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<u>Co-Chair (IAS)</u> Allan Ludbrook Ludbrook & Associates <u>ludbrook@netaccess.on.ca</u>

Secretary Blane Leuschner Schneider Electric/Square D leuschnb@squared.com

## Task Force on Revising Std 519

## Minutes of Meeting, 1999 IEEE I&CPS Meeting

Sparks, NV May 2, 1999

Mark Halpin led this inaugural meeting of the Task Force on Revising Std 519. Four were in attendance, including the cochair and secretary. The low attendance is attributed to the program announcing the meeting as "319 Revision". With the meeting being held on Sunday evening, there was no time to get the word out.

Mark discussed the structure of the committee and proposed content changes to Std 519. He used the slides beginning on page 2 of these minutes to facilitate the discussion.

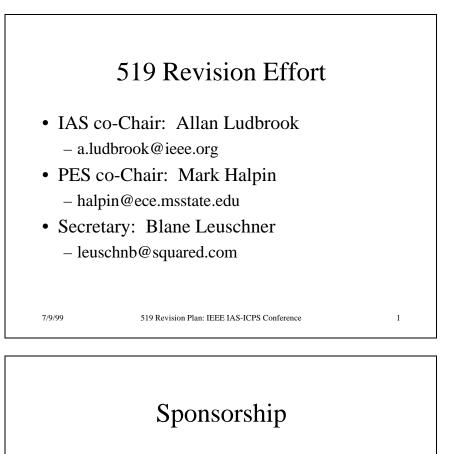
Points of emphasis included:

- Functioning as a single group offering participation by attending meetings and/or email in lieu of the concept of two separate committees.
- Std 519 will remain a Recommended Practice.
- Measurement requirements will be removed from 519 assuming 1159.1 Task Force preparing a "Guide for Recorder and Data Acquisition Requirements..." will address measurement of harmonics. [See related *Email 1,* page 7]
- Meetings will initially include presentations by volunteers who wish to present perceived deficiencies in Std 519. (Those desiring to present should notify Mark Halpin before the meeting and prepare a couple of slides to illustrate and support the argument.)

Several sections of proposed new content and the persons leading these efforts include:

- 1) Probabilistic Aspects of Harmonics Yahia Baghzouz or Paulo Ribero (existing PES Task Force chaired by Yahia)
- 2) Interharmonics Erich Gunther (existing PES Task Force chaired by Erich)
- 3) Even-order harmonics Alex Emanuel



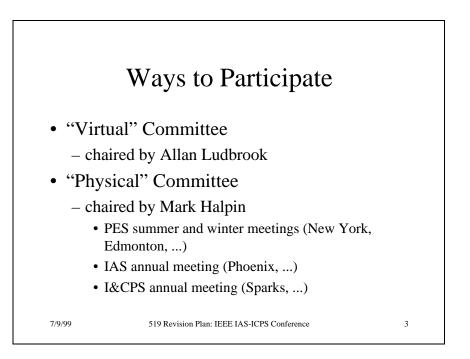


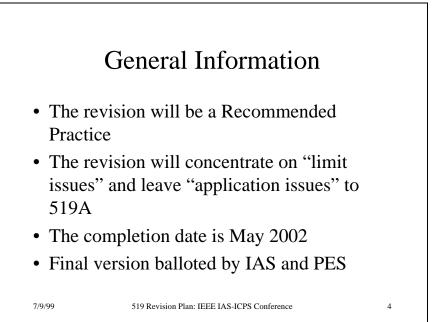
- Joint PAR
  - IAS Industrial Power Converter Committee
  - PES Transmission & Distribution Committee
- Co-Chairmen
  - Allan Ludbrook, IAS (ludbrook@netaccess.on.ca)
  - Mark Halpin, PES (halpin@ece.msstate.edu)
  - www.nas.net/~ludbrook/ieee519.html
  - P519WG (username) Y2000 (psswd)

7/9/99

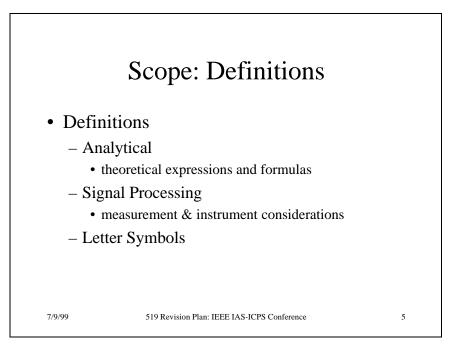
519 Revision Plan: IEEE IAS-ICPS Conference

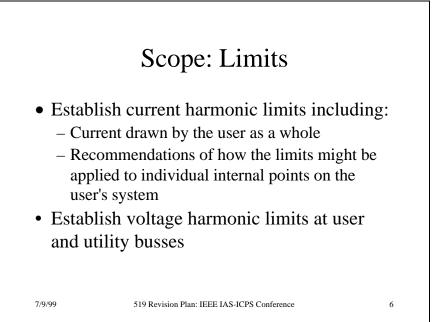




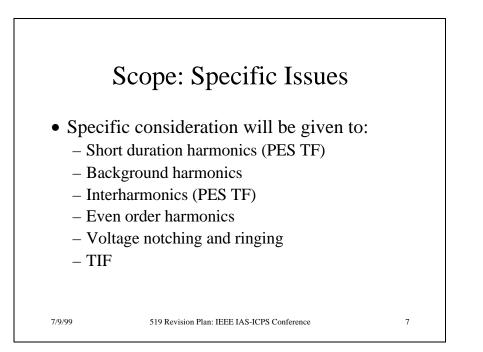


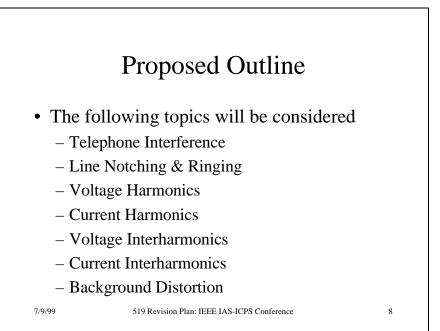




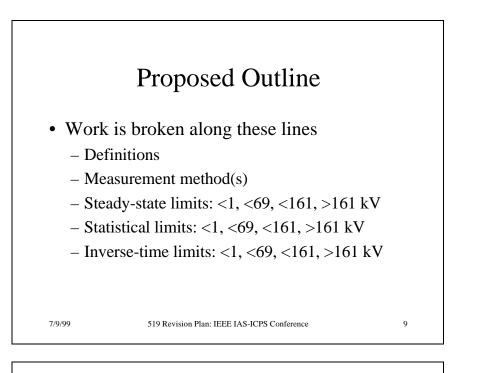












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## **Email Submitted to Working Group**

Email 1 >----Original Message----->From: NARANG A Mr -TS+NP DVLPMT [mailto:Arun.Narang@oht.hydro.on.ca] >Sent: Tuesday, June 22, 1999 4:21 PM >To: 'stds-519@majordomo.ieee.org' >Cc: NARANG A Mr -TS+NP DVLPMT; BELL Mike -TS+NP DVLPMT >Subject: Harmonic Measurement Issues > > > > > >Dear friends: > >I would like to seek your comments, suggestions and guidance on the >following. The issue concerns measurement of harmonics, and in >particular their accuracy. IEEE Std 519 provides limits for current and >voltage harmonics, which are understandably low relative to the >fundamental; for example, as low as 4% for low-order odd current >harmonics and 0.3% for higher-ones in case of generating equipment, and >even lower percentage values for HV & EHV systems. Section 9.3 proposes >accuracy requirements which seem reasonable (<5% measurement >uncertainty), until one ponders the practical constraints, as follows: >\* For generating equipment, the injected current harmonics must be >under 0.3% for harmonics beyond the 35th. To measure this with 5% >accuracy on a 480 V system means having a resolution of 0.04 V rms. A >conventional time-domain PO monitor would need to be using 14 bit >digitizer or better to allow for capturing overvoltages. This does not >yet consider uncertainties involving transducer (CT) and signal >conditioning gains, drift, frequency response and finally calculation >errors in case of FFT based instruments, so the required accuracy seems >rather onerous when one considers that these may need to be maintained >for hundreds/thousands of sites when regulatory compliance monitoring >takes hold. > >\* It seems that few commercial PQ monitors can meet this stringent >requirement. One of the more popular brands uses only 12 bit >digitizers, but in fact its accuracy spec for harmonics is 1% of >full-scale (ie. 1% of the fundamental) - inexplicably, much worse than >expected given the digitizer resolution, and way out of line relative to >519 requirements !!!! I have the impression that many utilities are >deploying this brand of monitors for network benchmarking, and perhaps >ultimately for demonstrating compliance with future standards. However >I'm wondering how they plan to reconcile the obvious discrepancy with



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>IEEE 519 (or whatever relevant std exists in the future). Another >popular make of PQ monitor I checked does not even provide a spec for >harmonics, though its 60 Hz spec is 1% of full-scale plus 0.7% of >reading. Based on this alone, the unit evidently does not provide the >necessary accuracy for harmonics. So what am I missing? > Some monitors require external PTs and CTs for signal >\* >conditioning, even in end-use applications (ie. 480 V). In this case, >proper calibration of PTs and CTs is necessary, though not >straightforward? Proper calibration requires that harmonic signals be >injected superimposed on the nominal power-frequency signal? A range >of harmonic signal levels should be covered, in addition to varying >their phase relationship relative to the fundamental? Is there a >simpler alternative which might be considered adequate? What happens in >the future when utilities/customers may be required to demonstrate >compliance with regulations, particularly at T&D voltage levels? Would >utilities/customers need to go to the trouble of installing calibrated >transducers in contentious circumstances, or would utilities perform >wholesale calibrations of existing PTs and CTs for continuous compliance >monitoring? > > >-Arun Narang->Customer Power Department - Strategic R&D >Ontario Power Technologies (Room KR 312) >Phone: (416) 207-6563 FAX: (416) 207-6565 >email: arun.narang@oht.hydro.on.ca <mailto:arun.narang@oht.hydro.on.ca>