

UNIVERSITY OF MINNESOTA

3 7 T H A N N U A L



Minnesota Power Systems Conference

November 12-14, 2001

**Earle Brown Continuing Education Center
University of Minnesota, St. Paul Campus**

Cosponsored by:

Twin Cities Section of IEEE

College of Continuing Education,

University of Minnesota

This conference provides electric utility engineers and consultants the opportunity to stay abreast of today's power system technology. The conference emphasizes the unique challenges faced by electric utilities in the Midwest. The conference also serves as a forum for power engineers to meet with their colleagues from other utilities to discuss mutual concerns. Newly created and redesigned concurrent sessions include project management, delivery systems, relaying, utility industry futures, design/redesign, and distributed resources.

Earn 16 Professional Development Hours for attending this program.



COLLEGE OF CONTINUING EDUCATION

Program Schedule

Monday, November 12, 2001

CONCURRENT SESSIONS

8:30 a.m.-12:00 p.m.

PROJECT MANAGEMENT

Moderator: Ivars Vancers

Co-Moderators: Roger Simundson, Phil Spaulding

- 7:30 Check-in
Continental Breakfast
- 8:30 Welcome
Craig Turner, Dakota Electric Association
- 8:45 Ramsey-McHenry 230 kV line —Temporary Rebuild
Brian Malchert, Otter Tail Power Company
- 9:30 Xcel Energy Willmar to Paynesville 230 kV Project: A Project Management Success Story
Pamela Jo Rasmussen, and Eugene R. Kotz II, Xcel Energy, Inc.
- 10:15 Break
- 10:30 St. Cloud Gas Explosion Case Study – What Went Wrong
Gary O'Hara, Xcel Energy, Inc.
- 11:15 Fundamentals of Project Management
Karl A. Smith, University of Minnesota
- 12:00 Lunch

DELIVERY SYSTEMS I

Moderator: Gerry Steffens

Co-Moderators: Nathan Germolus, Mark Harvey

- 7:30 Check-in
Continental Breakfast
- 8:30 Welcome
Al Haman, STAR Energy Services, LLC
- 8:45 A Five Year Analysis of Arrester Protected 69kV Circuits; Quantifying Line Performance Improvement
Jennifer Johnson, Minnkota Cooperative, Inc.; David Van House, Minnesota Power
- 9:30 Transient and Harmonic Overvoltages During Black Start Energization
Sung D. Cho and Bruce A. Mork, Michigan Technological University; Kalyan K. Mustaphi, Xcel Energy, Inc.
- 10:15 Break
- 10:30 Transmission Line Protective Systems Loadability
Roger Hedding, ABB Automation Inc.
- 11:15 North Dakota Transmission System – Past, Present, and Future
Timothy J. Rogelstad, Otter Tail Power Company
- 12:00 Lunch

CONCURRENT SESSIONS

1:00 p.m.-4:15 p.m.

RELAYING

Moderator: Jon Wahlgren

Co-Moderators: Pat Hayes, Gerry Steffens

- 1:00 Polarization Fundamentals
Roger Hedding, ABB Automation Inc.
- 1:45 Application of Current Differential Protection to Tapped Transmission Lines
Mark Adamiak, General Electric Company
- 2:30 Break
- 3:00 Understanding and Analyzing Event Report Information
David Costello, Schweitzer Engineering Laboratories, Inc.
- 3:45 Application and Protection of Shunt Capacitor Banks - Part II
Pratap G. Mysore, Xcel Energy, Inc.

DELIVERY SYSTEMS II

Moderator: Al Haman

Co-Moderators: Mark Harvey, Mike Klopp

- 1:00 Introduction to Reliability
Jean Waltz, Xcel Energy, Inc.
- 1:45 Application of Distributed Generation in Downtown Minneapolis-Project Management Aspects
Dave Boyles, Sebesta Blomberg & Associates
- 2:30 Break
- 3:00 Automatic Meter Reading – One Utility’s Decision to Install AMR and their Subsequent Experience
Eric Nordin, Minnesota Valley Electric Cooperative
- 3:45 Three-Phase Transformer Applications
Don L. Stuehm, North Dakota State University;
Bruce A. Mork, Michigan Technological University

EXHIBITOR RECEPTION

4:15-6:00 p.m.

Tuesday, November 13, 2001

GENERAL SESSION

8:15 a.m.-12:00 p.m.

STATE OF THE INDUSTRY ADDRESS

Moderator: Mike Steckelberg
Co-Moderators: Al Haman, Craig Turner

7:30	Continental Breakfast	10:15	Dakota, Minnesota, & Eastern (MDE) Railroad-Fuel Supply Project <i>John Waltman, Dakota, Minnesota, & Eastern Railroad</i>
8:15	General Announcements and Introduction of General Session <i>Craig Turner, Dakota Electric Association</i>	10:45	Power Delivery Planning – A Strategy for Planning Your Success <i>Thomas M. Lebakken, Power System Engineering Inc.</i>
8:30	Birth of a Resource: When? Where? How Much? How? <i>Betsy Engelking, Great River Energy</i>	11:15	Transmission as a Business <i>Terry Volkman, Xcel Energy, Inc.</i>
9:00	Department of Commerce – Energy Regulation Update <i>Jim Bernstein, Minnesota Department of Commerce</i>	11:45	General Presentations
9:45	Break	12:00	Lunch

CONCURRENT SESSIONS

1:00 p.m.-4:15 p.m.

SUBSTATION

Moderator: Denny Branca
Co-Moderators: Mike Klopp, Brian Lorentz

1:00	Shunt Capacitor Bank Applications <i>Antone Bonner, Cooper Power Systems</i>
1:45	Windfalls and Pitfalls - Firmware Upgrades for Microprocessor Relays <i>Tom Ernst, Minnesota Power</i>
2:30	Break
2:45	Typical Power Transformer Repair Specifications <i>Ken Kampshoff and Mark Hammer, US Transformer, Inc.</i>
3:30	Online Transformer Rating, Theory, and Experience <i>Russ Mattson and David Van House, Minnesota Power</i>

UTILITY INDUSTRY FUTURES

Moderator: Curt Monteith
Co-Moderators: Mike Steckelberg, Ivars Vancers

1:00 p.m.	Minnesota Regulatory Functions for the 21 st Century <i>Al Bierbaum, Minnesota Public Utilities Commission</i>
1:45	Temporary Spent Nuclear Fuel Storage Facility in Utah <i>Max M. DeLong, Xcel Energy, Inc.</i>
2:30	Break
2:45	Design Considerations for a Long Distance Power Transmission System with Interconnected Windpower <i>Michael Ropp, South Dakota State University</i>
3:30	D-SMES as a Voltage Stability Solution <i>Pete Hamacher, Wisconsin Public Service Corporation</i>

Wednesday, November 14, 2001

CONCURRENT SESSIONS

8:30-11:45 a.m.

DESIGN/REDESIGN

Moderator: Nathan Germolus
Co-Moderators: Al Haman, Pat Hayes

- 7:30 Continental Breakfast
- 8:30 Minneapolis XXI: Adding West River Road Substation
Scott Zima, Xcel Energy, Inc.
- 9:15 Generator Unit Relaying Upgrades – An Integrated Design
Matt Fowler and Dave Bisel, Minnesota Power
- 10:00 Break
- 10:15 Bus Design and Connections: Things to Consider
Glenn J. Gauger, Ulteig Engineers, Inc.
- 11:00 Important Factors in Calculating Cable Ampacities
Ed Walcott, BICC General Cable

DISTRIBUTED RESOURCES

Moderator: Dave Peterson
Co-Moderators: Larry Brusseau, Mike Steckelberg

- 7:30 Continental Breakfast
- 8:30 IEEE P1547–Standard for Interconnecting Distributed Resources with Electric Power Systems Update
Tom Ernst, Minnesota Power
- 9:15 Application of Microturbines to Defer Substation Expansion
Randy Bauer, Alliant Energy
- 10:00 Break
- 10:15 Installation of a 6 MW, Campus Generation System at Treasure Island Casino
Dan Ross, Consulting Engineering Group; Craig Turner, Dakota Electric Association; Paul Kaeding, Kaeding and Associates
- 11:00 Microturbine Installation and Operating Experience
Wayne Hanson, Great River Energy

11:45 Conference Adjourns

Topic Descriptions

PROJECT MANAGEMENT

Ramsey-McHenry 230 kV line —Temporary Rebuild

Brian Malchert, Otter Tail Power Company

A 10-mile rebuild/reroute of the 230 kV line starting just south of Devils Lake, North Dakota was completed in late December 2000. This paper will discuss the teamwork by area utilities to design, locate, and deliver material, and to assemble manpower and equipment to accomplish the task. The work was completed in 12 days with an average temperature of 0 degrees by a dedicated group of linemen from seven area utilities.

Xcel Energy Willmar to Paynesville 230 kV Project: A Project Management Success Story

Pamela Jo Rassmussen and Eugene R. Kotz II, Xcel Energy, Inc.

The industry is facing challenges from the public and regulators in their efforts to build infrastructure in a timely manner. Xcel Energy, along with Great River Energy and Willmar Municipal Utilities, is partnering on a project in western Minnesota that is a success story in the midst of many projects that are stalled in the permitting phase. Through good communication and cooperation between neighboring utilities, government agencies and the public, the 30-mile rebuild of a 115 kV transmission line to 230 kV line, announced at the end of 2000, is well on its way to completion in 2003. A discussion of the various issues and actions that have worked well for this project relative to permitting and construction will be discussed.

Fundamentals of Project Management

Karl A. Smith, University of Minnesota

Brief overview of fundamental technical and human aspects necessary for effective project management. Emphasizes project characteristics; basics of planning, scheduling, and controlling; achieving time, cost, quality, and client acceptance objectives; scoping projects by creating a project charter, statement of work, and work breakdown structure; and using project scheduling programs.

DELIVERING SYSTEMS I

A Five-Year Analysis of Arrester Protected 69kV Circuits; Quantifying Line Performance Improvement

Jennifer Johnson, Minnkota Cooperative, Inc.;

David Van House, Minnesota Power

In 1995 Minnkota Power began installing arresters on their 69kV transmission system. This paper will discuss the process Minnkota Power used in deciding where and how to install arresters, what worked, and what additional data would have been useful in making this decision. It will also discuss the process used to determine if the performance of the lines improved, the shortcomings of this analysis, lessons learned, and if the expense can be justified by improved performance.

Transient and Harmonic Overvoltages During Black Start Energization

Sung D. Cho and Bruce A. Mork, Michigan Technological University; Kalyan K. Mustaphi, Xcel Energy, Inc.

This presentation will address the transient and harmonic overvoltages occurring during black start procedures, discusses the development of Electromagnetic Transient Program (EMTP) models, and presents simulation results. The simulated voltages and currents at energized buses and transformers are compared with the actual fault recorder measurement. Based on these comparisons with the measurement, modeling requirements and some guidelines necessary for obtaining accurate results are provided.

Transmission Line Protective Systems Loadability

Roger Hedding, ABB Automation Inc.

This paper is about the effects of protective relaying on the loadability of transmission lines. The calculation of relaying load limits for use in comparing to transmission line load limits or other limits is discussed. The identification of problems associated with the application of relay protection that result in the interference of line loading capabilities is covered. This is followed by the discussion of methods available that are aimed at increasing the loadability of relay schemes while also maintaining required levels of relay coverage and security.

North Dakota Transmission System – Past, Present, and Future

Timothy J. Rogelstad, Otter Tail Power Company

In the past, the North Dakota transmission system has been primarily limited by transient stability. Recent transmission studies have demonstrated that thermal problems, as well as steady state voltage stability problems, are occurring and may eventually become as limiting as transient stability. This paper will provide a history of the North Dakota transmission system, discuss the results of the recent technical studies, and talk about what future facility additions are planned to mitigate the problems.

RELAYING

Polarization Fundamentals

Roger Hedding, ABB Automation Inc.

Polarizing is a term used in relaying to describe the process of selecting some reference phasor, with which other phasors may be compared to determine forward or reverse fault direction. For example, a current may be compared in phase relationship with a voltage or with another current. The reference phasor is chosen to have a predictable relationship to current flowing to a fault, irrespective of the location of the fault. This paper presents a tutorial on polarization and shows some examples of related application problems.

Application of Current Differential Protection to Tapped Transmission Lines

Mark Adamiak, General Electric Company

Given the continuing growth of reliable high-speed digital communications throughout the utility enterprise, digital current differential protection of power lines has become attractive. This paper looks at the issues of applying differential protection on tapped lines where the measurement of current at the tap point is not available or economically justifiable.

Understanding and Analyzing Event Report Information

David Costello, Schweitzer Engineering Laboratories, Inc.

Event reporting is a standard feature in microprocessor-based protective relays. The information saved in these reports is valuable for testing, measuring performance, analyzing problems, and identifying deficiencies before they cause future misoperations. This paper emphasizes the usefulness of event report data and shows practical analysis methods and simple tools.

Application and Protection of Shunt Capacitor Banks - Part II

Pratap G. Mysore, Xcel Energy, Inc.

The power point presentation is based on the most recently published IEEE guide for the protection of shunt capacitor banks, C37.99-2000. The presentation highlights the protection aspects for different bank configurations with either internally or externally fused capacitor units or fuseless or unfused capacitor units. The presentation also highlights commissioning, operations, and maintenance issues related to capacitor banks.

DELIVERY SYSTEMS II

Introduction to Reliability

Jean Waltz, Xcel Energy, Inc.

Reliability indices are common utility terms recognized by everyone, but often times misunderstood. This presentation will discuss some of the basic industry reliability indices, including SAIDI, SAIFI, CAIDI, and MAIFI. As major storms can greatly affect the reliability indices, many utilities also calculate 'storm normalized' values. The calculation for storm normalizing varies from one utility to another and has prompted the IEEE to propose a standardized methodology. With restructuring either here or on the horizon for upper Midwest states, regulators are becoming more active in determining acceptable levels of performance for electric utility companies. A brief discussion of state positions on reliability performance will wrap up the session.

Application of Distributed Generation in Downtown Minneapolis-Project Management Aspects

Dave Boyles, Sebesta Blomberg & Associates

The district energy plant operated by Hennepin County in downtown Minneapolis presents a good opportunity to install a combined heat and power plant for distributed generation. This presentation will highlight the feasibility, sizing, and environmental issues associated with the installation and operation of such a plant.

Automatic Meter Reading – One Utility's Decision to Install AMR and their Subsequent Experience

Eric Nordin, Minnesota Valley Electric Cooperative

This presentation will summarize the course of events that started MVEC looking at AMR systems, the decision process to select a system, experience to date installing the equipment, and benefits the system has been able to deliver.

Three-Phase Transformer Applications

*Don L. Stuehm, North Dakota State University;
Bruce A. Mork, Michigan Technological University*

Three-phase transformer connections will be evaluated and discussed. The evaluation includes ratings, cores, phase shift, grounding, unbalance, faults, ferro resonance, and harmonics. The emphasis will be on why certain connections are used and the reasons why others should not be used.

GENERAL SESSION—STATE OF THE INDUSTRY ADDRESS

Birth of a Resource: When? Where? How Much? How?

Betsy Engelking, Great River Energy

How does a utility decide which resources to add? How do you compare build versus buy decisions? This discussion will cover the resource planning and development process from the load forecast to integrated planning, market analysis, RFPs, and self-build options.

Department of Commerce – Energy Regulation Update

Jim Bernstein, Minnesota Department of Commerce

The presentation will provide a regulatory perspective on current energy issues including economic and customer service considerations and how energy regulation will affect our future. Commissioner Bernstein will also provide a progress update on the mandates of the new state energy legislation.

Dakota, Minnesota, & Eastern (MDE) Railroad – Fuel Supply Project

John Waltman, Dakota, Minnesota, & Eastern Railroad

DM&E Railroad is building into the Powder River Basin in Wyoming. Nearly 900 miles of new and re-constructed railroad will total about \$1.4 billion in investment in Wyoming, South Dakota, and Minnesota. This is the largest railroad project in 100 years. John Waltman, VP Energy, will provide an update on the project, the approval process, and impacts on the Energy Industry.

Power Delivery Planning – A Strategy for Planning Your Success

Thomas M. Lebakken, Power System Engineering Inc.

Electric distribution system and operations planning for your utility has become increasingly complex. Pressures in the areas of customer service and reliability, coupled with

opportunities for automation, distributed generation, and other solutions, is changing the shape of strategic plans. Learn about one approach to creating a broader and more meaningful strategic plan, called a “Power Delivery Plan.”

Transmission as a Business

Terry Volkman, Xcel Energy, Inc.

From the Federal Power Act of 1992 to FERC 888/889 to Order 2000, FERC has endeavored to open access to transmission system and create regional markets. Some parts of the country have moved faster than others. Some parts of the country have been more successful than others in moving to a regional market. The transition has been slower than desired by FERC. Why aren't utilities embracing FERC's vision and timeframe? Will FERC's model in the end state create robust transmission business? Will it foster expansion? Will investors view transmission as a good investment? Let's explore Transmission as a Business.

SUBSTATION

Shunt Capacitor Bank Applications

Antone Bonner, Cooper Power Systems

This presentation will review IEEE 1036 Guide for the Application of Shunt Power Capacitors. The guide includes information on capacitor benefits, ratings, switching transients, and substation and distribution feeder applications. The most recent changes to the guide will be highlighted. These changes include capacitor momentary capabilities, power quality considerations, switchgear issues, and explanation of capacitor bank types (externally fused, internally fused, and fuseless capacitor banks).

Windfalls and Pitfalls - Firmware Upgrades for Microprocessor Relays

Tom Ernst, Minnesota Power

The promise of a future with reduced relay maintenance, due to self-diagnostics and reduced testing requirements, financially drives the move toward replacement of electro-mechanical relays with microprocessor based relays. However, the maintenance costs and bookkeeping requirements associated with firmware upgrades may reduce the future savings. This paper explores the issue of minimizing the cost of firmware upgrades and challenges the relay vendors to provide relays with minimal life-cycle firmware upgrades.

Typical Power Transformer Repair Specifications

Ken Kampshoff and Mark Hammer, US Transformer, Inc.

This presentation will cover the details of a typical transformer repair specification. Following this specification will insure a transformer received from a repair facility will meet current ANSI standards and provide years of continued service. Topics to be covered include: failure analysis, winding types, insulation systems, short circuit forces, and testing.

Online Transformer Rating, Theory, and Experience

Russ Mattson and David Van House, Minnesota Power

The manufacturer's rating of a transformer is based on its continuous operation at nameplate rating with an ambient temperature of 30°C and resulting hottest spot winding temperature of 95 or 110° C. Use of online temperature probes provide the data necessary to safely load transformers on the basis of a thermal equivalent to the nameplate rating. This paper will discuss the theory of this method of loading, development of algorithms to estimate future hottest spot temperature, and Minnesota Power's experience to date.

UTILITY INDUSTRY FUTURES

Minnesota Regulatory Functions for the 21st Century

Al Bierbaum, Minnesota Public Utilities Commission

Significant regulatory changes are occurring following a number of 2001 Minnesota Legislature mandates. These mandates involve simplifying the transmission line siting process, and granting more regulatory authority in Promulgating rules to measure electric utility reliability and developing interconnection standards for distributed generation. The Minnesota Legislature seems to be swinging its emphasis from ensuring that electric rates are reasonable and proper to looking at electric system reliability issues. This presentation will discuss the history of electric utility regulation in Minnesota, the impact of the 2001 Legislative mandates, and some projections for possible deregulation in the future.

Temporary Spent Nuclear Fuel Storage Facility in Utah

Max M. DeLong, Xcel Energy, Inc.

The Private Fuel Storage, LLC is developing a temporary spent nuclear fuel storage facility on the Reservation of the Skull Valley Band of the Goshute Indians near Salt Lake City, Utah. This status report will address the NRC licensing activities, the facility design, and the storage and transportation technologies used.

Design Considerations for a Long Distance Power Transmission System with Interconnected Windpower

Michael Ropp, South Dakota State University

There is strong interest in building new generation plants in the coal fields of Wyoming, and exporting the generated power to eastern and southwestern markets via HVDC lines. This presentation discusses possibilities and technical challenges associated with allowing access to these lines for wind turbines.

D-SMES as a Voltage Stability Solution

Pete Hamacher, Wisconsin Public Service Corporation

A summary of WPSC's experiences evaluating, installing, and operating six Distributed Superconducting Magnetic Energy Storage (D-SMES) units spread throughout a 200-mile 115 kV transmission network located in north central Wisconsin. The D-SMES units were installed to eliminate voltage stability concerns in that region by injecting real and reactive power into the transmission grid in response to critical transmission system contingencies.

DESIGN/REDESIGN

Minneapolis XXI: Adding West River Road Substation

Scott Zima, Xcel Energy, Inc.

Moving forward into the 21st Century, the City of Minneapolis is redeveloping itself at a record pace. What is the Xcel Energy plan to meet 70MVA of downtown electrical load growth from 2001 to 2003? More than 30 major construction projects downtown are in progress, including: four new blocks with Target, American Express Client Server, the Convention Center in the south and west, the warehouse district, scrap metal yards, old federal reserve redevelopment in the north and west, the mills district and riverfront redevelopment with the new Guthrie Theater in the north and east, and Light Rail Transit corridor down the center. Find out how Xcel Energy plans to serve Minneapolis XXI expanding electrical needs.

Generator Unit Relaying Upgrades – An Integrated Design

Matt Fowler and Dave Bisel, Minnesota Power

This presentation will cover the project of replacing a 500MW unit's aging relay system. The project scope included upgrading the auxiliary transformer, generator, generator step-up transformer, and 230kV bus relaying systems. Topics covered will include design criteria, relaying and wiring details, unique features, and problems encountered along the way.

Bus Design and Connections: Things to Consider

Glenn J. Gauger, Ulteig Engineers, Inc.

In the past many substation engineers have considered only deflection and material stresses when designing tubular bus configurations. Other elements of design such as switch pad strength, switch operation, geometric layout, bus fittings and connections should also be considered. This paper will describe the various parameters, discuss their interaction, and present examples of bus configurations designed with these elements in mind.

Important Factors in Calculating Cable Ampacities

Ed Walcott, BICC General Cable

There are a number of factors that need to be established to determine the ampacity of a medium voltage cable. It is these factors and how they influence the cable ampacity which will be discussed in this presentation.

DISTRIBUTED RESOURCES

IEEE P1547—Standard for Interconnecting Distributed Resources with Electric Power Systems Update

Tom Ernst, Minnesota Power

Distributed resources (DR) are being promoted as a way for energy users to gain increased control over the cost and quality of their energy supply and as an innovative utility planning tool. However, a lack of uniform interconnection requirements is a significant barrier to the widespread application of DR. In response to this, the Institute of Electrical and Electronics Engineers (IEEE) initiated the development of P1547, "Standard for Interconnecting Distributed Resources with Electric Power Systems." This paper provides a status update of P1547 and highlights significant evolutionary changes that the document has undergone during the IEEE standards development process.

Application of Microturbines to Defer Substation Expansion

Randy Bauer, Alliant Energy

In June 2001, Alliant installed 4-28 kw Capstone microturbines at the Racine, Minnesota substation. This is a 24/4 kv, 750 kva substation. Loads have been as high as 820 kva. The Capstones will operate in a peak shaving mode to keep loadings on the substation below 750 kva. It is estimated that the units will run 100 hours per year.

Installation of a 6 MW, Campus Generation System at Treasure Island Casino

Dan Ross, Consulting Engineering Group, Craig Turner, Dakota Electric Association; Paul Kaeding, Kaeding and Associates

This presentation will review the design and installation challenges which were faced with the installation of a 6 MW Campus Generation system. The presentation will review Dakota Electric's standardized Campus Generation Design, which has been utilized at several locations on Dakota Electric's system. Also we will focus on the specific design issues for the Treasure Island installation. The design issues discussed will include: permitting; operational control; monitoring; communication; metering; interconnection standards; installation testing and system protection. This installation is unique in that it is located more than seven miles from the supplying substation and is a large percentage of the feeder's load. Several concerns associated with this installation were identified during the initial design. This talk will show how things are now working with the installation.

Microturbine Installation and Operating Experience

Wayne Hanson, Great River Energy

Great River Energy (GRE) is a generation and transmission cooperative that serves much of the rural area of Minnesota. The relatively low population density of the rural area presents potential applications for distributed generation. The goal of the GRE microturbine test program is to gain experience and knowledge in the area of microturbines to better equip GRE to respond to customer needs in the area of distributed generation. This presentation will review the installation, startup, and operating experience of the Capstone microturbine located at GRE facilities in Elk River. The presentation will also address minimum performance requirements for generating equipment in the distributed generation market.

LOCATION AND ACCOMMODATIONS

The conference will be held at the Earle Brown Continuing Education Center on the St. Paul Campus of the University of Minnesota. Parking is available adjacent to the center for \$4.25 per day and across the street in the fairgrounds lot for \$3.00 per day.

Convenient lodging for out-of-town participants is available at the Four Points Hotel Minneapolis, 1330 Industrial Boulevard, Minneapolis, 612-331-1900 or 1-800-777-3277. The rate is \$82, plus tax, single or double room. Participants are responsible for making their own lodging reservations. To ensure receiving the special conference rate, please identify yourself as a participant of the Minnesota Power Systems Conference. Reservations must be made by November 4. After this date reservations will be accepted on a space and rate available basis.

REGISTRATION AND FEES

The fee for the conference is \$180 if received by October 29; if received after October 29 the fee is \$200. The conference fee includes all sessions, two luncheons, refreshment breaks, the exhibitor reception, and the conference proceedings. You are encouraged to register early to take advantage of the lower fee.

If you need to cancel your registration, a refund, minus \$25, will be issued if you cancel your registration in writing by November 1. If you cancel after this date you will not be eligible for a refund. A full refund will be issued if the conference is cancelled by the University of Minnesota.

EXHIBITOR RECEPTION

The exhibitor reception will be held on Monday, November 12, from 4:15-6:00 p.m. at the Earle Brown Center (the same location as the conference sessions). The exhibits will be displayed in the main ballroom and foyer. Exhibitors will display brochures and small equipment. All conference attendees are invited to attend this reception to view the exhibits, meet the exhibitors, and enjoy some hors d'oeuvres.

CONTINUING EDUCATION UNITS (CEUS)

Participants who attend the entire conference will receive 1.6 CEUs. Participants who attend only Tuesday and Wednesday will receive 1.3 CEUs. One CEU is defined as 10 contact hours of participation in an organized continuing education experience under responsible sponsorship, capable directions, and qualified instructions. 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.

FOR FURTHER INFORMATION

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CALL FOR PAPERS FOR 2002 CONFERENCE

Deadline for title and abstract submission for MIPSYCON 2002 is *January 7, 2002*. Notification of acceptance will be mailed by *June 2002*. The deadline for final paper submission for accepted speakers is *August 12, 2002*.

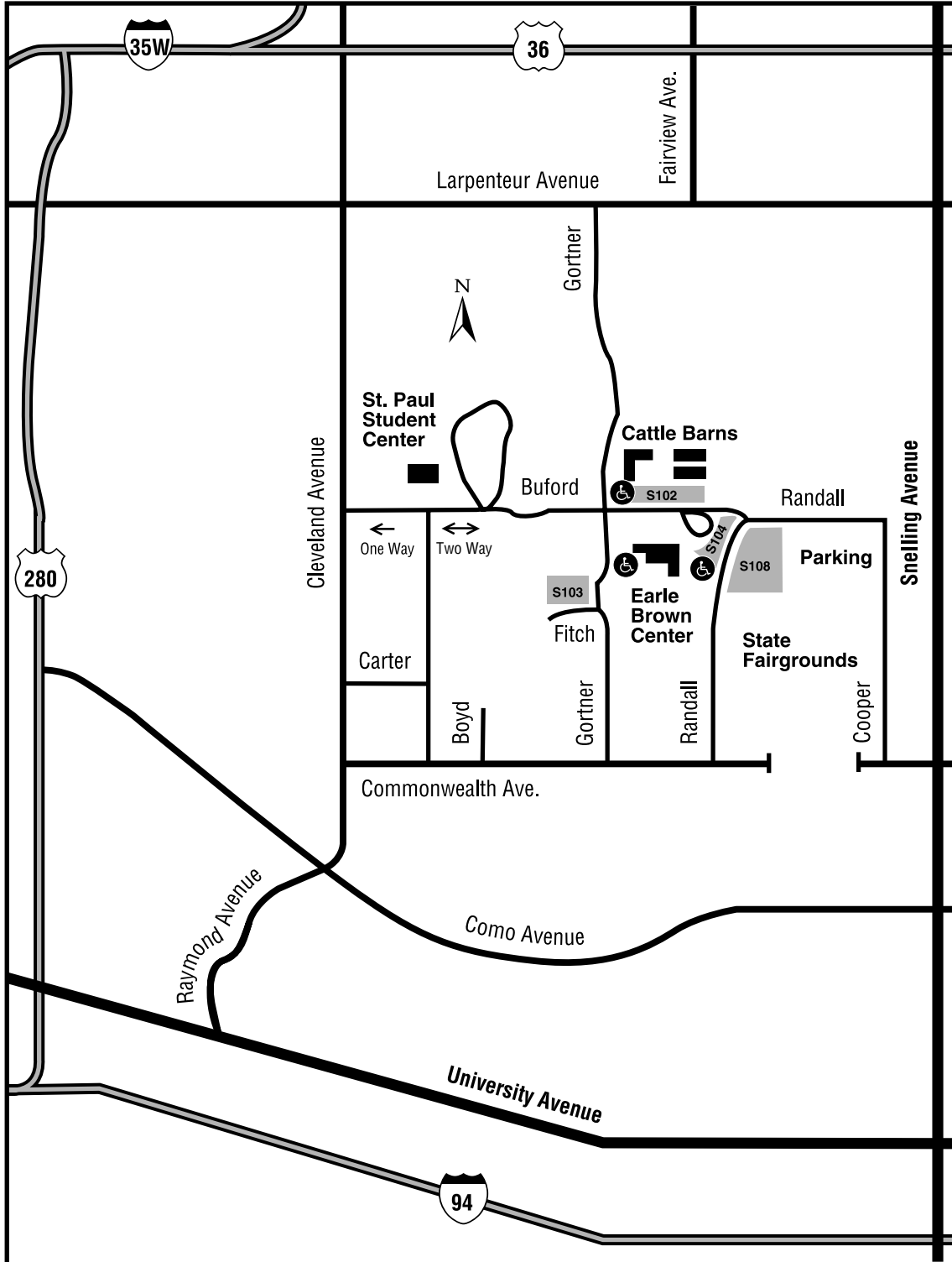
If you would like to be considered for the 2002 program, please submit an abstract of approximately 300 words to: Josh Barney, Department of Continuing Professional Education, University of Minnesota, 352 Classroom Office Building, 1994 Buford Avenue, St. Paul, MN 55108, E-mail: jbarney@cee.umn.edu

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DIRECTIONS: From I-94 go north on Snelling Avenue to Dan Patch Avenue, formerly Commonwealth Avenue, and the entrance to the State Fairgrounds. Go through the fairgrounds on Dan Patch Avenue for one block and turn right on Cooper Street. Go approximately two blocks and turn left on Randall. The center is one half mile on Randall and Buford.

From I-35 take Highway 36 exit and turn south on Cleveland Avenue to Larpenteur Avenue. Go left on Larpenteur to Gortner, turn right on Gortner and go to Buford. Turn left on Buford to the parking area.

 = Handicapped access and parking



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2001
**Minnesota
Power Systems
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Company/Institution _____

Title/Position _____

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I agree to be listed on the registrant list for this conference, for distribution to conference participants.

Conference Fee

- Enclosed is \$180 in full payment of the conference registration fee (received by October 29).
- Enclosed is \$200 in full payment of the conference registration fee (received after October 29).

Method of Payment

- Enclosed is a check or money order payable to the University of Minnesota.
- The fee will be paid by my employer. Enclosed is a purchase order.
- Payment should be charged to my credit card (check one)

Credit Card Number _____ Expiration Date _____

Name as printed on card (please print) _____

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Type of Credit Card: _____ VISA _____ MasterCard _____ Discover/Novus _____ American Express

If your check is returned because of insufficient funds or closed account, or because you have made a stop payment request, you will be charged a check handling fee of \$20.

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