

2-Day Professional Development Seminar on

# Underground POWER CABLE SYSTEM PRINCIPLES - *Design, Installation, Testing, Operation & Maintenance*

*By*

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## INTRODUCTION

Utility engineers, architect-engineering personnel, developers and industrials are often faced with considering an underground cable option either as a portion of an otherwise overhead line, to connect nearby substations, as entry to an already congested substation, or in urban setting where underground transmission or distribution is the only alternative.

The attendees of this seminar will gain an overall understanding of the major underground cable system types including extruded and self-contained, as well as an understanding about elements of design, manufacturing, installation and operation of underground transmission and distribution cables.

## COURSE OUTLINE

### 1. Introductions, Summary of Course Goals

### 2. Cable System Types

### 3. Transmission Vs. Distribution

### 4. Cable System Planning, Selection and Characteristics

### 5. Cable Project Types

### 6. Cable System Components

- ◇ Cable Construction
- ◇ Terminations
- ◇ Splices/Joints
- ◇ Other Accessories

### 7. General Design Considerations

- ◇ Underground vs. Overhead
- ◇ Power Transfer Requirements and Rating Criteria
- ◇ Cable System Type
- ◇ Route Selection & Rights-of-Way

### 8. Summary of Design Calculations

### 9. Manufacturing Considerations

- ◇ Extruded Dielectric (XLPE, EPR)
- ◇ Laminate Cables (Self-Contained)

### 10. Installation and Civil Design Considerations

- ◇ Open Trench
- ◇ Trenchless Technology
- ◇ Transitions to Other Equipment

### 11. Cable Project Types

### 12. Testing, Standards & Specifications

- ◇ Prequalification Tests
- ◇ Factory Acceptance Tests
  - Routine
  - Sample
- ◇ Commissioning Tests
- ◇ Fault Location Tests
- ◇ Standards and Specifications

### 13. Operation & Maintenance

## SEMINAR LEADER'S PROFILE



### **Earle C. (Rusty) Bascom, III**

Principal Engineer with Electrical Consulting Engineers, P.C. Mr. Bascom has over 20 years experience focusing on the analysis, design, research and education on underground transmission and distribution cable systems. His expertise has been applied to the construction of new underground cable circuits as well as advancing the continued successful operation of existing underground systems. He co-authored the underground cable system section in the 14<sup>th</sup> and 15<sup>th</sup> editions of the McGraw-Hill *Standard Handbook for Electrical Engineers*, and reviewed the 1992 edition and was the principal author for Chapter 11, Ampacity, in the 2006 edition of the EPRI *Underground Transmission Systems Reference Book*.

He is active in the IEEE, Power & Energy Society, Standards Association, and contributes to several working groups and discussion groups of the Insulated Conductors Committee as well as being the U.S. representative to CIGRÉ Group B1.35. Mr. Bascom holds an A.S. degree in Engineering Science from Hudson Valley Community College in Troy, New York, a B.S. and M.E. degrees in Electric Power Engineering from Rensselaer Polytechnic Institute in Troy, New York, and an M.B.A. degree from the State University of New York in Albany. Mr. Bascom is a licensed professional engineer in the U.S., has authored over 40 technical papers or publications and holds one patent.

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## WHO SHOULD ATTEND

This course will be of interest to those wanting to gain an understanding about underground cable systems, components and applications, including alternatives to building power transmission and distribution circuits overhead.

Attendees of this course should be generally familiar with power systems; a background in electrical, mechanical or civil engineering will be helpful in understanding some concepts.

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