Key role for P.Engs in new electrical safety regulation

By Peter Marcucci, P.Eng.

A diverse group of stakeholders was instrumental in shaping recommendations found in the new provincial regulation governing the safety of electricity distribution. As with many other issues at a time of infrastructure renewal, the responsibility of engineers will again be brought to the fore.

Under the publicly owned utility structure that existed prior to electricity industry restructuring in Ontario, individual electric utilities established and maintained their own minimum electrical safety standards. However, in light of the ongoing restructuring, the Electrical Safety Authority (ESA) recommended to the Minister of Consumer and Commercial Relations in 2001 that the utility industry's electrical safety framework be reviewed.

The ESA was formed in 1999 from Ontario Hydro's Electrical Inspection Division. In accordance with provisions of the *Electricity Act* and the *Safety and Consumer Statutes Administration Act*, the ESA has been delegated authority by the provincial government to administer and enforce Ontario's electrical safety regulations and standards.

In the fall of 2001, consultation on the development of the new electrical distribution safety regulation began and approximately 40 stakeholder groups participated. On February 11, 2004, Ontario Regulation 22/04 *Electrical Distribution Safety* received approval by the Lieutenant Governor in Council. This new regulation establishes minimum electrical safety requirements for the design and construction of distribution systems owned by Ontario's Local Distribution Companies (LDCs)–approximately 95 electricity distributors licensed by the Ontario Energy Board.

The role of professional engineers and their paramount duty to public welfare figured prominently in the design of this new regulation. The regulation provides mechanisms for direct regulatory oversight (plan approval, inspection and equipment approval) by the Electrical Safety Authority. However, the regulation also provides for "self-verification" by local distribution companies. In these circumstances, the regulation relies heavily on the judgments, certification and obligations of engineers and to ensure the safety of electrical distribution systems.

Safety standards

This regulation establishes objective-based safety standards, rather than taking a prescriptive approach. This approach ensures that the new requirements continue to accommodate design innovations, build on established industry experience and practice, and promote cost-effective and flexible solutions to maintain the high levels of safety the public and the industry have come to expect. For example, safety standards for overhead distribution lines are identified as follows:

1. Electrical equipment shall be maintained in proper operating condition;
2. Adequate space shall be provided around electrical equipment for proper operation and maintenance;
3. Energized conductors and live parts shall be surrounded by barriers such that vegetation, equipment or unauthorized persons do not come into contact with them or draw arcs under reasonably foreseeable circumstances;
4. Metal parts of the installation that are not intended to be energized and that are accessible to unauthorized persons shall be effectively grounded;
5. Structures supporting energized conductors and live parts shall have sufficient strength to withstand the loads imposed on the structure by electrical equipment and weather loadings.

LDCs are also able to design and construct in accordance with existing Canadian standards, or their own design specifications and standards where these have been approved as meeting specified minimum safety requirements. For overhead and underground distribution lines, the Regulation references CSA standards C22.3 No. 1-01 *Overhead Systems* and C22.3 No. 7-94 *Underground Systems* (Reaffirmed 1999) respectively. More prescriptive alternatives for the safe design and construction of distribution systems are found in Ontario's *Electrical Safety Code*.

Before beginning work on an electrical installation, the regulation requires a distributor to ensure the installation work is based on plans that have been prepared by a professional engineer, or are in line with the distributor's standard design drawings or standard design specifications that have been assembled by a professional engineer, an engineering technologist, or other competent person. A professional engineer or the ESA must approve the plans, standard design drawings, or standard design specifications.

Before putting a distribution system into use, the regulation requires a distrib-

Section	Effective Date
Application, Change of Ownership, Safety Standards, When Standards Met	May 11, 2004
Compliance, Reporting of Serious Incidents	Aug. 11, 2004
Proximity to Distribution Lines, Disconnection of Unused Lines Approval of Electrical Equipment, Approval of Plans	Nov. 11, 2004
Specification & Drawings, Inspection and Approval of Construction	February 11, 2005
Audit, Declaration of Compliance	May 11, 2005

utor to ensure that the construction of the system has been inspected by either a professional engineer on behalf of the distributor, qualified persons identified in an approved Construction Verification Program or the ESA at the request of the distributor. Once satisfied that the safety standards have been met, the person conducting the inspection will prepare a certificate and provide it, along with the record of inspection, to the distributor.

In a number of instances, the regulation provides LDCs with the ability to deviate from the requirements. However, in these instances the regulation will rely on the judgment of a professional engineer so that doing so would not create an undue hazard.

To ensure compliance, the regulation requires each distributor each year to engage an independent auditor to review and report on the distributor's compliance with specified sections of the regulation.

For other portions of the regulation, each LDC is required to provide an annual statement of compliance signed by a director or officer of the company or a professional engineer.

ESA will monitor LDC compliance through feedback from consumers and stakeholders, investigation and response to complaints, incidents or accidents, and through spot-check inspections. Where safety issues are identified, ESA has the authority to issue orders to ensure the safety of persons or the protection of property.

It is important for engineers to understand the extent to which this regulation relies on their professional judgments and commitment to the public welfare (e.g. assessing whether a design meets the objective-based safety standards, authorizing deviations to the requirements of the national standards where they believe there is no undue hazard, etc.). The professional engineer will play a key role in the success of this regulation and in the ongoing assurance of safety.

Additional background information and a link to the complete text of Ontario Regulation 22/04 *Electrical Distribution Safety* can be obtained from the Electrical Safety Authority website at www.esasafe.com

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