LOG OF MEETING
DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: National Electrical Manufacturers Association (NEMA) members meeting CPSC staff to discuss potential enhancements with ground-fault circuit interrupters (GFCIs)

DATE OF MEETING: August 24, 2005

PLACE OF MEETING: NEMA Headquarters, Rosslyn, Virginia

LOG ENTRY SOURCE: Doug Lee, ESEE DL

DATE OF LOG ENTRY: September 15, 2005

COMMISSION ATTENDEES:
Doug Lee, ESEE
Andrew Trotta, ESEE
Hope Johnson, ESHF
Bob Ochsman, ESHF

NON-COMMISSION ATTENDEES:
Harvey Gannon – NEMA
Doug Troutman – NEMA
Ken Gettman - NEMA
Henry Sylstra- Square D Co
Aaron Chase- Leviton
Steve Campolo – Leviton
Jack Wells – Pass & Seymour Legrand
Joe Wurz - Pass & Seymour Legrand
Dan Kissane – Pass & Seymour Legrand
Tom Packard – Pass & Seymour Legrand
Howard Leopold – Cooper Wiring Devices
John Young – Siemens Energy & Automation
John Goodsell – Hubbell Wiring Device
Nelson Bonilla – Hubbell Wiring Device
Bill Murphy – Cutler-Hammer/Eaton
Phil Piqueira – GE
David McDonald - TRC

SUMMARY OF MEETING:

Mr. Troutman opened the meeting with introductions of attendees. Mr. Lee presented the CPSC staff background summary leading up to a discussion on enhanced/self-testing ground-fault circuit interrupters (GFCIs). Mr. Lee discussed the 2001 NEMA field study that found approximately 10 percent of inoperable GFCIs in the field. Mr. Lee also discussed the recent major changes to the standard to improve the product from surges, moisture/water, mis-wiring, abnormal overvoltages, mechanical operation inhibition, and environmental noises. Mr. Lee also

discussed field incidents and the CPSC staff objectives to continue to improve the level of safety and reliability with the product. Making the GFCI less dependent on monthly testing and "failing safe" with no unprotected power were discussed as areas that could still be improved upon. Mr. Lee discussed previous work in the area of power denial and the key benefits of a self-testing system.

Mr. Lee explained that CPSC staff previously met with other companies that have ideas on self-testing GFCIs. He stated that these ideas were favorable because they offered to be: Simple technology, have self-testing circuitry separated from ground-fault detection, low-cost, would not require the user input to test or recognize a failure mode, or have a single component failure that would result in unprotected power to the consumer. Mr. Lee explained that CPSC staff wanted to work with industry and help outline requirements to further enhance GFCIs. Mr. Ochsman described the CPSC Human Factors staff and how they could offer some support with how users might interact with GFCIs.

A discussion followed on self-testing issues. NEMA members were split on whether self-testing requirements would be a good enhancement for GFCIs. Most members agreed to discuss options at their upcoming NEMA/industry meetings although they believed it would be difficult to build consensus on many issues involved with self-testing. CPSC staff offered to participate in future discussions.

The viewgraphs of CPSC's presentation are appended to the meeting log.

NEMA meeting on Ground-Fault Circuit Interrupter Enhancements

August 24, 2005

Doug Lee
US Consumer Product Safety Commission (CPSC)

"These comments are those of the CPSC staff, have not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

GROUND-FAULT CIRCUIT-INTERRUPTERS (GFCIs) – BACKGROUND SUMMARY

- 2001 NEMA Field Study - ~10 % inoperable
- Improvements to Voluntary Standard for GFCIs, UL 943
  - expansion and revision of surge tests
  - resistance to moisture and corrosion
  - reverse line-load miswire test
  - abnormal overvoltage test
  - operation mechanism test
  - and resistance to environmental noise test
- Incorporated as ANSI/UL 943 requirements – no longer just "safety certification requirements"

GFCI IN-DEPTH INVESTIGATIONS

- Review of 22 Investigations, 1988-2001
  - 3 Deaths
  - 7 No Trip On
    - Construction site investigation of 21 units
      - 16/21 failed with power to receptacle
      - 5/21 failed with no power to receptacle
  - 6 Prevented Incident
    - Saved the consumer from more severe incident
  - 6 Undetermined

CPSC STAFF OBJECTIVES

- Improve level of safety for GFCIs
  - add "fail safe" or power denial
  - less likely to be incorrectly wired
  - less dependent on consumer for monthly testing
  - more tolerant of electrical surges
  - more resistant to effects of humidity

ENHANCED GFCI SAFETY

- Auto-Test w/ power denial
- Power Denial – Method A
  - SCR, IC, and Coil failures
  - Addresses miswiring
- Power Denial – Method B
  - SCR failures
  - Miswiring of load terminals only
- Auto-Test with indicators for non-functioning GFCI
- Present technology with increased surge protection and corrosion protection

CONSUMER PERCEPTION OF POWER DENIAL TECHNOLOGY

- Would consumers not use or test?
  - Consumer testing is independent of perceived outcome of test
  - Consumers may test when visible
  - Consumers may test when reminded
- Research shows that consumers want device to fail safely and not provide unprotected power

POWER DENIAL TECHNOLOGY

- Power Denial Technology supported by:
  - American Institutes for Research Study
  - Leviton proposal
  - Pass & Seymour proposal
  - Electrical Inspectors - IAEI *NEC* panel 2 comments
  - CPSC Engineering staff
  - CPSC Human Factors staff
- 2001 Engineering Staff Position Paper
  - CPSC website: Voluntary Standards/GFCIs/

Auto/ Self Testing

- 2001 Met with company w/ ideas on auto testing of GFCIs
  - Simple Technology
  - Test Circuitry is separated from GF detection
  - Low Cost
  - Does not require user input to test or recognize a failure mode
  - A single component failure will not result in unprotected power

PROJECT GOALS

- 2005 - Meet with industry and outline requirements for enhanced/auto/self testing GFCIs
- Work with industry to develop requirements and develop prototype GFCI
  - CPSC Human Factors Staff
- Propose new requirements to voluntary standard if appropriate