IEEE Guide for RF Protection of Personnel Working in the Vicinity of Wireless Communications Antennas Attached to Electric Power Line Structures

IEEE Power & Energy Society

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Power System Communications Committee

IEEE
3 Park Avenue
New York, NY 10016-5997, USA

30 June 2009

IEEE Std 1654™-2009

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Sponsor

Transmission and Distribution Committee
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IEEE Power & Energy Society

Approved 19 March 2009

IEEE-SA Standards Board

Acknowledgements

Appreciation is extended to Bonneville Power Administration and American Electric Power for providing data for determining the immunity of personal RF monitors to power-frequency magnetic and electric fields. Also many thanks to all the electric utilities that provided information about their RF safety programs and contributed to preparation of the RF safety program recommendations described in this guide.

Abstract: Information on establishing an effective safety program to ensure compliance with the applicable regulations for radio frequency (RF) protection of electrical workers in the vicinity of wireless communication antennas adjacent or attached to electrical power line structures is presented. The guide also provides information on power-frequency electric and magnetic field immunity of RF personal monitors and RF protective clothing.
Keywords: electrical workers, immunity, power frequency, RF personal monitors, RF protective clothing, RF safety program

The Institute of Electrical and Electronics Engineers, Inc.
Park Avenue, New York, NY 10016-5997, USA

PDF: ISBN 978-0-7381-5943-0 STD95926
Print: ISBN 978-0-7381-5944-7 STDPD95926

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Introduction

This introduction is not part of IEEE Std 1654-2009, IEEE Guide for RF Protection of Personnel Working in the Vicinity of Wireless Communications Antennas Attached to Electric Power Line Structures.

The rapid expansion of the wireless communications industry has led to new impacts on the power transmission industry. Wireless companies are looking to share the advantages of existing power line rights-of-way. Thousands of power transmission structures have been modified to perform a dual role as communications towers. This dual role places an additional burden on electrical workers who must install and maintain the communications antennas while performing their usual duties in the maintenance of the power transmission lines. Maintenance personnel are now faced with issues regarding possible hazards arising from working in the presence of high-intensity RF fields.

The U.S. Federal Communications Commission (FCC) performed scientific studies and produced reports and recommendations, and regulations,[a] which have also resulted in the promulgation of regulations by the Occupational Safety and Health Administration (OSHA) to address worker exposures in RF fields. Utility companies are obligated to develop plans, training, policies, and work practices to protect their workers from excessive exposures to RF fields. In addition, it is incumbent upon utilities to evaluate the necessity of equipping their workers with personal protective equipment, such as RF detectors and shielding apparel.

Questions and concerns about RF exposures of electrical workers were discussed at meetings of the IEEE Power Engineering Society (PES), Engineering in the Safety, Maintenance, and Operation of Lines (ESMOL) Subcommittee in Las Vegas 2000 and Columbus 2001, as well as in panel presentations in Edmonton, Montreal, and Vancouver, Canada, all of which provided foundation material for this guide. The main decisions and recommendations arrived at during the Vancouver meeting were the following:

a) An RF exposure safety program should be developed by an electric utility if it plans to permit use of its structures for attachment of RF antennas and/or the associated transmitters.

b) Personal RF monitors should be worn by each employee when RF antennas are located on structures where he or she is working, or on other structures in the vicinity.

A next milestone was the publication in 2003 of an IEEE conference paper entitled "RF Protection of Personnel Working in the Vicinity of Wireless Communications Antennas Attached to Electric Power Line Structures" (ESMOL Subcommittee [B7]). The purpose of this paper was to present a summary of present electric utility practices and proposed minimum requirements pertaining to RF protection of personnel working in the vicinity of wireless communications antennas attached to electric power line structures. In this respect, the paper provided information on RF exposure limits, RF safety compliance steps, power-frequency electric and magnetic field immunity of RF personal monitors, and RF protective clothing. The 2003 paper served as the main basis for this guide. IEEE Std 1654-2009 was prepared by the ESMOL Subcommittee Task Force entitled "Protection of Line Workers from RF Radiation Fields Emitted from Antenna/Transmitter Arrays."

[a] Information on references can be found in Clause 2.

[b] The numbers in brackets correspond to those of the bibliography in Annex A.

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1. Overview

1.1 Scope

This guide presents information on establishing an effective safety program to ensure compliance with the applicable regulations for radio frequency (RF) protection of electrical workers in the vicinity of wireless communication antennas adjacent or attached to electrical power line structures. The guide also provides information on power-frequency electric and magnetic field immunity of RF personal monitors (RFPM) and RF protective clothing.

1.2 Purpose

Electric utilities are required to meet the requirements established by applicable regulations [e.g., Occupational Safety and Health Administration (OSHA), Federal Communications Commission (FCC)] for protection of electrical workers in the vicinity of wireless communication antennas adjacent or attached to