Chairman Wellighoff, Commissioners, Staff, and fellow panelists. I want to thank the Commission for having this conference today. By hosting a series of reliability technical conferences over the last several years, the Commission has demonstrated its continued commitment to reliability and its willingness to receive inputs on important reliability matters from diverse perspectives.

The mission of the North American Electric Reliability Corporation (NERC) is to ensure the reliability of the international bulk power system. We accomplish this mission through risk-based, fact-driven analysis that identifies the most serious risks to bulk power system reliability, followed by cost-effective solutions to mitigate those risks. Simply put, we have developed a systematic approach to capture details about all bulk power system events, from minor Category 0 and 1 events that rarely affect customers, to Category 4 and 5 events that can result in wide area outages. For each event, we record rigorous cause-code information to enable analysis of patterns and trends, leading to prioritization of the work on which NERC, the Regional Entities and the industry need to focus to ensure reliable performance. We are achieving full, voluntary participation by industry in the reporting of event details, causes, and mitigation strategies. We are in the process of teaching industry a disciplined and rigorous root-cause analysis method so that over time the quality and robustness of the reports received are improving.

Since the enhanced Event Analysis program began in 2010, it has covered approximately 307 categorized events. NERC receives detailed technical data on every transmission facility interruption through our Transmission Availability Database System (TADS), as well as every generator outage through our Generator Availability Database System (GADS). A third database, Demand-Response Availability Database System (DADS), records the response performance of demand response systems when called upon as a resource. We also maintain, jointly with the Regional Entities, a Relay Misoperations Database. We are currently investing significant resources in completing an Event Analysis Database and merging the databases into a single comprehensive tool for analysis of the root cause of all system events. This will cover everything from a momentary interruption of a transmission line or brief disruption of the energy management system, to the largest events on the bulk power system.

While the approach above allows NERC and industry to continue getting better over time at identifying and remedying the causes of events we can see and control, it does not address potential risks that are
more difficult to measure because we do not see them directly. These include what we call “high-impact, low-frequency” (HILF) risks that are real but do not manifest as readily in performance data that we can easily measure today. Examples include the risk of a serious coordinated physical or cybersecurity attack on the grid or the impact of a severe geomagnetic disturbance. For these potentially severe, but much less frequent or as yet unobserved events, we must develop risk-mitigation strategies based on our sense of likelihood and possible consequences.

In our current assessment, the highest priorities in avoiding or mitigating the severity of large scale outages are:

- System protection (relay) misoperations. Excluding weather, almost all other events that cascade to a wide-area impact involve relays that did not operate as expected. We found there are opportunities to reduce human and organizational errors involved in the setting of complex and increasingly digitized protection systems.

- Equipment failures. Avoidable equipment failure is the second most prominent cause of bulk power events (once again excluding weather). A recently discovered common cause is that circuit breakers from certain manufacturers are prone to incorrectly mounted flash suppressors inside the breaker, resulting in a breaker failure when it attempts to operate, potentially resulting in an entire substation bus and multiple transmission lines being taken out of service.

- A third priority is right of way maintenance. Notably, we have made significant progress in this area. Vegetation management was a principal root cause of the August 2003 Northeast Blackout and has been involved in a number of other historical events. Our vegetation management standard, which became mandatory and enforceable in 2007, and its rigorous enforcement by NERC and the Regional Entities have reduced, if not eliminated, vegetation growing into high voltage lines. In 2010, NERC discovered there were broader issues regarding the maintenance of safe clearances between live conductors and other objects in the rights of way, such as distribution and communications underbuild, berms, buildings and structures. We issued a major industry-wide alert in Fall 2010 and are in the third year of tracking the significant progress of industry in mitigating this risk. In addition, FERC approved revisions, embodied in new FAC-003-2 in March 2013, that will further improve vegetation management efforts.

- Cold weather preparations were identified as a significant risk, most recently manifesting in the February 2011 severe freeze in Texas and other parts of the southwest. We are working with southern tier regions to ensure that cold weather procedures are in place at every power station, and that adequate training and resources are in place to ensure plants are properly winterized for periods of severe cold.
• Situational awareness is historically a major risk to a reliable bulk power system, a risk that was at the root of the August 2003 and other historic events. For the most part, this risk is well-controlled, but requires ongoing vigilance, as seen in the Southwest event of September 2011. Inadequate sharing of information and situational awareness by a number of entities directly contributed to a major cascading event. NERC is working with the Western Electricity Coordinating Council (WECC) to address those causes. We have conducted a review with Regional Entities to ensure these poor practices have not crept back into any other regions.

• Finally, human error is receiving more attention. We are finding that most events that escalate more than would have been expected involve some form of preventable individual or organizational error. A recent example discovered is the unnecessary operation of Remedial Action Schemes that cause multiple lines to trip as a result of incorrect wiring by technicians – partially individual error, but more prominently organizational error in inadequate verification of manufacturer wiring instructions.

With regard to HILF risks, NERC has identified the following as most significant:

• Coordinated physical attack on bulk power assets. Following September 11, 2001, NERC developed a best practices guide for protecting bulk power transmission and generation assets from attack. Focus in recent years has turned primarily to cybersecurity. However, following a recent coordinated physical attack on a bulk power substation, NERC issued an alert to industry and is working with the Critical Infrastructure Protection Committee to refresh the physical security guidelines and awareness.

• Coordinated cyber security attack. This area remains a high priority and will continue to remain so for the foreseeable future because of the rapid evolution of cyber threats to the grid. NERC has worked with industry to achieve significant mitigation, although the threat continues. We have mandatory security standards and rigorous compliance monitoring, soon to cover all bulk power system assets when Version 5 becomes effective. NERC operates the Electricity Sector Information Sharing and Analysis Center (ES-ISAC) to provide timely information exchange with industry and governmental security partners on emerging threats and vulnerabilities. Presently, NERC’s focus is on building additional foundational capability at ES-ISAC to better address dynamic and emerging risks in collaboration with key institutional security partners. NERC conducts onsite readiness reviews based on the Administration’s maturity model pilot. We conduct periodic grid exercises including one scheduled in November that will engage more than 110 companies across North America in a simulated severe cyber and physical attack.

• Geomagnetic disturbances (GMD). With the support and encouragement of the Commission, NERC has accelerated efforts to mitigate the possible impacts of a severe solar incident affecting the power grid. We have engaged industry experts and equipment
manufacturers in developing ground current measurements and enhanced equipment monitoring, improving equipment design, and developing the modeling capabilities necessary to identify critical assets to be protected. NERC has made significant progress in preparing GMD standards that are responsive to the recent Commission order on this subject.

In addition to the above observed and HILF risks, NERC is working through its reliability assessment program to identify longer term risks and recommend mitigating strategies to enable safe transitions to increased dependency on natural gas and rapid adoption of renewable and intermittent resources. We are also closely monitoring and encouraging solutions to possible regional capacity concerns, such as our recent focus on Texas and Southern California.

In 2012, NERC formed a Reliability Issues Steering Committee (RISC) with subject matter experts and senior executives from industry to advise the NERC Board on reliability priorities. The priorities reported by this group are consistent with the results we are seeing from our performance data. The committee has identified the following as its highest priorities: coordinated cyber attack, work force capability and human error, protection system misoperations, and situational awareness. As medium priorities, the RISC identified equipment maintenance, operational modeling and model inputs, coordinated physical attack, generator availability, and increased dependency on natural gas. NERC staff continues to work with the RISC to ensure our risk analysis capabilities support its efforts to prioritize issues and to collaborate on the identification of effective risk mitigation controls where performance can be improved.

The risk-based approach outlined above helps NERC align the resources industry must invest in reliability on the most important issues. There is a two-fold benefit. First, we focus the most energy and resources around problems that can be solved and that will improve reliability performance. Second, we can minimize less effective use of resources chasing less important problems. With this in mind, our risk-based approach has led to implementation of strategic shifts in both reliability standards and compliance monitoring and enforcement.

In standards, we have realigned our management and accountability for standards development, streamlined the development process and made it less rigid, and restructured our standards projects to achieve better allocation of NERC and industry resources. We have also initiated work to remove less important requirements that have limited reliability value based on our risk analysis and prioritization. We appreciate the recognition by the Commission in proposing to approve our recent “Paragraph 81” filing that reliability can actually improve if we remove requirements of limited value and eliminate past standards directives that have been addressed in some other manner, are redundant with another directive or provide general rather than specific guidance. The benefit is the ability to shift resources to more important issues that will prevent future outages. In standards, the stage has been set – the management, procedures, resources, and framework are in place – and we are beginning to see significant improvement in the productivity and quality of standards. An additional recent effort has been
to contract an independent expert review team to evaluate all existing requirements for reliability relevance and quality. The results will be presented to the NERC Board in August, and they will help set the course for the work remaining to get our standards to the level of excellence we expect in the next two years.

Another strategic initiative is the transformation of our compliance monitoring and enforcement programs across NERC and the Regional Entities to more effectively address reliability risk and minimize administrative compliance burdens that can detract resources from reliable operations. This transformation, called the reliability assurance initiative (RAI) is in an earlier stage of development than our standards reforms, but significant progress has been made.

We have initiated the Find, Fix Track and Report (FFT) program to rapidly close minor issues that do not present a risk to bulk power system reliability. We appreciate the Commission’s support of the FFT program, including approval of recent FFT enhancements, and recognition that quickly disposing of minor issues allows industry to shift emphasis to more important reliability matters. One part of RAI going forward is to determine how the use of FFT can be further expanded and become even more efficient in resolving minor issues.

Other efforts within the RAI framework that are intended to promote more effective reliability risk mitigation include maturing and expanding internal management controls at registered entities. Industry already self-reports more than two-thirds of all possible violations that are discovered. We want to leverage this culture to promote excellent behaviors with regard to self-assessment and correction of compliance issues. This would allow NERC and Regional Entity oversight through audits and spot checks to focus on key issues affecting reliability or on entities needing more attention. We are also looking to ensure enforcement distinguishes between egregious or poor performance that needs to be discouraged and positive behaviors that we are seeing like robust event reports, aggressive mitigation, and root cause analyses that can be shared across industry to improve performance of everyone. RAI ensures entities are being held accountable and aligns resources to address the most important reliability concerns, while reducing administrative burdens.

NERC recently published its second annual State of Reliability report. This report is the capstone of our overall assessment of reliability performance and priorities going forward. While NERC’s Long-Term Reliability Assessment (LTRA) report produced annually by NERC in the fall projects the state of reliability for the next ten years based on load and resource forecasts and emerging issues, this report looks at how well we are doing to date and what issues we are seeing that need to be addressed. The 2013 State of Reliability report found bulk power system reliability remains adequate and highlights two areas of importance, relay misoperations and equipment failures. As noted, both of these issues have a prominent place in NERC’s priorities.
As this work matures in the coming years, we will be able to expand the level of detail and analysis in this report, and it should become a primary tool for assessing the effectiveness our reliability efforts across NERC, Regional Entities and industry.

One feature used in the State of Reliability report is a new metric created by NERC, a severity index. This index takes information from each reported event and scales the impact of the event based on the amount of load lost, as well as the extent of the loss of transmission and generation resources. The scores are generated from event analysis, TADS, GADS, DADS, and relay misoperation data. The results are presented in the report in a graphical form showing what could best be described as a mean time to failure of events of different magnitudes. Using this metric, we can see if performance is improving or degrading year over year. We can also match the most significant large- and medium-sized events to determine common causes that can be mitigated to improve future performance. This information can be further broken down regionally, and it could even be used to compare the performance of individual entities to peers. NERC currently maintains a dynamic dashboard on our website showing aggregated information on reliability performance.

Although the conclusions from the recent report are too voluminous to describe here, the report does indicate steady or slightly improving performance over the past five years. In recent years, the majority of severe events we have been able to measure are outside of NERC’s control or jurisdiction as they involve severe weather impacts to distribution systems. Examples include Hurricane Sandy, the June 2012 derecho, the October 2011 Northeast snowstorm, Hurricane Irene in October 2011, and severe tornado events. Of the eight largest impact events in the past five years, seven were weather related. Six of these events affected distribution systems and are outside NERC’s scope. Only the cold weather event of February 2011 had a significant impact on the bulk power supply and is an issue NERC is working hard with industry to address. Of the eight most severe impact events in the past five years, only the September 2011 Southwest event was unrelated to weather. This event resulted from more traditionally known causes such as inadequate situational awareness, information exchange, and modeling, as well as unclear lines of authority.

The systematic, risk-based approach NERC is moving toward allows NERC and the Regional Entities to set goals and objectives and prioritize business plans. Examples of goals being introduced into our business planning processes include:

- Review of system events to determine if there are any gaps in standards or, conversely, if event history is telling us some requirements have little relevance to reliability performance.
- Review of system events to determine if there are repeating patterns of noncompliance that contribute to significant events.
- Reductions in the number of Category 3, 4, and 5 events.
• Increased levels of self-reporting by industry and even more aggressive and timely mitigation of gaps.
• Specific targeted metrics around tailored solutions, such as projects to improve right of way maintenance or relay maintenance, or to reduce human error.

In conclusion, NERC is on a path toward improved reliability standards and compliance monitoring and enforcement. More importantly, NERC is on a path to better understand and communicate reliability risks that need to be addressed. Our approach allows us to target results around specific issues that benefit electricity customers through improved bulk power system performance. It also allows us to measure and be accountable for the effectiveness and value of the investments made by industry on behalf of their customers.

The ongoing evolution of NERC further sharpens our focus on reliability and accountability through the use of risk-based processes, and encourages learning and continuous improvement within the industry. By continuing to strengthen these pillars upon which the foundation of NERC is built, we are well positioned to continue ensuring the reliability of the bulk power system in North America.