51st Annual MINNESOTA POWER SYSTEMS CONFERENCE
November 10–12, 2015

Saint Paul RiverCentre
175 W Kellogg Boulevard
Saint Paul, Minnesota

New this year—
Download the conference mobile app!
See page 12 for details.

Sponsored by:
College of Continuing Education, University of Minnesota

Co-sponsored by:
IEEE, Power and Energy Society, Twin Cities Chapter

cce.umn.edu/mnpowersystems

COLLEGE OF CONTINUING EDUCATION
University of Minnesota
## Program At A Glance

**TUESDAY, NOVEMBER 10, 2015**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session / Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 a.m.</td>
<td>Registration and Continental Breakfast</td>
</tr>
<tr>
<td>8:00</td>
<td>Welcome and Opening Remarks</td>
</tr>
<tr>
<td>8:15</td>
<td>Leadership in the Ever-Changing Energy Landscape</td>
</tr>
<tr>
<td>9:00</td>
<td>Construction of the Minnesota Multipurpose Stadium</td>
</tr>
<tr>
<td>9:45</td>
<td>Break</td>
</tr>
<tr>
<td>10:15</td>
<td>Delivering Electric Power to the Bakken</td>
</tr>
<tr>
<td>11:00</td>
<td>Business Ethics: Lessons from an $8.5 Million Fraud</td>
</tr>
</tbody>
</table>

**Noon**

<table>
<thead>
<tr>
<th>Location</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lunch – Grand Ballroom</td>
</tr>
</tbody>
</table>

### General Session – Grand Ballroom

<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>Welcome and Opening Remarks</td>
</tr>
<tr>
<td>8:15</td>
<td>Leadership in the Ever-Changing Energy Landscape</td>
</tr>
<tr>
<td>9:00</td>
<td>Construction of the Minnesota Multipurpose Stadium</td>
</tr>
<tr>
<td>9:45</td>
<td>Break</td>
</tr>
<tr>
<td>10:15</td>
<td>Delivering Electric Power to the Bakken</td>
</tr>
<tr>
<td>11:00</td>
<td>Business Ethics: Lessons from an $8.5 Million Fraud</td>
</tr>
</tbody>
</table>

### breakout Sessions

<table>
<thead>
<tr>
<th>Substation Rooms 1-3</th>
<th>Utility Industry Futures I Ballroom A</th>
<th>Delivery Systems I Rooms 4-6</th>
<th>Relaying I Ballroom E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:00 p.m.</td>
<td>3-D Coming to a Substation Near You</td>
<td>Performance Analysis of 258 kW AC Solar Demonstration Project</td>
<td>Xcel Energy Field Area Network</td>
</tr>
<tr>
<td>1:45</td>
<td>Evaluating Dielectric Condition in SF6 Gas Breakers</td>
<td>Hometown BioEnergy: On Peak Power Generation from Waste</td>
<td>Meeting the Challenges in Regional Transmission Planning and Development</td>
</tr>
<tr>
<td>2:30</td>
<td>Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:45</td>
<td>Experiences with Mobile Substation Installations</td>
<td>Distributed Generation and Electric Rates</td>
<td>Distribution Grid Resiliency Structure Testing, Results, and Learnings</td>
</tr>
<tr>
<td>3:30</td>
<td>System Upgrades for Phase Angle Regulating Transformers</td>
<td>Drones Promise Faster, Easier Inspection</td>
<td>Robots for Energized Transmission Line Work</td>
</tr>
<tr>
<td>4:15</td>
<td>Exhibitor Reception (4:15-6:30) – Exhibit Hall A (Lower Level)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6:30</td>
<td>Adjourn</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WEDNESDAY, NOVEMBER 11, 2015**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session / Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30 a.m.</td>
<td>Registration and Continental Breakfast</td>
</tr>
<tr>
<td>8:30</td>
<td>Antenna Systems–The Weak Link in High Data Throughput Wireless Data Communications Systems</td>
</tr>
<tr>
<td>9:15</td>
<td>Hacking SCADA Networks–Awareness and Prevention</td>
</tr>
<tr>
<td>10:00</td>
<td>Break</td>
</tr>
<tr>
<td>10:30</td>
<td>What Protection Engineers Need to Know About Networking</td>
</tr>
<tr>
<td>11:15</td>
<td>Securing Communications for SCADA and Critical Industrial Systems</td>
</tr>
</tbody>
</table>

**Noon**

<table>
<thead>
<tr>
<th>Location</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lunch – Grand Ballroom</td>
</tr>
</tbody>
</table>

### Distribution Automation/Communications

<table>
<thead>
<tr>
<th>Ballroom E</th>
<th>Project Management Rooms 4-6</th>
<th>Utility Industry Futures II Ballroom A</th>
<th>Power Generation Rooms 1-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30</td>
<td>Storm Restoration of a 500 kV Line–Challenges &amp; Successes</td>
<td>Lessons Learned in Implementing Battery Systems Controls in Low-Inertia Systems</td>
<td>Traditional and Emerging Emissions Control for Baseload Generation Stations</td>
</tr>
<tr>
<td>9:15</td>
<td>Birch Lake Dam Rebuild</td>
<td>Risk of Unintentional Islanding in the Presence of Multiple Inverters or Mixed Generation Types</td>
<td>Low SCR Wind Generation Instability Identification and Mitigation</td>
</tr>
<tr>
<td>10:30</td>
<td>Leveraging the Power of GIS Technology for Asset Management–Pole Replacement Tracking Tool</td>
<td>Integrating Solar Energy</td>
<td>Spiritwood Station’s Unique Design Features</td>
</tr>
</tbody>
</table>
**Program Schedule**

Saint Paul RiverCentre  
175 West Kellogg Boulevard  
Saint Paul, Minnesota

**TUESDAY, NOVEMBER 10, 2015**

**GENERAL SESSION – Grand Ballroom**

8:00 a.m.–noon  
Moderator: Michael Marz  
Co-Moderators: Michael Ebert, Larry Brusseau, Al Haman

**Welcome and Opening Remarks**  
Michael Marz, American Transmission Company

**Leadership in the Ever-Changing Energy Landscape**  
Timothy Rogelstad, Otter Tail Power Company  
Change in the electrical energy landscape continues to accelerate. Utility leadership is needed to navigate this change, and this presentation will discuss how we lead the way to the future.

**Construction of the Minnesota Multipurpose Stadium**  
Kevin Dalager, M.A. Mortenson; Larry Heinsch, Gephart Electric - Build 23; Scott Smith, Parsons Electric - Build 23  
The construction of the Minnesota Multipurpose Stadium is underway on the eastern edge of downtown Minneapolis. This presentation will provide an overview of the construction, special challenges on site, expectations from stakeholders, and unique electrical installations implemented.

**Delivering Electric Power to the Bakken**  
Matthew Stoltz, Basin Electric Power Cooperative  
This presentation will describe how development of the Bakken oil field impacts the area transmission system. Transmission operational optimization and facility additions will be described in detail.

**Business Ethics: Lessons from an $8.5 Million Fraud**  
Nathan Mueller, Consultant  
Mr. Mueller will present the ethical lessons learned professionally and personally from embezzling $8.5 million and being sentenced to 97 months in federal prison.

**CONCURRENT SESSIONS**  
1:00–4:15 p.m.

**SUBSTATION – Rooms 1-3**  
Moderator: Chuck Healy  
Co-Moderators: Steve Mohs, Rick Johnson

**3D Coming to a Substation Near You**  
Michael Chasser, Burns & McDonnell  
This presentation will be an in-depth analysis of the benefits and challenges of migrating your existing design processes to a 3D design process. We will demonstrate migration from 2D CAD and Raster Image work flows to 3D and Intelligent 3D.
Evaluating Dielectric Condition in SF6 Gas Breakers
Linda Nowak, Doble Engineering

The object of this presentation is to review test techniques which have been developed for SF6 gas circuit breakers for evaluating their dielectric condition.

Experiences with Mobile Substation Installations
Scott Storrar, Xcel Energy

This presentation will provide an overview of mobile substations and how they are installed, including considerations for sizing, settings, and siting. It will also highlight some lessons learned: what has worked well and not so well.

System Upgrades for Phase Angle Regulating Transformers
Benjamin Fameree, Kenneth Sletten, Minnesota Power

This presentation examines the replacement of all eight motor drives for two-phase angle regulating transformers operating in series, including an upgrade of the equipment controls for remote monitoring and diagnostic analysis. The audience will be provided with an understanding of the planning, implementation, and commissioning of both projects taking place in International Falls, MN.

UTILITY INDUSTRY FUTURES I – Ballroom A
Moderator: Mike Steckelberg
Co-Moderators: Larry Brusseau, Philip Spaulding

Performance Analysis of 258 kW AC Solar Demonstration Project
John Aiton, Andy Bergrud, Great River Energy

Detailed performance comparisons of three equipment manufacturers and production data will be presented. Lessons learned regarding design, procurement, and construction will also be discussed.

Hometown BioEnergy: On Peak Power Generation from Waste
Benjamin Simmons, Avant Energy

Hometown BioEnergy generates sustainable energy on peak power from food and agricultural processing wastes. The project supports Minnesota Municipal Power Agency’s compliance with MN Renewable Energy Standard. Operational in 2013, the 8 MW distributed generation facility was designed with on-site gas storage, enabling “dispatch flexibility” to maximize revenue generation.

Distributed Generation and Electric Rates
Tom Nigon, STAR Energy Services LLC

Electric cooperatives are reviewing their rates because of the growth in solar distributed generation. Topics covered are strategies to reduce cost shifting including the development of a residential demand rate.

Drones Promise Faster, Easier Inspection
Jon Cavote, Brandon Schulz, United Dynamics Advanced Technologies Corporation

“United Aerobotics” process patented aerial drone inspections provide pathway to high-quality evaluation at reduced costs. Case studies present working proof of inspection performance and accuracy.

DELIVERY SYSTEMS I – Rooms 4-6
Moderator: Al Haman
Co-Moderators: Will Lovelace, Scott Hoberg

Xcel Energy Field Area Network
Kyle Grossmann, Dan Nordell, Xcel Energy

Xcel Energy is demonstrating a Field Area Network (FAN) architecture which is intended to extend the corporate data network using two additional standards-based and interoperable tiers (WiMAX and Wi-SUN) beyond the substation to support communication to a variety of field devices including Electric Distribution Automation (SCADA), Fault Locators, High-Speed Distribution Switching (Relaying), Gas Transmission and Distribution, Street Lighting, and both Electric and Gas Advanced Meter Infrastructure (AMI). A proof-of-concept project is being fielded in the Denver Metro area which will be a blueprint for future Xcel Energy field communications.

Meeting the Challenges in Regional Transmission Planning and Development
Douglas Brown, Siemens

FERC Order 1000 reformed electric transmission planning and cost allocation requirements for transmission providers. This presentation provides an overview of Order 1000 and looks at examples of developing and evaluating transmission plans to meet regional reliability, economic, and public policy needs.

Distribution Grid Resiliency Structure Testing, Results, and Learnings
David Flaten, Xcel Energy

Xcel Energy and EPRI simulated trees falling on a three-mile, out-of-service 1950s-era line. Results of structure and conductor failures are discussed along with potential mitigation measures.

Robots for Energized Transmission Line Work
Bryan Rushing, Quanta Technology

This presentation will explore past experience with ground-based robots and the current types of robots available in the industry. We will look at the basics of robots suspended from transmission lines and the basics of unmanned aerial vehicles. Additionally, we will explore methods to estimate benefits of energized work and the future of transmission line robotics.

RELAYING I – Ballroom E
Moderator: Neil Stiller
Co-Moderators: Dave Bisel, Greg Owen

Life Lessons from the Power System
R. Benjamin Kazimier, Basler Electric Company

Life Lessons from the Power System explores the basic principles of relay protection design and relay protection commissioning, while reflecting upon lessons learned.

A Practical Guide to Performing Wide-Area Coordination Analysis
Bipasha Barman, Power Engineers Inc.

The presentation will cover the analysis methodology and selecting an approach to performing a wide-area coordination study. Topics such as (i) subset boundaries, (ii) calculation spreadsheets, and (iii) looped system and multiterminal line examples will be presented to show the challenges, considerations, and choices the protection engineer may be faced with in this type of study.

Transmission Line Automated Relay Coordination Checking
Saman Alaeddini, Paul Nyombe, Quanta Technology, LLC.

This presentation is a follow-up to the previous year’s presentation which focused on the automation mechanics of evaluating the sensitivity and selectivity of transmission line protective relay settings. Now the focus is on some of the key findings of that automated relay coordination study.
Improving Reliability and Security of System Protection
Steve Turner, Beckwith Electric Company

Citing a NERC report on the dramatic rise in misoperations due to complex programming and testing of numerical protection relays, this paper provides examples of actual misoperations and illustrates results.

EXHIBITOR RECEPTION – Exhibit Hall A (Lower Level)
4:15–6:30 p.m.

WEDNESDAY, NOVEMBER 11, 2015

CONCURRENT SESSIONS
8:30 a.m.–noon

DISTRIBUTION AUTOMATION/COMMUNICATIONS – Ballroom E
Moderator: Jay Morris
Co-Moderators: Tom Guttormson, Dan Nordell

Antenna Systems – The Weak Link in High Data Throughput Wireless Data Communications Systems
Mike Larson, Larson Data Communications, Inc.

A growing number of utilities are experiencing poor radio link performance issues when fielding new generation radio systems, which are operating at ever-increasing over-the-air data throughput rates, made possible by ever-increasingly complex modulation schemes. The issue may be under-performing radio equipment, but often, the issues are the result of less-than-optimal antenna selection and mounting location.

Hacking SCADA Networks – Awareness and Prevention
Matthew Cowell, Phoenix Contact

This presentation will offer discussion on the threats facing industrial controls and SCADA systems with suggestions on how to prevent future incidents (including brief live demonstration).

What Protection Engineers Need to Know About Networking
Mark Adamiak, GE Grid Automation

This presentation explores the network architecture of the modern protection and control systems including protective relays. Lessons learned from real projects will also be presented.

Securing Communications for SCADA and Critical Industrial Systems
Kevin Carson, Schweitzer Engineering Laboratories, Inc.

This presentation details the threats that SCADA and industrial control systems face, how to detect and counter those threats, and how to apply countermeasures, new technologies, and safe practices to these systems.

PROJECT MANAGEMENT – Rooms 4-6
Moderator: Denny Branca
Co-Moderators: Greg Woodworth, Jake Bernhagen

Storm Restoration of a 500 kV Line – Challenges & Successes
William Pim, Xcel Energy

Overview of the development of a dedicated restoration plan for a remote 500 kV transmission line and subsequent successful execution of the plan to rapidly replace a downed tower.
Lessons Learned from Failures
Peter Catchpole, Power Engineers, Inc.

By using examples, we will explore the various types of failures and the value of studying them. Additionally, we will discuss how to study and learn from the lessons of failures.

Study of Galloping Mitigation
Jay Quint, Burns & McDonnell

Galloping is large amplitude oscillations which impact the operation of a transmission line. This discussion will review the available devices used to control galloping.

Transition from SPS to RAS – What Will Really Change?
Hari Singh, Xcel Energy

Apparent versus actual changes in NERC’s new Remedial Action Scheme (RAS) definition are delineated. Rationales for explicitly excluding certain corrective actions from the RAS “umbrella” are discussed.

Downtown East Distribution System
Andy Dammel, Xcel Energy

Xcel Energy redesigned its distribution system in downtown Minneapolis to provide cost-effective and reliable service to the Vikings Stadium and surrounding developments. This presentation explains how that was accomplished.

Transmission Planning for Physical Security of Critical Electricity Infrastructure
Frank McElvain, Siemens PTI

An effective CIP-014-2 grid criticality study adds key insight to assure reliability. Presentation will provide unique perspectives on reliability coordination, planning, and the military to maximize insights from a CIP-014-2 criticality evaluation.

Meeting Minnesota Energy Efficiency Requirements with Utility Projects
Aaron Vander Vorst, Minnkota Power Cooperative, Inc.

This presentation introduces use of utility-scale projects to meet MN Conservation Improvement Program energy efficiency requirements. It will also cover the introduction to CIP, lessons learned, and creative identification of projects during system planning and design.

Concurrent Sessions
1:00–4:15 p.m.

CIVIL-STRUCTURAL – Ballroom A
Moderator: Rick Johnson
Co-Moderators: Chuck Healy, Steve Mohs

Conductor Dynamics: Practical Information for Design Engineers
Paul Springer, Southwire

While vibration theory can be daunting, the practical rules are not. This presentation is designed to help the transmission engineer know whether they need dampers, and if so, what the right questions are to get fair value for the investment in vibration protection.

Foundation Design and Construction Challenges with Shallow Bedrock
Nathaniel Roth, Sargent & Lundy

Foundation design and construction can be extremely challenging with shallow bedrock. This presentation will explore viable foundation types, as well as the potential challenges faced during construction.

Lessons Learned from Failures
Peter Catchpole, Power Engineers, Inc.

By using examples, we will explore the various types of failures and the value of studying them. Additionally, we will discuss how to study and learn from the lessons of failures.

Low SCR Wind Generation Instability Identification and Mitigation
Will Lovelace, Minnkota Power Cooperative, Inc.

Instability may result from high penetration of power electronic-based generation such as wind into a relatively weak system. This presentation describes historical events resulting from a low SCR (Short Circuit Ratio) and some low-cost control changes employed as mitigation.

Spiritwood Station’s Unique Design Features
William Gallagher, Great River Energy

North Dakota’s newest coal-fired, combined heat- and power-generating station was presented with fuel, ash, steam, and water challenges. This session discusses how those challenges were met.

Minnesota Power Laskin Energy Center Gas Conversion
Jodi Piekarski, Kristopher Spenningsby, Minnesota Power

Minnesota Power has recently converted its Laskin Energy Center from coal to natural gas. This presentation will cover the project from origination through start-up focusing on scope development, design, permitting, and construction.

Concurrent Sessions
1:00–4:15 p.m.

CIVIL-STRUCTURAL – Ballroom A
Moderator: Rick Johnson
Co-Moderators: Chuck Healy, Steve Mohs

Conductor Dynamics: Practical Information for Design Engineers
Paul Springer, Southwire

While vibration theory can be daunting, the practical rules are not. This presentation is designed to help the transmission engineer know whether they need dampers, and if so, what the right questions are to get fair value for the investment in vibration protection.

Foundation Design and Construction Challenges with Shallow Bedrock
Nathaniel Roth, Sargent & Lundy

Foundation design and construction can be extremely challenging with shallow bedrock. This presentation will explore viable foundation types, as well as the potential challenges faced during construction.

Lessons Learned from Failures
Peter Catchpole, Power Engineers, Inc.

By using examples, we will explore the various types of failures and the value of studying them. Additionally, we will discuss how to study and learn from the lessons of failures.

Low SCR Wind Generation Instability Identification and Mitigation
Will Lovelace, Minnkota Power Cooperative, Inc.

Instability may result from high penetration of power electronic-based generation such as wind into a relatively weak system. This presentation describes historical events resulting from a low SCR (Short Circuit Ratio) and some low-cost control changes employed as mitigation.

Spiritwood Station’s Unique Design Features
William Gallagher, Great River Energy

North Dakota’s newest coal-fired, combined heat- and power-generating station was presented with fuel, ash, steam, and water challenges. This session discusses how those challenges were met.

Minnesota Power Laskin Energy Center Gas Conversion
Jodi Piekarski, Kristopher Spenningsby, Minnesota Power

Minnesota Power has recently converted its Laskin Energy Center from coal to natural gas. This presentation will cover the project from origination through start-up focusing on scope development, design, permitting, and construction.

CONCURRENT SESSIONS
1:00–4:15 p.m.

CIVIL-STRUCTURAL – Ballroom A
Moderator: Rick Johnson
Co-Moderators: Chuck Healy, Steve Mohs

Conductor Dynamics: Practical Information for Design Engineers
Paul Springer, Southwire

While vibration theory can be daunting, the practical rules are not. This presentation is designed to help the transmission engineer know whether they need dampers, and if so, what the right questions are to get fair value for the investment in vibration protection.

Foundation Design and Construction Challenges with Shallow Bedrock
Nathaniel Roth, Sargent & Lundy

Foundation design and construction can be extremely challenging with shallow bedrock. This presentation will explore viable foundation types, as well as the potential challenges faced during construction.

Lessons Learned from Failures
Peter Catchpole, Power Engineers, Inc.

By using examples, we will explore the various types of failures and the value of studying them. Additionally, we will discuss how to study and learn from the lessons of failures.

Low SCR Wind Generation Instability Identification and Mitigation
Will Lovelace, Minnkota Power Cooperative, Inc.

Instability may result from high penetration of power electronic-based generation such as wind into a relatively weak system. This presentation describes historical events resulting from a low SCR (Short Circuit Ratio) and some low-cost control changes employed as mitigation.

Spiritwood Station’s Unique Design Features
William Gallagher, Great River Energy

North Dakota’s newest coal-fired, combined heat- and power-generating station was presented with fuel, ash, steam, and water challenges. This session discusses how those challenges were met.

Minnesota Power Laskin Energy Center Gas Conversion
Jodi Piekarski, Kristopher Spenningsby, Minnesota Power

Minnesota Power has recently converted its Laskin Energy Center from coal to natural gas. This presentation will cover the project from origination through start-up focusing on scope development, design, permitting, and construction.
CT Saturation Tolerance for 87L Applications
Terrence Smith, GE Digital Energy

This paper explores requirements for the line current differential function (87L) with regard to the tolerance to current transformer (CT) saturation. Typically, requirements provided by manufacturers or standards are to eliminate CT saturation completely by proper sizing of CTs, which is not always practical.

METERING – Rooms 1-3
Moderator: Tom Guttormson
Co-Moderators: Jay Morris, Dan Nordell

Advantages of Two-Way AMI/Demand Response Systems
Danielle Thompson, Eaton Corporation; Brad Lingen, Missouri River Energy Services

This presentation will explain the implementation of the MRES hosted multimunicipal member DR and AMI programs across four states using Eaton’s DR/AMI solution.

Minnesota Power’s Smart Grid Investment Grant Impacts: Past, Present, and Future
Daniel Gunderson, Tina Koecher, Minnesota Power

This presentation will focus on Minnesota Power’s Smart Grid Investment Grant Award, including how the Advanced Metering Infrastructure (AMI) deployment and Distribution Automation investment shaped the vision for a better customer experience. An overview of the project execution, lessons learned, and how those lessons are shaping the future strategic direction for Minnesota Power will be discussed.

Achieving Interoperability in a World of Standards Compliance
Dan Nordell, Xcel Energy
The buzzword of the day for vendors is to declare that their systems are “standards based”. What utilities need and want is “interoperability”. Standards compliance is a necessary but not sufficient component in achieving interoperability. This talk will examine what is needed to achieve true interoperability and help the audience become more discerning as they discuss this important issue with their vendors.

What to Do with All That 2-Way End-Device Data
Joe Childs, Eaton Corporation

This session reviews the value assessment of utilizing two-way data, and addresses some of the challenges of managing the abundance of data available. Discussion will occur about optimizing the data received through AMI, load management, and volt-var control applications.

THURSDAY, NOVEMBER 12, 2015

CONCURRENT SESSIONS
8:30 a.m.–noon

TUTORIAL I – Rooms 1-3
Moderator: Tom Guttormson
Co-Moderators: Greg Owen, Will Lovelace

Methods to Reduce Arc-Flash Hazards
David Bisel, Mike Merow, Schweitzer Engineering Laboratories

This tutorial discusses protective relaying methods used to reduce arc-flash hazards in switchgear, MCCs, and overhead distribution lines. Methods discussed include maintenance mode activation of instantaneous overcurrent settings, bus differential relaying, and high-speed light detection with optical sensors. Background information on arc flash and the standards driving calculations will be covered. Application and installation examples are shown, along with an exercise on implementing instantaneous settings for maintenance mode.

TUTORIAL II – Ballroom A
Moderator: Larry Brusseau
Co-Moderators: Michael Marz, Greg Woodworth

Project and Construction Management Techniques
Duane Phillips, Stanley Consultants, Inc.
Travel through a typical power delivery project work scope to introduce and develop project and construction processes and skills. Included will be industry best-practice techniques and considerations for specifically developing project and construction plans.

TUTORIAL III – Rooms 4-6
Moderator: Denny Branca
Co-Moderators: Steve Mohs, Chuck Healy

Shunt Capacitor Banks – Specifications, Applications, and Best Practices for Protection and Switching
Pratap Mysore, HDR Inc.
The tutorial provides insight into basics of shunt capacitor bank specifications, applications, and protection. Issues associated with switching transients and use of current limiting reactors with latest industry information are also covered.

GUIDEBOOK MOBILE APP
The Minnesota Power Systems Conference has gone mobile! Attendees can plan their days with a personalized schedule and browse concurrent sessions, exhibitors, and venue maps. The app is compatible with iPhones, iPads, and Android devices. Windows Phone and Blackberry users can access the same information via the mobile site: http://guidebook.com/guide/41965

iOS and Android users:
• Download ‘Guidebook’ from the Apple App Store or the Android Marketplace
• Scan the following image with your mobile phone’s QR-Code reader

WI-FI INFORMATION
Saint Paul RiverCentre’s public Wi-Fi signal is called “RC_FreeWifi” and can be accessed in all areas of the complex. Connect to the signal and then review and accept the terms on the page that auto populates.
CONTINUING EDUCATION UNITS (CEUs)
Participants who attend the entire conference will receive 1.5 University of Minnesota, College of Continuing Education CEUs. Participants who attend only Tuesday and Wednesday will receive 1.2 CEUs. One CEU is defined as 10 contact hours of participation in an organized continuing education experience. A CEU certificate will be sent to each participant after the conference. A permanent record of CEUs earned will be maintained by the University of Minnesota Office of Admissions and Record Transcript Unit.

ADDITIONAL INFORMATION
Visit the conference website – cce.umn.edu/mnpowersystems – for additional information on:
• 2016 call for presentations
• Conference papers and PowerPoint presentations