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IEEE Guide for Collecting and Managing Transmission Line Inspection and Maintenance Data

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Abstract: Reference information to assist electric utilities and their contractors with the development of computer-based means for collecting and managing transmission line inspection and maintenance data and associated asset information is provided. The guide provides a high-level overview of key principles and considerations learned through experience that will help ensure common pitfalls are avoided and enhance the usability of systems. It is not intended to provide an exhaustive discussion of the many details and specifics that must be accounted for when designing and developing a system for an individual utility's application and needs.
Keywords: asset management, automated, compliance, data, database, electric, electronic, GIS, inspection, lines, maintenance, regulations, transmission

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Introduction

This introduction is not part of IEEE Std 1808-2011, IEEE Guide for Collecting and Managing Transmission Line Inspection and Maintenance Data.

The Management of Existing Overhead Transmission Lines Working Group decided to organize a task force to develop this guide for the following reasons:

— Regulations regarding inspection and maintenance are on the rise.

— Demonstrable evidence of maintenance effectiveness is needed to justify budgets.

— Asset management business models require meaningful information to succeed.

— Automated data management systems facilitate increased knowledge transfer among personnel.

— The industry could benefit from a basic document to use as a guideline when developing or reviewing their automated transmission line inspection and maintenance data systems.

The PAR to develop this guide was submitted and approved in September of 2009. The Task Force met roughly every six months during the Towers, Poles, and Conductors Subcommittee meetings. Individuals from the Task Force were asked to prepare the initial drafts of clauses, which were then reviewed and edited by the group during the meetings. The first draft was completed and submitted for balloting in June of 2010, and the final draft was submitted for RevCom approval in December of 2010.

The purpose of the guide is to provide easy-to-use reference information that will serve as a framework and roadmap for designing efficient and effective systems that will facilitate and/or enhance the following:

— Data collection

— Field and office usability

— Data integrity

— Compatibility with geographic information systems (GIS) and enterprise solutions

— Data exchange with other systems and users

— System expansion and modification

— Transferability of data (from one system to another, i.e., due to system upgrade or implementation of a new system)

— Data analysis

— Reporting

— Security

— Flexibility to adapt to system and regulatory changes

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Participants

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Andrew Stewart, *Chair*

Mike Abbey
Dick Aichinger
John Alexion
Glen Andrew
J. M. Asselin
Gordon Baker
Kathy Beaman
Nelson Bingel
Bill Calhoun
Paul Cass
Neal Chapman
Jerry Cheeks
Rob Christman
Patrick Clark
Mike Clodfelder
Glenn Davidson
Nicholas J. DeSantis
Herve Deve
Anthony M. Digioia
Corrine Dimnik
Doug Dodson
Dale Douglass
Bill Eisinger
Steve Elder
Maggie Emery
Charlie Fijnvandraat
M. Garrels
George Gela
Elias Ghannoum
Erich Gnandt
Waymon Goch
Anand Goel
Asim Haldar
J. G. Hanson
Gregory M. Hardwick
Elizabeth Harris
Ibrahim Hathout
Dave Havard
Elon Hayes
Don Heald
Brad Holland
Randy Hopkins
Edward Horgan, Jr.
Magdi Ishac
Arjan Jagtiani
B. Johnson
Mark Jurgemeyer
Amir Kamarudin
Kenneth Keller
Hamdy Khalil
John Kile
Norbert Kilroe
Hank Kleinfelder
Robert Kluge
Michael Kurtgis
Brian Lacoursiere
Bob Lash
Robert Latham
Keith E. Lindsey
Ray Lings
Vito Longo
Otto J. Lynch
Tom McCarthy
Ray McCoy
Ralph McKosky
Janeen McReynolds
Bob Millies
Neal Murray
George B. Niles
Kevin D. Niles
Juan Nuño
David O'Claire
John Olenik
Laurie Oppel
Mark Ostendorp
Bob Oswald
Mohammad Pasha
Jason Payne
Zolt Peter
Robert Peters
Craig Pon
Douglas Proctor
Jerry Reding
Brian Reed
Joseph Renowden
John Ritter
Adam Rousselle
Stephen Rutty
Afshin Salehian
Robert Schultz
Tapani Seppa
David Shaffner
Douglas Shannon
Doug Sherman
Ross Smith
Dean Stoddart
Steven Syracuse
Carl Tamm
Ridley Thrash
Bruce Vaughn
Chris Wilbert
Prasad Yenumula

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Special thanks to the Task Force members who contributed significantly to the development of this guide:

Mike Abbey, *Chair*

Kathy Beaman
Corrine Dimnik
Doug Dodson
Waymon Goch
Ibrahim Hathout
John Kile
Norbert Kilroe
Jim McHan
David O'Claire
Tunde Owoola
John Peckinpaugh
Joseph Renowden
Don Ruff
David Shaffner
Andrew Stewart
Ron Yoshimura

The following members of the individual balloting committee voted on this guide. Balloters may have voted for approval, disapproval, or abstention.

James Chapman
William J. Ackerman
Gustavo Brunello
William Byrd
Robert Christman
Gary Donner
Gary Engmann
George Gela
Waymon Goch
Edwin Goodwin
Randall Groves
Lee Herron
Werner Hoelzl
Edward Hunt
R. Jackson
Gael Kennedy
Morteza Khodaie
Robert O. Kluge
Joseph L. Koepfinger
Jim Kulchisky
Saumen Kundu
Chung-Yiu Lam
Dennis Neitzel
Michael S. Newman
Gary Nissen
Carl Orde
Bansi Patel
Allan St. Peter
Douglas Proctor
Joseph Renowden
Michael Roberts
Joseph R. Rostron
Thomas Rozek
Bartien Sayogo
Dennis Schlender
Gil Shultz
Jerry Smith
John Spare
Gary Stoedter
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John Vergis
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1. Overview

1.1 Scope

This guide provides reference information to assist electric utilities and their contractors with the development of computer-based means for collecting and managing transmission line inspection and maintenance data and associated asset information including transmission line inventory data. It provides a high-level overview of key principles and considerations learned through experience that will help ensure common pitfalls are avoided and enhance the usability of systems. It is not intended to provide an exhaustive discussion of the many details and specifics that must be accounted for when designing and developing a system for an individual utility's application and needs.

1.2 Purpose

The purpose of the guide is to provide easy-to-use reference information that will serve as a framework and roadmap for designing efficient and effective systems that will facilitate and/or enhance the following:

— Data collection

— Field and office usability

— Data integrity

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— Compatibility with geographic information systems (GIS) and enterprise solutions

— Data exchange with other systems and users

— System expansion and modification

— Transferability of data (from one system to another, i.e., due to system upgrade or implementation of a new system)

— Data analysis

— Reporting

— Security

— Flexibility to adapt to system and regulatory changes

1.3 General

The blackout of August 2003 brought to light the urgency to address the reliability and availability of the transmission grid in North America. Aging of the infrastructure has a strong impact on the performance of the transmission grid. Until significant investment in restoration or reconstruction of these facilities can be made, maintenance planners are under growing pressure to squeeze more life out of the existing system. There are a variety of industry-recognized inspection programs, and all have been developed to satisfy specific requirements. Data collection tools should reflect this, and need to build on the ultimate purpose of the inspections.

The migration from paper-based to computer-based means for collecting and managing transmission line inspection and maintenance data has been underway for more than two decades. While this is the case, the migration has proceeded very slowly until recently, hence a large percentage of utilities have yet to initiate a transition or make a complete transition to using electronic media to manage the large volume of available inspection and maintenance data. Today, the migration is progressing at a higher rate than ever before due to a variety of factors and pressures (see Clause 2) and utilities are seeking resources to guide the design and development of systems appropriate for their work practices and reporting requirements. This guide was developed in response to this need in the area of transmission line inspection and maintenance.

1.4 Application

The guide is applicable to the requirements for computer-based data collection and management needs specifically related to the inspection and maintenance of transmission lines. It is intended to be useful for operations and engineering personnel and managers responsible for transmission line maintenance as well as software developers and IT personnel supporting the maintenance function and/or other relevant corporate functions.

1.5 Contents and organization

The contents of this guide are organized to provide a logical flow of relevant information. Table 1 provides a summary of the content of the clauses of the guide beginning with Clause 2.

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Table 1—Summary of the contents of individual clauses of the guide

Topics and description	Clause
Drivers for collecting and managing inspection and maintenance information: Reasons/rationale supporting the need to collect and manage inspection and maintenance information using efficiently designed computer-based systems are provided.	2
Starting to design a data management system: A variety of key considerations ranging from determining stakeholders and development drivers to establishing requirements and resources necessary to design, develop, implement and support a system are provided.	3
Data requirements: The types of data that need to be collected to meet various goals for system use are outlined.	4
Data collection and management tools versus data management systems: Issues that will be encountered and must be addressed when using multiple data collection and management tools within a data management system are discussed.	5
Role of GIS: Capabilities offered by and advantages of integrating GIS functionality with data collection and management systems are discussed.	6
Data collection methods: Brief explanations of the various methods for data collection are provided, including general considerations for each.	7
Matching data collection capabilities with various types of inspections: The capabilities of various types of inspections and the data collection features needed to support them are reviewed.	8
Sample data models: Graphical depictions of data models representative of those required to support systems with varying degrees of sophistication and functionality are provided.	9
Optimizing data quality and usability: Data collection system design features that help ensure data quality and usability are reviewed.	10
Data collection and communication hardware: Various hardware options for field data collection and data communication are discussed and the features and advantages of each are reviewed.	11
Reporting functionality: A variety of types of reports, and report generation and presentation options designed to meet different asset management needs are discussed.	12

2. Drivers for developing a system for collecting and managing inspection and maintenance data

2.1 Introduction

Common drivers are described as follows for the purpose of catalyzing thought and discussion among those setting out to develop a data collection and management system and to assist with prioritizing development activities. When undertaking the development of a system for collecting and managing transmission line inspection and maintenance data, it is important to consider all needs, pressures, and opportunities that are driving a specific development, not just the highest profile items, as the secondary drivers will often impact the design and become more important with time.

— *Regulations* regarding transmission line inspection and maintenance are on the rise and often include requirements for recordkeeping/reporting and audits. Proactive response is needed to establish tractable approaches to meeting the requirements before prescriptive standards are established.

— *Timely access to information* is required to facilitate the restoration of safety and availability following transmission line degradation or failure.

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