP) proposed should be guided by the following principles:

F.1.1. The CEP should be organized as an independent functional unit within the NAERO so as not to be unduly influenced in its compliance and enforcement activities.

F.1.2. The NAERO board should assure that the CEP has adequate resources to carry out activities at regional levels in relation to Regional Compliance Action Plans.

F.1.3. The CEP should have the ability to carry out its activities in Canada, Mexico, and the United States, consistent with the laws in each of these countries.

- F.1.4. The CEP should be guided by the standards developed by the NAERO.
- F.2. The major functions of the CEP should include the following:
- F.2.1. Review of proposed Regional compliance action plans and monitoring of implementation of approved Regional Compliance Action Plans.
 - F.2.2. Periodic audits of all entities that affect the bulk electric system.
 - F.2.3. Ongoing monitoring of all entities that affect the reliability of the bulk electric system.
 - F.2.4. Investigations and reviews of major interruptions of service.
 - F.2.5. Studies of member complaints regarding transmission curtailment and practices.
 - F.2.6. Enforcement and sanction actions either independent of or in concert with regional organizations.
- F.3. The major strategies that should guide the CEP are as follows:
- F.3.1. The compliance and enforcement system must be absolutely fair and clear in regard to procedures. To this end, a Compliance Enforcement Code should be developed that clearly describes procedures, steps, and levels of fines and sanctions involved in regard to investigation, compliance, and enforcement activities.
 - F.3.2. The board of directors should appoint a Director of Compliance who will report to the board on a regular basis.
 - F.3.3. The independence and competency of the CEP staff are essential to the efficiency and fairness of compliance and enforcement. However, technically expert industry representatives should also be utilized, as appropriate, in investigations, audits, compliance, and enforcement activities. Their expertise and capacity for peer review are critical to assuring the key elements of a self-regulating organization. Thus, procedures should be established that are acceptable to the Compliance Enforcement Program, the CEP staff, and the board of directors for

adequate and appropriate involvement of these industry representatives. Industry representative must have no vested interest in the outcome of their investigations.

F.4. The NAERO should promote compliance through professionalism in addition to enforcement. NAERO should develop and administer a certification licensing scheme for system operators supported by any necessary legislation in the United States, Canada, and Mexico.

G. Implementation

For several decades, the NERC has been able to carry out its work with a small, central staff and a high degree of involvement by volunteer professionals from the bulk electric industry. It will be desirable, and should be a goal of the new NAERO, to encourage the continued participation of highly qualified volunteers to the extent possible. This should provide a group of technically competent volunteers with current knowledge of the bulk electric industry and its needs.

It may be more difficult to assure the involvement of volunteers in the future because of deregulation. However, the NAERO should do all it can to engage well-qualified volunteers. The NAERO will also need a larger and highly qualified technical staff to work with volunteers and to carry out an expanded series of responsibilities that will accompany changes in the industry. The following are the panel's recommendations addressing the implementation of the new NAERO organization.

G.1. To carry out its work, the NAERO should maintain a strong, highly qualified staff, including the President, and the organization should be guided by the following principles:

G.1.1. The use of volunteers from all parts of the industry should be maximized as a procedure to attract outstanding and balanced technical expertise.

G.1.2. Volunteers may be reimbursed for their expenses related to NAERO.

G.1.3. The board of directors should appoint a President who would serve as the CEO and a member of the board.

G.2. As part of its responsibilities, the NAERO should undertake steps to systematically evaluate and learn from reviews of the overall reliability system and major interruptions of service.

H. Government Interface

In the previous discussion about compliance and enforcement, the point was made that a SRO is preferable to a government agency in managing efforts to assure reliability in the bulk electric industry. However, as has been explained, deregulation is changing conditions and arrangements within the industry in ways that should require a mandatory system of compliance rather than one based upon voluntary peer pressure. This means that the NERC must be redesigned and transformed into a NAERO that is organized, governed, and funded in dramatically different ways.

The SRO model proposed here is similar to the NASD mentioned above. The model gives a maximum degree of control to the NASD in a manner, pursuant to federal law, which assures full participation by all affected parties, democratic procedures, and a workable mechanism of enforcement and compliance.

As a self-regulating organization, the NAERO should also develop new and different ways of relating to government. To assure it has sufficient authority to enforce compliance with reliability standards, the NAERO will need to be respected for its expertise and supported by government entities that approve permits, licenses, and tariffs in the bulk electric industry. In granting such recognition to the NAERO, it is only reasonable to expect that government entities will want to review and approve the standards and procedures of the NAERO. The challenge that will be faced in accommodating this need is to create review and approval procedures that are appropriate to the responsibilities of government entities while not imposing excessive constraints on NAERO. A user-friendly, shared regulatory system must be fashioned between government and the NAERO.

The challenges faced by the NAERO and government entities are compounded by several factors. One is that the NAERO is an international institution that needs to work with federal and provincial government entities in Canada, and with federal and state government entities in Mexico and the U.S. Further, there is uncertainty in several cases, such as the Federal Energy Regulatory Commission (FERC) in the U.S., as to the nature and extent of their authorities.

The NAERO should maintain clear and positive relationships with government agencies in North America with regulatory oversight in regard to the bulk electric industry. In recognition of the unique challenges and conditions cited above, the panel offers the following recommendations concerning the interface between NAERO and the governmental entities with which it must relate.

H.1. A suitable international framework, either building upon existing agreements or reflected in a new agreement, should be established between Canada, Mexico, and the U.S. to assure adequate recognition, commitment, and support for NAERO as the SRO responsible for the reliability of bulk electric systems in North America.

H.2. Through legislation or regulatory authority (whether existing or new), appropriate government authorities should act to assure that the NAERO is assigned responsibility and sufficient authority as an SRO to: (a) assure compliance with, and enforcement of reliability standards; and (b) to collect funds to support the SRO function.

H.2.1. NERC should initiate efforts as soon as possible to recommend specific federal legislation analogous to Section 15A of the Securities and Exchange Act under which the National Association of Securities Dealers (NASD) is organized.

H.3. To carry out its responsibilities as an SRO, the NAERO should require general oversight approval from the appropriate agencies of governments with relevant oversight responsibility. An approval and oversight system should be established that is simple, reasonable, fair, and manageable. Therefore, NAERO rules and procedures should be reviewed and approved by appropriate governmental authorities.

I. Public Participation

Among the qualities the panel believes to be essential to the success of the NAERO are those of openness, transparency, and accessibility. These qualities are crucial to assure fair treatment among the many and diverse businesses that constitute the bulk electric industry. Furthermore, these qualities are necessary to protect the interests of the public because of the fundamental importance of electricity to public safety, the economy, and daily life.

Public participation represents practical ways in which the principles of openness and accessibility are made real. The cornerstone of public participation must be to provide sufficient, clear, and continuous information about the bulk electric industry and the work of NAERO to the public. The foundation of the NAERO must also provide numerous and convenient ways for industry members, interested parties, and the public to influence and shape the actions of the NAERO in its commitment to assure reliability.

- I.1. The NAERO should operate in a transparent manner and seek to maximize opportunities for participation among members, interested parties, and the public.
- I.2. All meetings of the board of directors of the NAERO and of its Councils should be open to observers. Executive sessions may be called at the discretion of the board.
- I.3. The minutes of all board and committee meetings should be made available in a timely manner. The minutes of executive sessions should not be available to the public.
- I.4. The NAERO board should undertake an independent evaluation every five years to review its performance and the need for the organization.

Special Concerns

The Electric Reliability Panel has some concerns about the future reliability of the bulk electric system in North America. Those concerns, however, derive from matters beyond the scope of our charge. We do believe that we should bring these issues to the attention of NERC and the public, even though we provide no concrete recommendations.

1. **Legislative Authority in the United States**

The authority of the FERC to approve and assist a self-regulatory reliability organization (SRO) such as NAERO is uncertain. The new NAERO may require FERC and/or Congressional action to ensure that it has sufficient authority to carry out its mission to develop and enforce standards. It needs clarification of its authority to operate as soon as possible in order to undertake its operations, finance them, and enter into any necessary international agreements.

2. **International and Intergovernmental Cooperation**

Governmental reliability oversight of the North American grid is divided among many regulatory jurisdictions. In the U.S., FERC and other regulatory agencies have no jurisdiction over some entities affecting the reliability of the bulk electric system. In Canada, the National Energy Board has little authority over the electric industry in terms of reliability. The electric industry is becoming more national, and even continental in scope. We urge the governmental agencies to constitute a process that achieves greater coordination among them.

3. **Physical Security**

The panel believes that the NAERO should consider explicitly including a provision in its mission to address potential threats to electric reliability from sabotage or terrorism.

4. **Investing in Transmission**

In the deregulated market, policy makers assume that market forces will assure adequate electricity supplies, but it is not clear that regulators will permit market pricing of reliability services, or provide the necessary incentives to elicit those services from providers. Responsibility for the monitoring and planning of adequacy must reside somewhere even in a deregulated market.

Investment incentives differ between generation, transmission, distribution, and marketing. Right now, the investments concentrate in generation and marketing, the two sectors being deregulated. We have heard reports of lack of investment in transmission, confusion about incentives offered, lower maintenance of transmission projects, and stories of engineers abandoning their careers in the sector. We expect states to show reluctance in allowing the construction of transmission enhancements that serve consumers in other states. We cannot depend on market forces to provide incentives to enhancement while transmission is regulated as it is. Quality of the transmission system could deteriorate in the future. That would not only hamper the development of an open and competitive electricity market, but it would also lead to a deterioration of reliability. The future of the transmission grid requires far more attention than it has gotten, to date, in the discussions of deregulation.

5. Promote the Independence of Security Coordinators

The panel understands that security coordinators have been established to coordinate, oversee, and enforce Regional and subregional security processes affecting bulk electric systems. Currently, there are 23 security coordinators covering the four Interconnections in North America. To assure then can effectively monitor the “big picture” and adequately assess the security of the Region or Interconnection, they are connected through a state-of-the-art communications system — the Interregional Security Network. Security coordinators are empowered to coordinate certain emergency control actions, including line loading relief, to maintain the reliability of the grid.

Because the security coordinator role may be perceived by some to be susceptible to manipulation by market participants, it is essential that the security coordinators perform their functions independent of any market influences. This independence can be assured in several ways. The Panel believes the best way is to have security coordinators structured as independent entities, or their role subsumed into independent system operator-type organizations.

APPENDIX 1

Panel Members and Staff Information

Co-chairs

Richard Drouin was Chairman and Chief Executive Officer of Hydro-Quebec from 1988-1995 and is now Vice Chairman, Morgan Stanley Canada, and a partner in the Canadian law firm of McCarthy Tetrault. He formerly chaired the steering committee on transmission and generation at Unipede (International Union of Electricity Producers and Distributors) in Europe. Mr. Drouin is the founding member of the E-7 which brings together the largest utilities of the G-7 countries. He was Honorary Chairman of the World Energy Congress in Montreal in 1989.

Charles Stalon, an economist and former member of the Federal Energy Regulatory Commission (FERC), is an independent consultant on energy regulation. Until his retirement in 1993, he was Director of the Institute of Public Utilities and Professor of Economics at Michigan State University. He served as a FERC Commissioner for five years and a Commissioner of the Illinois Commerce Commission for seven years. Mr. Stalon is a member of the Board of Directors of ISO New England and the New Jersey Resources Corp. and a member of the California Power Exchange Monitoring Committee.

Members

Dr. Richard E. Balzhiser, President Emeritus of Electric Power Research Institute (EPRI), was the Institute's President and Chief Executive Officer from 1988-96 during a career with EPRI that started in 1973. He came to EPRI from the White House Office of Science and Technology where he was Assistant Director for Energy, Environment, and Natural Resources from 1971-73. Earlier, Dr. Balzhiser was Chairman of the Department of Chemical Engineering at the University of Michigan. He is the author of two texts on thermodynamics.

William H. Clagett was Administrator of the Western Area Power Administration from 1985-94, Deputy Administrator from 1978-85, and Assistant Administrator of the Bonneville Power Administration's Washington, D.C. office from 1971-78. He has served as Chairman of the North American Electric Reliability Council's Board of Trustees and Chairman of the Western Systems Coordinating Council. Mr. Clagett is now Vice President of Summit Group International, Inc., and Chairman of the Management Board for the Navajo Tribal Utility Authority.

George L. Edwards has been President of the Alliance for Telecommunications Industry Solutions (ATIS) since 1990. The organization was then called the Exchange Carriers Standards Association and was formed in 1983 as part of the breakup of the Bell System. Before joining ATIS, Mr. Edwards was Executive Director of External Affairs at Bell Atlantic and has had extensive experience in telecommunications engineering, industry relations, and standards development. He brought to the panel broad knowledge of the process and procedures used by the telecommunications industry in setting standards and resolving issues with minimal regulatory oversight.

Dr. Victor Gilinsky, a consultant on energy matters, served as Commissioner of the U.S. Nuclear Regulatory Commission from 1975-84. From 1973-75, he was head of the Physical Sciences Department and Director of the Applied Science and Technology Program at the Rand Corporation where he also was a physicist from 1961-71. From 1972-73, Dr. Gilinsky was Assistant Director for Policy and Program Review in the Office of Planning and Analysis of the U.S. Atomic Energy Commission.

Richard Hemstad has been a member of the Washington Utilities and Transportation Commission since 1993. Before that, he served as legal counsel to Governor Dan Evans, Director of the State Office of Community Development, and a member of the State Senate representing the greater Olympia area. Mr. Hemstad has also taught law at the University of Puget Sound School of Law. He is a member of the Electricity Committee of the National Association of Regulatory Utility Commissioners and chairs its Reliability Working Group.

Leonard S. Hyman, Senior Industry Advisor to Smith Barney's Global Energy and Power Group, specializes in utility and telecommunications finance and economics. From 1978-94, he was head of the Utility Research Group and First Vice President at Merrill Lynch and before that a Vice President of Wainwright Securities and an official of Chase Manhattan Bank. Mr. Hyman is author of *America's Electric Utilities: Past, Present and Future*, co-author of *The New Telecommunications Industry* and editor of *The Privatization of Public Utilities*.

Hazel O'Leary, a lawyer and businesswoman, served as Secretary of the U.S. Department of Energy during the first administration of President Clinton. Before that, she was President of the natural gas subsidiary of Northern States Power (NSP), a diversified utility holding company for which she also served as Executive Vice President. During the Administration of President Carter, Mrs. O'Leary was a Presidential appointee at the Department of Energy and the Federal Energy Administration. She is now President of O'Leary and Associates, an energy consulting firm.

Alex Radin served for 35 years as Executive Director of the American Public Power Association, a national organization representing more than 1,750 municipal and other local public power utilities. Mr. Radin has served as Chairman of the Consumer Energy Council of America and Vice President of the Consumer Federation of America.

He is now President of Radin & Associates, Inc., a consulting firm specializing in government and energy policy issues for consumer-owned electric utilities.

Dr. Vernon L. Smith is Regents' Professor of Economics and Research Director of the Economic Science Laboratory at the University of Arizona. Previous faculty appointments include Purdue and Brown University and the University of Massachusetts. He is author or co-author of over 150 articles and books on capital theory, finance, natural resource economics, and experimental economics. Dr. Smith is past President of the Public Choice Society, the Economic Science Association, the Western Economic Association, and the Association for Private Enterprise Education. In 1995, he was elected to the National Academy of Science.

Advisor to the Panel

Mary L. Schapiro became President and a member of the Board of Directors of NASD Regulation, Inc., (NASDR) in 1996. Before that, she was appointed Chairman of the Commodities Futures Trading Commission in 1994. Earlier, for six years, she was a Commissioner of the Securities and Exchange Commission. Ms. Schapiro brought to the panel extensive knowledge of a leading self-regulating organization. NASDR, an independent subsidiary of the National Association of Securities Dealers, is responsible for regulating 5,400 member brokerage firms and 506,000 registered representatives and oversight of the Nasdaq Stock Market.

Electric Reliability Panel Facilitation and Design Team

The Florida Conflict Resolution Consortium based at Florida State University was responsible for designing, managing, and facilitating the panel's deliberation. Members of the team included:

Stuart Langton, PhD is the co-facilitator of the panel. He has been a consultant to 300 organizations, directed 25 research projects, and published five books and over 50 articles. He was a professor at Boston University and was the Lincoln Filene Professor of Citizenship and Public Affairs and directed the Lincoln Filene Center at Tufts University. He served as Executive Director of Challenge to Leadership, a community leadership initiative among major Boston area leaders. He currently is a consultant to the American Association of Retired Persons, the Federal Reserve Bank System, the South Florida (Everglades) Ecosystem Restoration Task Force, and the U.S. Army.

Robert Jones served as the panel's co-facilitator and project director. Mr. Jones serves as the director of the Florida Conflict Resolution Consortium, a Florida State University based statewide program, and has designed and facilitated dozens of large groups, commissions, and task forces charged with complex policy development missions and has served as a mediator in many public policy conflicts within Florida.

Paul O'Brien served as a special advisor to the panel throughout its deliberation and is president of The O'Brien Group which consults in the telecommunications field internationally, and was the former CEO of the New England Telephone Company. With a management perspective from a comparable industry in terms of deregulation, he provided valuable assistance in issue identification and offered his expertise and perspectives on the deregulation process.

Tom Brady served as the panel's communications and press advisor and is a communications strategist and consultant with considerable report writing experience for clients in the private, non-profit and public sector. His background in journalism and his ability to absorb and write effectively on a wide range of topics made him a valued member of the team.

James May, Neil Sipe, and Pamela Richmond served as the background research team and are based at Florida State University.

Appendix 2

Press Releases for the Electric Reliability Panel

September 25, 1997 — Electric Reliability Panel to Meet

October 3, 1997 — Electric Reliability Panel Meets

October 30, 1997 — Electric Reliability Organization Should Have Independent Board

December 10, 1997 — Reliability Panel Readies Final Recommendations