



Mike Terbrueggen, CEO, O-T-S



Mike Terbrueggen is the CEO and Principal Engineer at Operations-Training-Solutions, which he founded in 1994. He designs, develops, and delivers advanced training seminars, develops training

programs and materials, and provides consulting services for power operations and engineering personnel.

Mike received his undergraduate degree in Electronics Engineering from the University of Michigan (Go Blue!) and his graduate degree in Power Engineering from the University of Colorado.

Mike was born in Detroit, Michigan. After high school, he entered the U.S. Army and was stationed at Fort Carson, Colorado. He was in the 4th infantry with the 4th Combat Engineers. Mike has two daughters, one son, and four grandchildren. He lives in Longmont, Colorado, where he enjoys golf, music, and home improvement projects in his spare time.

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Operations-Training-Solutions and Otter Tail Power Company are recognized by the North American Electric Reliability Corporation as a continuing education provider that adheres to NERC Continuing Education Program Criteria.

2025

Power System Fundamentals for Operations Personnel

HOSTED BY



Primary Business Address
215 South Cascade Street
Fergus Falls, MN 56537

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May 5-8, 2025
Arrowwood Resort
Alexandria MN

2025

Power System Fundamentals for Operations Personnel

Presented by Mike Terbrueggen, CEO, O-T-S

FUNDAMENTALS COURSE DESCRIPTION (32/5)

This 32 CEH class will encompass math concepts used in power systems, AC and DC theory concepts, and the organizational structure and components of the North American Power System. It will also describe how Transmission Operators, Balancing Authorities, and Reliability Coordinators utilize tools, procedures and real-time system data to operate the power system during normal and emergency conditions. It concludes with a brief description of the NERC Reliability Standards.

This course is designed to provide Operations Personnel with an understanding of power system fundamental concepts and applications and includes NERC CEH-allocated learning activities.

Course Schedule

MONDAY, MAY 5, 2025

0800-1700

- Describe and Illustrate Math concepts used in Power Systems
 - Fractions, Exponents, Square Root, Sine and Cosine functions, Per-unit System of Measurement and the usage of the constant “PI”
- Describe and illustrate the usage of DC Theory
 - Atomic scale difference between a conductor and insulator
 - Concept of voltage and illustrate voltage sources
 - Concept of electro-magnetic induction
 - Illustrate the development of an AC voltage and its conversion to DC using a commutator
 - Conventional current flow and electron flow
 - DC Electrical Circuit
 - Usage of HVDC transmission

TUESDAY, MAY 6, 2025

0800-1700

- Describe and illustrate the usage of AC Theory
 - Creation of an AC voltage using electro-magnetic induction
 - AC sine wave concepts including peak versus RMS values
 - Inductance and inductive reactance
 - Capacitance and capacitive reactance
 - Impedance and power triangles
 - Reactive Power
 - Power Factor
 - Advantages of a 3-phase power system

WEDNESDAY, MAY 7, 2025

0800-1700

- Describe and illustrate the organizational structure and components of the North American Power System
 - Typical Power System arrangement
 - Explain how load varies, and load is forecast
 - The 4 NERC Interconnections
 - Roles of FERC, NERC, Regional Entities and NAESB
 - Components and usage of the Generation System and the Transmission System
- Describe and illustrate the job function of each of the 18 entities listed in the NERCs Glossary and Functional Model.

THURSDAY, MAY 8, 2025

0800-1700

- Describe how Transmission Operators, Balancing Authorities and Reliability Coordinator utilize tools, procedures and real-time system data to operate Power system during normal and emergency conditions.
 - Generation Operations
 - Transmission Operations
 - Power System Operation during Emergency Conditions
- List and briefly describe the content of the current NERC Reliability Standards

Registration

NAME

COMPANY

BILLING ADDRESS

PHONE

EMAIL

NERC CERT#

Fee: \$1,400.00 per attendee

(Includes breakfast, breaks, and lunches)

Method of payment: Bill me Check

Please note: all attendees are expected to arrange and pay for their own hotel accommodations.

Hotel accommodations:

Arrowwood Resort

320-762-1124

2100 Arrowwood Lane NW, Alexandria, MN 56308

A block of 17 rooms has been held from Sunday–Thursday for the week. Rooms are blocked under **Otter Tail Power Company Training**.

Room rate:

\$109.00 for Otter Tail Power Company.
Government rate available upon request.

To register, email this form or contact:

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