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06 December 2006

Anne-Marie Sahazizian  
Hydro One Inc.  
483 Bay St. (TCT13)  
Toronto, Ontario M5G 2P5  
AM.Sahazizian@HydroOne.com

Re: P80 - Guide for Safety in AC Substation Grounding

Dear Anne-Marie:

I am pleased to inform you that on 06 December 2006 the IEEE-SA Standards Board approved the above referenced project until 31 December 2010. A copy of the file can be found on our website at <http://standards.ieee.org/board/nes/projects/80.pdf>.

Now that your project has been approved, please forward a roster of participants involved in the development of this project. This request is in accordance with the IEEE-SA Operations Manual, Clause 5.1.2i under Duties of the Sponsor which states:

"Submit annually to the IEEE Standards Department an electronic roster of individuals participating on standards projects"

For your convenience, an Excel spreadsheet for your use has been posted on our website at <http://standards.ieee.org/guides/par/roster.xls>. Please forward this list to me via e-mail at [s.hampton@ieee.org](mailto:s.hampton@ieee.org) no later than 06 March 2007.

Please visit our website, IEEE Standards Development Online (<http://standards.ieee.org/resources/development/index.html>), for tools, forms and training to assist you in the standards development process. Also, we strongly recommend that a copy of your draft be sent to this office for review prior to the final vote by the working group to allow for a quick review by editorial staff before sponsor balloting begins.

If you should have any further questions, please contact me at +1 732 562 6003 or by email at [s.hampton@ieee.org](mailto:s.hampton@ieee.org).

Sincerely,

Sherry Hampton  
Administrator, Governance  
Standards Activities  
Phone +1 732 562 6003  
FAX +1 732 875 0695  
Email: s.hampton@ieee.org

CC: HannaEssa.Abdallah@aps.com, stds-pes-scc@ieee.org, rpkeil@cai-engr.com

**PAR Request Date:** 03 October 2006**PAR Approval Date:** 06 December 2006**PAR Signature Page on File:** Yes**Type of PAR:** Revision to IEEE Standard**Status:** Revision to an Existing IEEE Std 80-2000**Root Project:****1.1 Project No.:** **P80****1.2 Type of Document:** Guide**1.3 Life Cycle:** Full-Use**1.4 Is this document in ballot now?** No**2.1 Title**

Guide for Safety in AC Substation Grounding

**2.1 Amendment/Corrigenda Title****3.1 Working Group Name**[Grounding](#)**Working Group Chair**[Keil, Richard P](#)

Phone: 937-416-3324

Email: rpkeil@cai-engr.com

**Working Group Vice Chair****3.2 Sponsor**[IEEE Power Engineering Society Substations \(PE/SUB\)](#)**Sponsor Chair**[Abdallah, Hanna E](#)

Phone: 602-371-6524

Email: HannaEssa.Abdallah@aps.com

**Name of Standards Liaison Representative (if applicable)**[Sahazizian, Anne-Marie](#)

Phone: 416-345-6657

Email: AM.Sahazizian@HydroOne.com

**3.3 Joint Sponsor****4.1 Type of Ballot:** Individual**4.2 Expected Date of Submission for Initial Sponsor Ballot:** December 2007**4.3 Projected Completion Date for Submittal to RevCom:** December 2008**5.1 Approximate number of people expected to work on this project:** 35

**5.2 Scope:** This guide is primarily concerned with outdoor AC substations, either conventional or gas-insulated. These include distribution, transmission, and generating plant substations. With proper caution, the methods described herein are also applicable to indoor portions of such substations, or to substations that are wholly indoors. No attempt is made to cover the grounding problems peculiar to DC substations. A quantitative analysis of the effects of lightning surges is also beyond the scope of this guide.

**Old Scope:** This guide is primarily concerned with outdoor ac substations, either conventional or gas-insulated. Distribution, transmission, and generating plant substations are included. With proper caution, the methods described herein are also applicable to indoor portions of such substations, or to substations that are wholly indoors.1 No attempt is made to cover the grounding problems peculiar to dc substations. A quantitative analysis of the effects of lightning surges is also beyond the scope of this guide.

**5.3 Is the completion of this document contingent upon the completion of another document?** No

**5.4 Purpose:** The intent of this guide is to provide guidance and information pertinent to safe grounding practices in AC substation design. The specific purposes of this guide are:

a) To establish, as a basis for design, the safe limits of potential differences that can exist in a substation under fault conditions between points that can be contacted by the human body; b) To review substation grounding practices with special reference to safety, and develop criteria for a safe design; c) To provide a procedure for the design of practical grounding systems, based on these criteria; d) To develop analytical methods as an aid in the understanding and solution of typical gradient problems; e) To provide benchmark cases using various commercial software programs. This guide is primarily concerned with safe grounding practices for power frequencies in the range of 50-60 Hz. The problems peculiar to DC substations and the effects of lightning surges are beyond the scope of this guide.

**Old Purpose:** The intent of this guide is to provide guidance and information pertinent to safe grounding practices in ac substation design. The specific purposes of this guide are to

a) Establish, as a basis for design, the safe limits of potential differences that can exist in a substation under fault conditions between points that can be contacted by the human body.

b) Review substation grounding practices with special reference to safety, and develop criteria for a safe design.

c) Provide a procedure for the design of practical grounding systems, based on these criteria.

d) Develop analytical methods as an aid in the understanding and solution of typical gradient problems. The concept and use of safety criteria are described in Clause 1 through Clause 8, practical aspects of designing a grounding system are covered in Clause 9 through Clause 13, and procedures and evaluation techniques for the grounding system assessment (in terms of safety criteria) are described in Clause 14 through Clause 20. Supporting material is organized in Annex A through Annex G. This guide is primarily concerned with safe grounding practices for power frequencies in the range of 50–60 Hz. The problems peculiar to dc substations and the effects of lightning surges are beyond the scope of this guide. A grounding system designed as described herein will, nonetheless, provide some degree of protection against steep wave front surges entering the substation and passing to earth through its ground electrodes.<sup>2</sup> Other references should be consulted for more information about these subjects.

**5.5 Need for the Project:** The guide is the main source for grounding information throughout the world. It provides both general information and specific design information that can be used by the utility industry. This project will provide "benchmarking" information using available computer programs. This benchmarking will give users examples to improve their understanding and limitations of the design equations presented in the Guide. Benchmarking will also provide users with results they can use to verify their use of computer programs.

**5.6 Stakeholders for the Standard:** The stakeholders are the substation and power plant design engineers responsible for grounding system designs.

**6.1.a. Has the IEEE-SA policy on intellectual property been presented to those responsible for preparing/submitting this PAR prior to the PAR submittal to the IEEE-SA Standards Board?** Yes    **Presented Date:** 2006-10-23

If no, please explain:

**6.1.b. Is the Sponsor aware of any copyright permissions needed for this project?** No

If yes, please explain:

**6.1.c. Is the Sponsor aware of possible registration activity related to this project?** No

If yes, please explain:

**7.1 Are there other standards or projects with a similar scope?** No

If yes, please explain:

**Sponsor Organization:**

**Project/Standard Number:**

**Project/Standard Date:** 0000-00-00

**Project/Standard Title:**

**7.2 Is there potential for this standard (in part or in whole) to be adopted by another national, regional, or international organization?** ? Do not know at this time

**Technical Committee Name and Number:**

**Contact person:**

**Contact person Phone Number:**

**Contact person Email Address:**

**7.3 Will this project result in any health, safety, security, or environmental guidance that affects or applies to human health or safety?** Yes

The intent of the guide is to provide information about the criteria needed to design a substation ground grid based on safety, that is, reducing voltage gradients to a safe level.

**7.4 Additional Explanatory Notes:**

The major change to the Guide will be the introduction of benchmark cases to provide the user with a means to verify their understanding of IEEE-80 equations, the limitations of the equations, a means for users to verify their understanding of commercially available computer programs for the design of grounding systems or developers of computer programs to verify their programs against other programs.

**8.1 Sponsor Information:**

Is the Scope of this project within the approved scope/definition of the Sponsor's Charter? Yes

If no, please explain: