U.S. Consumer Product Safety Commission
LOG OF MEETING

SUBJECT: Meeting with American Council on Electrical Safety (ACES) to discuss CPSC electrical safety activities.

DATE OF MEETING: November 14, 2002

LOG ENTRY SOURCE: William H. King, Jr., ES

DATE OF LOG ENTRY: November 15, 2002

LOCATION: Comfort Inn, BWI Airport location, Baltimore, MD

CPSC ATTENDEE(S): William H. King, Jr., ES

NON-CPSC ATTENDEE(S):
Len Frier, MET Laboratories, Inc.
Gordon Gillerman, Underwriters Laboratories Inc.
Michael Clendenin, Electrical Safety Foundation International
Michael Baldwin, MET Laboratories, Inc.
William Burr, CSA International
Mike Farahani, Prince George's County, MD government
Michael Raffael, Prince George's County, MD government
Nino Mancini, CSA International
J. Thomas Hutchcraft, American Council of Independent Laboratories
Ronald Cole, Frederick County, MD government
Robert Loop, QPS Evaluation Services, Inc.
Tim Calland, TUV Rheinland of North America, Inc.
Barbara Brooks, Wyle Laboratories
T.L. Moore, Fairfax County, VA government
and other members of the ACES

SUMMARY OF MEETING: Mr. King attended the scheduled meeting of the American Council on Electrical Safety. Attached is a copy of the agenda for the meeting. Mr. King discussed proposals prepared by the CPSC staff for the 2005 edition of the "National Electrical Code." Attached are copies of the proposals.

American Council on Electrical Safety (ACES)
An Independent Forum Administrated by (ACIL)
Agenda
ACES Meeting - Thursday November 14, 2002
The Comfort Inn - BWI Airport
6921 Baltimore - Annapolis Blvd.
Baltimore, Maryland 21225

9:30 AM 1. Opening Remarks
Introductions - Review Agenda

2. Review Draft of "Special Inspection" procedures. The program is for recognizing a uniform program, not an inspection body.

3. Review progress of advocates of Suppliers Declarations (SDoC) on electrical products in the United States. Manufacturers and manufacturing organizations are expending great efforts and in some cases succeeding in by passing third party testing

4. NRTL Issues of concern and interest to Inspection Authorities

5. Underwriters Laboratories will present information on a potentially hazardous AFCI tester with an unauthorized Certification Mark

12 Noon Lunch complements of NRTLs

6. OSHA will compare the IEC Certificate of Conformity with the OSHA/NRTL recognition of electrical equipment used in hazardous locations. This comparison will cover the requirements of OSHA 1910.7 and the IECEx Scheme

7. Description of the reorganization at OSHA that may affect their relationship with Inspection Authorities and NRTLs

8. Up-date on Consumer Product Safety Commission issues:
Information on the eight proposals CPSC is submitting the NEC on GFCIs, AFCIs, and electric vending machines. Also and up date on activities relating to cord connected items.

9. Discussion with the US Custom Service on identifying foreign products that enter the US without safety certification or with fraudulent markings.

10. Presentation on fraudulent marking and labeling of molded case circuit breakers. Efforts and means to identify fraudulent markings and products

4 PM 11. Other issues - Next meeting - adjournment

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Company U.S. Consumer Product Safety Commission
Address 4330 East West Highway **City** Bethesda **State** MD **Zip** 20814-4408
Please indicate organization represented (if any) U.S. Consumer Product Safety Commission

1. a) **NFPA Document Title** National Electrical Code
   b) **NFPA No. & Edition** 70-2002 **c) Section/Paragraph** 210.12
2. **Proposal Recommends** *(check one)*: ☑ **new text** ☐ **revised text** ☐ **deleted text**
3. **Proposal.** *(Include proposed new or revised wording, or identification of wording to be deleted.)* Note: Proposed text should be in legislative format, that is, use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).
   (See attachment for Proposal)
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PROPOSAL.

Section/Paragraph: Art. 210, Part I. General Provisions, para. 210.12

Add a new 210.12 ( ) section to paragraph 210.12 as follows:

( ) Lighting and Appliance Branch Circuits in Dwelling Units. When the service equipment at a dwelling is replaced, a listed arc-fault circuit interrupter, branch/feeder type, or a listed arc-fault circuit interrupter, outlet branch circuit type, shall protect each branch circuit that existed prior to the replacement that serves 125-volt, single-phase, 15- and 20-ampere outlets for lighting and appliances. The arc-fault circuit interrupter, outlet branch circuit type, shall be installed at the outlet closest to, and within 3.0 m (10 ft) of the overcurrent device as measured along the branch circuit conductors.

FPN: See 230.XX for complementary requirement for service equipment.

(Editorial note: 230.XX is a proposed new section, submitted to the CMP 4 for Article 230, to complement the proposed new paragraph (B) to 210.12. For information purposes, the proposed new 230.XX reads as follow: Replacement of Service Equipment at Dwelling Units. When the service equipment at a dwelling is replaced, a listed arc-fault circuit interrupter, branch/feeder type, or a listed arc-fault circuit interrupter, outlet branch circuit type, shall protect each branch circuit that existed prior to the replacement that serves 125-volt, single-phase, 15- and 20-ampere outlets for lighting and appliances. The arc-fault circuit interrupter, outlet branch circuit type, shall be installed at the outlet closest to, and located within 3.0 m (10 ft) of the overcurrent device as measured along the branch circuit conductors.)

STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PROPOSAL.

The new requirement for lighting and appliance branch circuits within existing dwellings that undergo service equipment replacement addresses the condition of wiring systems identified in technical studies sponsored by the U.S. Consumer Product Safety Commission (CPSC). The 1987 CPSC report ("Residential Electrical Distribution System Fires", Smith & McCoskrie) provided evidence that fires originating in branch circuit wiring predominately occurred in dwellings over 20 years old, with the highest rates of fires occurring in dwellings over 40 years old. Older dwellings are frequently upgraded with replacement service equipment to increase the service rating to supply additional appliance and equipment loads. However, existing lighting and appliance branch circuits are not replaced when the service is upgraded in many cases due to the increased cost, and/or the inability to evaluate the extent of degradation in aged circuits. The branch circuit conductors are frequently located in concealed spaces surrounded with thermal insulation, and could be in a deteriorated condition at the time the service is upgraded. This proposal is intended to provide extra protection with the addition of arc-fault circuit interrupter (AFCI) technology to address the potential fire hazards in existing

branch circuits. This proposal is not intended to apply AFCI devices as a substitute for replacing unsafe wiring. Unsafe wiring should be replaced when it is identified, and the wiring methods should be done in accordance with the *NEC*.

In 1995 arc-fault detection was identified as a promising technology that could be applied to older homes to improve electrical safety by detecting symptoms that can cause fires (report "Technology for Detecting and Monitoring Conditions That Could Cause Electrical Wiring System Fires", sponsored by CPSC and prepared by Underwriters Laboratories Inc.). Shortly after this report was issued, the production of listed arc-fault circuit interrupter devices began. In 1999 the *NEC* introduced the first AFCI requirement for branch circuit protection, limited to branch circuits supplying outlets in bedrooms. When considering needs for additional AFCI protection, one of the priority locations is the older home that undergoes a service upgrade intended to extend the service life of the structure. This is the situation where the existing, older branch circuits in the dwelling will be expected to continue to supply power for appliance and lighting loads in the years ahead. These circuits need the benefit of the extra protection afforded by AFCI devices.

Other Considerations

- Cost of single-pole, 15 and 20 ampere AFCI circuit breakers currently on the market range from $20-35 in retail stores and electrical supply stores. Contractors' cost and wholesale cost are estimated to be in the $20-30 range. Costs will likely decrease with increasing volume.

- For 1998, CPSC estimates that there were 38,800 electrical distribution fires resulting in 280 civilian deaths, 1,230 injuries, and $680.0 million in property loss. Engineering experience indicates that most of these involve arcing conditions that precede ignition. Engineering judgment, based on fire investigations sponsored in the past by CPSC, indicates that AFCI devices currently on the market might address 50% or more of these fires.

- Once installed, AFCI devices will likely remain in place throughout the life of the structure and, if found defective in the future, be replaced with an equivalent device. This has been the experience with GFCI devices.

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   b) **NFPA No. & Edition** 70-2002 c) **Section/Paragraph** 230.XX in Part V
2. **Proposal Recommends** *(check one)*: ☑ **new text** ☐ **revised text** ☐ **deleted text**
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PROPOSAL.

Section/Paragraph: Art. 230, Part V. Service Equipment – General, new Section 230.XX

Add new Section 230.XX as follows:

230.XX Replacement of Service Equipment at Dwelling Units. When the service equipment at a dwelling unit is replaced, a listed arc-fault circuit interrupter, branch/feeder type, or a listed arc-fault circuit interrupter, outlet branch circuit type, shall protect each branch circuit that existed prior to the replacement that serves 125-volt, single-phase, 15- and 20-ampere outlets for lighting and appliances. The arc-fault circuit interrupter, outlet branch circuit type, shall be installed at the outlet closest to, and located within 3.0 m (10 ft) of the overcurrent device as measured along the branch circuit conductors.

FPN: See 210.12 (B) for complementary requirement for branch circuits.

(Editorial note: 210.12 (B) is a proposed new paragraph submitted to the CMP for Article 210, to complement the proposed new Section 230.XX. For information purposed, the proposed new paragraph (B) of Section 210.12 reads as follows: Lighting and Appliance Branch Circuits in Dwelling Units. When the service equipment at a dwelling is replaced, a listed arc-fault circuit interrupter, branch/feeder type, or a listed arc-fault circuit interrupter, outlet branch circuit type, shall protect each branch circuit that existed prior to the replacement that serves 125-volt, single-phase, 15- and 20-ampere outlets for lighting and appliances. The arc-fault circuit interrupter, outlet branch circuit type, shall be installed at the outlet located closest to, and within 3.0 m (10 ft) of the overcurrent device as measured along the branch circuit conductors.)

STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PROPOSAL.

A report issued by the U.S. Consumer Product Safety Commission in 1987 ("Residential Electrical Distribution System Fires", Smith & McCoskrie) provided evidence that fires originating in branch circuit wiring predominately occurred in dwellings over 20 years old, with the highest rates of fires occurring in dwellings over 40 years old. Older dwellings are frequently upgraded with replacement service equipment to increase the service rating to supply additional appliance and equipment loads. However, existing lighting and appliance branch circuits are not replaced when the service is upgraded in many cases due to the increased cost, and/or the inability to evaluate the extent of degradation in aged circuits. The branch circuit conductors are frequently located in concealed spaces surrounded with thermal insulation, and could be in a deteriorated condition at the time the service is upgraded. This proposal is intended to provide extra protection with the addition of arc-fault circuit interrupter (AFCI) protection to address the potential fire hazards in existing branch circuits. This proposal is not intended to apply AFCI devices as a substitute for replacing unsafe wiring. Unsafe wiring should be

replaced when it is identified, and the wiring methods should be done in accordance with the *NEC*.

In 1995 arc-fault detection was identified as a promising technology that could be applied to older homes to improve electrical safety by detecting symptoms that can cause fires (report "Technology for Detecting and Monitoring Conditions That Could Cause Electrical Wiring System Fires", sponsored by CPSC and prepared by Underwriters Laboratories Inc.). Shortly after this report was issued, the production of listed arc-fault circuit interrupter devices began. In 1999 the *NEC* introduced the first AFCI requirement for branch circuit protection, limited to branch circuits supplying outlets in bedrooms. When considering needs for additional AFCI protection, one of the priority locations is the older home that undergoes a service upgrade intended to extend the service life of the structure. This is the situation where the existing, older branch circuits in the dwelling will be expected to continue to supply power for appliance and lighting loads in the years ahead. These circuits need the benefit of the extra protection afforded by AFCI devices.

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PROPOSAL.

Section/Paragraph: Art. 210, Part I. General Provisions, para. 210.12

The recommendation is that Code-Making Panel No. 2 should request that Code-Making Panel No. 1 consider the following expanded definitions of arc-fault circuit interrupters and incorporate the definitions within Article 100 (a separate proposal to cover this change has been submitted to Code-Making Panel No. 1 for action.):

Arc-Fault Circuit Interrupter, Branch/Feeder Type. A device intended to protect the branch or feeder circuit from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the entire branch or feeder circuit when an arc fault is detected.

Arc-Fault Circuit Interrupter, Outlet Branch Circuit Type. A device intended to be installed at the first outlet in a branch circuit to protect the branch circuit, outlet devices, and wires connected to outlet devices from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit at the load side of the arc-fault circuit interrupter (including de-energizing receptacles provided on the arc-fault circuit interrupter outlet device).

STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PROPOSAL.

The definitions are expanded to coincide with the listing of new arc-fault circuit interrupter devices. The definitions are moved to Article 100 because a proposal is being made to include requirements mentioning these devices in Article 230, in addition to requirements in Article 210.

Although AFCI devices currently available are incorporated within circuit breakers, AFCI devices have been listed that are incorporated into outlet devices. While only AFCI/circuit breakers can de-energize the entire branch circuit, listed AFCI/outlet devices can be applied in applications where fuses are provided as the branch circuit overcurrent protection devices. In addition, listed AFCI/outlet devices have been investigated and listed as an outlet branch circuit type with expanded arc detection capabilities, including sensing certain arcing conditions upstream of the AFCI/outlet device location, and sensing broader arcing conditions downstream of the AFCI/device location. These safety devices will provide the broadest range of fire protection to the occupants of dwellings.

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   b) **NFPA No. & Edition** 70-2002 c) **Section/Paragraph** Art. 100, Part I
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PROPOSAL.

Section/Paragraph: Art. 100, Part I. General

Add the following definitions to Part I:

Arc-Fault Circuit Interrupter, Branch/Feeder Type. A device intended to protect the branch or feeder circuit from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the entire branch or feeder circuit when an arc fault is detected.

Arc-Fault Circuit Interrupter, Outlet Branch Circuit Type. A device intended to be installed at the first outlet in a branch circuit to protect the branch circuit, outlet devices, and wires connected to outlet devices from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit at the load side of the arc-fault circuit interrupter (including de-energizing receptacles provided on the arc-fault circuit interrupter outlet device).

STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PROPOSAL.

Definitions for arc-fault circuit interrupters have been expanded from the definition that exists in Section 210.12 of the 2002 edition to coincide with the listing of new arc-fault circuit interrupter devices. It is recommended that the definitions be re-located from Article 210 to Article 100 because a proposal has been submitted to include new requirements in both Articles 210 and 230.

Although AFCI devices currently available are incorporated within circuit breakers, AFCI devices have been listed that are incorporated into outlet devices. While only AFCI/circuit breakers can de-energize the entire branch circuit, listed AFCI/outlet devices can be applied in applications where fuses are provided as the branch circuit overcurrent protection devices. In addition, listed AFCI/outlet devices have been investigated and listed as an outlet branch circuit type with expanded arc detection capabilities, including sensing certain arcing conditions upstream of the AFCI/outlet device location, and sensing broader arcing conditions downstream of the AFCI/device location. These safety devices will provide the broadest range of fire protection to the occupants of dwellings.

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PROPOSAL.

Section/Paragraph: Art. 210, Part I. General Provisions, para. 210.12

Revise the section of the paragraph covering dwelling unit bedrooms as follows:

( ) Dwelling Unit Bedrooms. All branch circuits that supply 125-volt, single-phase, 15- and 20-ampere outlets installed in dwelling unit bedrooms shall be protected by ~~an arc-fault circuit interrupter listed to provide protection to the entire branch circuit~~ a listed arc-fault circuit interrupter, branch/feeder type, or a listed arc-fault circuit interrupter, outlet branch circuit type. The arc-fault circuit interrupter, outlet branch circuit type, shall be installed at the outlet closest to, and within 3.0 m (10 ft) of the overcurrent device as measured along the branch circuit conductors.

STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PROPOSAL.

The existing requirement at 210.12 covering dwelling unit bedrooms has been modified to include both types of arc-fault circuit interrupters (i.e., branch/feeder type and outlet branch circuit type) that are to be covered by expanded definitions.

Although AFCI devices currently available are incorporated within circuit breakers, AFCI devices have been listed that are incorporated into outlet devices. While only AFCI/circuit breakers can de-energize the entire branch circuit, listed AFCI/outlet devices can be applied in applications where fuses are provided as the branch circuit overcurrent protection devices. In addition, listed AFCI/outlet devices have been investigated and listed as an outlet branch circuit type with expanded arc detection capabilities, including sensing certain arcing conditions upstream of the AFCI/outlet device location, and sensing broader arcing conditions downstream of the AFCI/device location. These safety devices will provide the broadest range of fire protection to the occupants of dwellings.

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   b) **NFPA No. & Edition** 70-2002 c) **Section/Paragraph** 210.8 (A)
2. **Proposal Recommends** *(check one)*: ☑ **new text** ☐ **revised text** ☐ **deleted text**
3. **Proposal.** *(Include proposed new or revised wording, or identification of wording to be deleted.)* Note: Proposed text should be in legislative format, that is, use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).
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Signature ***(Required)*** William A King Jr

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PROPOSAL.

Section/Paragraph: Art. 210, Part I. General Provisions, para. 210.8 (A)

Replace the existing language in 210.8(A) with the following:

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel

FPN: See 215.9 for ground-fault circuit-interrupter protection for personnel for feeders.

(A) Dwelling Units. All 125-volt, single phase, 15- and 20-ampere outlets installed in the locations specified in (1) and (2) shall have ground-fault circuit-interrupter protection for personnel.

(1) Receptacle outlets on general-purpose and individual branch circuits installed as required in 210.52 and for other purposes

Exception No. 1: Receptacles that are not readily accessible and that are located in garages, unfinished basements, and accessory buildings.

Exception No. 2: A single receptacle or a duplex receptacle for two appliances in a garage, unfinished basement, or accessory building, and located within dedicated space for each appliance that, in normal use, is not easily moved from one place to another and that is cord-and-plug connected in accordance with 400.7(A)(6), (A)(7), or (A)(8).

Exception No. 3: A receptacle outlet for refrigeration equipment.

Exception No. 4: A receptacle for security equipment, smoke/fire alarm, carbon monoxide alarm, medical appliance, or other life-safety equipment.

(2) Outlets for boat hoist motors and associated equipment wiring

STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PROPOSAL.

Approximately 200 people are electrocuted each year in incidents in and around the home; this number dipped to 170 in 1999, the most recent year reported. (Reference: CPSC Report dated July 2002 "1999 Electrocutions Associated with Consumer Products", available on CPSC web site (www.cpsc.gov) or from CPSC Freedom of Information Office. Copies provided to NFPA with this proposal.)

Analysis of CPSC investigations of electrocution incidents indicates that significant numbers occur when consumers come in contact with energized circuit conductors and

ground associated with appliances, tools and equipment connected to receptacle outlets not presently required by the *NEC* to be provided with ground-fault circuit-interrupter (GFCI) protection for personnel. Example after example can be cited. The following is a selection of those cases investigated by CPSC where the receptacle outlets were located in areas of dwellings not presently required by the *NEC* to provide ground-fault circuit-interrupter protection for personnel.

Middleburg, FL September 14, 2000 A 17-year-old male electrocuted when he contacted a portable, floor fan in the bedroom of his home. CPSC Case No. 001108HCC0080.

Winder, GA May 29, 1998 A 32-year-old female and her 10 year old son electrocuted when they contacted a band saw in the workshop in their home. CPSC Case No. 990316HCC2327.

Macon, GA July 22, 1998 A 39-year-old female electrocuted when she touched an antique lamp in the master bedroom of her home. CPSC Case No. 990316HCC2328.

Portland, OR April 15, 1998 A 49-year-old male electrocuted when he touched exposed conductors on a damaged power cord of a portable saw connected to a hallway receptacle outlet while working alone remodeling an apartment. CPSC Case No. 990104CCC3105.

Brooklyn, NY August 1, 1998 A 1-year-old male electrocuted when he bit into the electrical cord of an stereo amplifier in the living room of a residence. CPSC Case No. 981110HCC0083.

Hartville, MO April 17, 1998 A 2-year-old female electrocuted when she touched exposed electrical wires energized from a 110-volt ac receptacle outlet under a kitchen table. The victim was also in contact with the heating system vent cover. CPSC Case No. 980827HCC2807.

Dexter, NM April 24, 1997 A 2-month-old male electrocuted by a heating pad. The pad had a damaged cord with tape repairs. CPSC Case No. 990609CCC3365.

Cincinnati, OH July 16, 1997 A 9-month-old female electrocuted when she contacted the bare wires of the cord for a pedestal fan. CPSC Case No. 990408HCC2395.

McAllen, TX August 25, 1997 A 15-month-old male electrocuted when he contacted the metal door plate of the mobile home of his parents. The metal plate was electrically charged from an extension cord that was worn and frayed. CPSC Case No. 981110HCC3049.

Pascagoula, MS July 12, 1997 A 5-month-old male electrocuted at his home when he came in contact with exposed wires in the cord of an alarm clock on the floor where he was playing. CPSC Case No. 981110HCC2055.

Sycamore Tnsp, OH November 5, 1997 A 74-year-old female electrocuted when she contacted bare wires while attempting to repair an electric lamp. CPSC Case No. 980817HCC2788.

Brownsville, TX June 3, 1997 A 15-month-old male electrocuted when he pulled an extension cord from a wall outlet in a bedroom. CPSC Case No. 980219CCC3606.

Newport Beach, CA July 15, 1997 A 35-year-old male electrocuted when he contacted a modified portable fan and plugged the fan into a receptacle in the bedroom of a home. CPSC Case No. 980202CCC3570.

Muskogee, OK August 16, 1997 A 9-month-old female electrocuted when she reached from a baby walker she was in and grabbed the exposed socket portion of a table lamp with no bulb in the socket. The lamp was laying on the floor of her home. CPSC Case No. 9709009CWE7048.

Barbourville, KY January 13, 1996 A 76-year-old male electrocuted when he contacted a broken aquarium heater while cleaning the fish-tank in his apartment. CPSC Case No. 960523CCC6231.

Millville, NJ July 7, 1996 A 5-year-old female electrocuted in the living room of the residence when she contacted an electric fan and the frame of a sliding glass door. CPSC Case No. 970423CCC1157.

Evansville, IN September 2, 1996 A 7-year-old female electrocuted when she contacted an electric fan and metal heat register in the doorway area between the living room and kitchen. CPSC Case No. 96093CCC7462.

Springfield, MO October 10, 1995 A 4-year-old male electrocuted when he contacted the blade of an attachment plug of a floor lamp partially inserted into a receptacle outlet located above a metal floor heating grate and behind a couch in the family room. CPSC Case No. 970220HCC7384.

The GFCI has been in service on selected circuits in homes and elsewhere for 30 years. Reductions in the number of electrocutions have occurred for receptacle outlets and equipment that are required by code to be provided with GFCI protection. The average cost of the GFCI device has decreased substantially since the early period, with the retail cost for a receptacle GFCI below $10. It is time to expand the scope of GFCI protected areas in dwellings to include all general-purpose receptacle outlets. This will provide the same level of electrocution protection as now provided at those receptacle locations that

were identified in the early years on the basis of priority. The unit cost of a GFCI is offset by the increased protection.

GFCIs manufactured to the current industry-supported safety standard (UL 943) are more reliable than those units manufactured in the past. UL 943 requires stringent voltage surge testing, improved resistance to corrosion, and resistance to false tripping from electronic interference.

With regard to boat hoists at dwelling premises, outlets that provide power for motor-operated boat hoist equipment should be provided with GFCI protection for personnel. In the 1980s, in cooperation with manufacturers of boat hoist equipment, CPSC staff identified motor-operated boat hoist equipment intended for use at residential settings as consumer products that needed GFCI protection to reduce the risk of electrocution when using this equipment while near bodies of water. This action was taken because there were a number of electrocutions with boat hoists in residential settings where the equipment did not have GFCI protection. Grounding provisions associated with fixed wiring cannot be relied upon alone for adequate electrocution protection for boat hoists. This is based on the fact that these installations are exposed to harsh weather conditions, the presence of moisture corrosive to the typical boat hoist metallic apparatus, and the presence of cords associated with the motor and motor control wiring harnesses commonly found on fixed wired electrically powered boat hoists. Including the requirement for GFCI protection for boat hoists at dwelling units harmonizes the *NEC* with accepted manufacturing practice and will reduce confusion and the chance that products without GFCI protection will enter service in the future.

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Date Oct. 1, 2002 **Name** William King **Telephone** 301-504-0508, ext. 1296
Company U.S. Consumer Product Safety Commission
Address 4330 East West Highway **City** Bethesda **State** MD **Zip** 20814-4408
Please indicate organization represented (if any) U.S. Consumer Product Safety Commission

1. a) **NFPA Document Title** National Electrical Code
   b) **NFPA No. & Edition** 70-2002 c) **Section/Paragraph** 210.8 (B)
2. **Proposal Recommends** *(check one)*: ☑ **new text** ☐ **revised text** ☐ **deleted text**
3. **Proposal.** *(Include proposed new or revised wording, or identification of wording to be deleted.)* Note: Proposed text should be in legislative format, that is, use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).
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PROPOSAL.

Section/Paragraph: Article 210, Part I, General Provisions, para. 210.8 (B)

Add the following new item to paragraph 210.8 (B) covering GFCI requirements for "Other Than Dwelling Units":

(4) Areas frequented by public and community segments at-large -- where receptacles installed for cord- and plug-connected appliances and equipment are readily accessible to populations in general (for example, receptacles located at schools, stores, theaters, shopping malls, restaurants, museums, houses of worship and other commercial, private and government structures, in corridors and lobbies, along sidewalks, plazas, parks, promenades, etc).

STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PROPOSAL.

The U.S. Consumer Product Safety Commission (CPSC) estimates that there were 170 accidental electrocutions associated with consumer products in 1999 in the United States, the latest year available. Based on information provided on death certificates, CPSC identified six product categories involved in significant numbers of electrocutions: powered tools and equipment, installed wiring, antenna products, large appliances, small appliances, and lighting products. CPSC conducted its own follow-up investigations of a selection of the electrocution deaths that occurred over the seven-year period (1994-2000) in the United States to find causal factors. In total, 209 incidents were documented with sufficient detail (many included on-site visits by CPSC representatives, photographs, investigation reports by local authorities, and interviews with people with relevant knowledge). From these in-depth investigation reports, conditions that led to death were noted. Practical solutions to reduce the risk of electrocution under similar circumstances in the future emerged.

While most electrocutions to consumers occur in and around the home, electrocutions frequently are reported in public and community settings associated with cord-connected power equipment and large appliances, such as coin-operated machines, tools, pumps, and cleaning equipment. Providing GFCI protection for receptacle outlets, both indoor and outdoor, located at public and community access areas patronized by consumers will address these high-risk locations. The following is a partial list of electrocutions that occurred at areas covered by this proposal.

Williston, ND	October 8, 1996 A 9-year-old male electrocuted at an indoor recreation center by a cord- and plug-connected coin-operated machine. CPSC Case No. 970922CCC2427.
Waco, TX	May 29, 1997 A 44-year-old male electrocuted on public property while servicing a cold drink dispensing machine. CPSC Case No. 980402CCC3732.

Clanton, AL	August 21, 1995 A 10-year-old male electrocuted at a motel when he came in contact with a vending machine. CPSC Case No. 950823CCN2720.
Melbourne, FL	June 24, 1998 A 19-year-old male electrocuted at a rented unit in a public storage facility when he came in contact with an electric guitar and microphone plugged into a receptacle outlet not properly grounded. CPSC Case No. 98073CCC1613.
Tallahassee, FL	November 11, 1988 A 26-year-old male electrocuted after he contacted a change machine and a snack machine simultaneously at a college student lounge. CPSC Case No. 881202CCC1072.
Corwith, IA	May 4, 2000 A 16-year-old male electrocuted when he contacted a power tool plugged into a receptacle outlet within a shelter in a municipal park. CPSC Case No. 000530HCC2576.

The GFCI has been in service on selected circuits for 30 years. Reductions in the number of electrocutions have occurred for receptacle outlets and equipment that are required by code to be provided with GFCI protection. The average cost of the GFCI device has decreased substantially since the early period, with the retail cost for a receptacle GFCI below $10. It is time to expand the scope of GFCI protected areas to provide the same level of electrocution protection as now provided at those receptacle locations that were identified in the early years on the basis of priority. The unit cost of a GFCI is offset by the increased protection.

GFCIs manufactured to the current industry-supported safety standard (UL 943) are more reliable than those units manufactured in the past. UL 943 requires stringent voltage surge testing, improved resistance to corrosion, and resistance to false tripping from electronic interference.

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1. a) **NFPA Document Title** National Electrical Code
   b) **NFPA No. & Edition** 70-2002 c) **Section/Paragraph** 422.XX in Part IV
2. **Proposal Recommends** *(check one)*: ☑ **new text** ☐ **revised text** ☐ **deleted text**
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PROPOSAL.

Section/Paragraph: Art. 422, Part IV. Construction, para. 422.XX

Add new paragraph to Part IV of Article 422 as follows:

422.XX Vending Machines. Cord-and-plug connected vending machines shall be protected by one of the following:

(1) Ground-fault circuit-interrupter protection for personnel. The ground-fault circuit interrupter shall be factory-installed on new and re-manufactured machines, and be an integral part of the attachment plug or be located in the power supply cord within 300 mm (12 in.) of the attachment plug. As an alternative to factory-installed devices, cord-and-plug connected vending machines with plugs rated 125-volt, single-phase, and 20 amperes or less, manufactured prior to January 1, 2005 and not re-manufactured on or after that date, shall be connected to receptacles that provide ground-fault circuit-interrupter protection for personnel.

(2) A system of double insulation, or its equivalent.

STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PROPOSAL.

The U.S. Consumer Product Safety Commission (CPSC) has investigated four electrocutions in four separate incidents (CPSC Investigation Nos. 881202CCC1072, 950823CCN2720, 970922CCC2427 & 980402CCC3732), three of which occurred since 1995. Two of the deaths were to children, ages 9 & 10, when they contacted the vending machine. CPSC also investigated three additional incidents with vending machines, cases that involved non-fatal, electric shocks (CPSC Investigation Nos. 940816CEP9009, 950907CWE7273, & 960605CEP9016). In all incidents a vending machine conductor intended to carry current apparently faulted to the exposed frame of the machine, and the ground-fault path was damaged or inadequate.

In addition to the incidents investigated by CPSC, the agency has collected additional reports. One is a death certificate for an individual electrocuted on May 18, 1999 "while working on vending machine." Eight other reports are from a sample of hospital emergency rooms where patients reportedly received an electric shock while in contact with a vending machine.

Recent publications highlight two electric shock events involving electric vending machines. One article, entitled "Case of the Legal Candy Machine", was published in the January 2002 edition of "Electrical Construction and Maintenance Magazine" ("EC&M", published by Intertec, a Primedia Company, Overland Park, KS). An electro-forensic engineering consultant, who found that the candy vending machine had a broken grounding pin on the power cord, wrote this article. The other article, "Vending Machine Accident Underscores NEC Grounding Requirements", was published in the January/February 2002 edition of "IAEI News", a publication of the International Association of Electrical Inspectors, Richardson, TX. An attorney, citing evidence that

the vending machine caused severe injuries to a consumer because it was not properly grounded, wrote this article.

Some of the incidents of shock and electrocution are the result of product modification that defeated the grounding feature. However, the ground-fault circuit interrupter (GFCI) does not rely on the presence of a grounding conductor to provide electrocution protection. Vending machines with GFCI protection or a system of double insulation will address the increased risk introduced by tampering with the grounding of the machines and make them safer.

Electric vending machines are often located in damp and wet locations, in public places, and used by people standing on the ground. Under these circumstances, reliance on equipment grounding conductors alone for protection against electrocution is insufficient.

An alternative to providing a machine with GFCI protection is included in the proposal. The alternative is a machine designed to be protected by a system of double insulation, such systems being defined by nationally recognized standards. This alternative can address concerns about the loss of perishable food products (milk, yogurt, ice cream, ice, etc.) in the event of a GFCI trip.

An alternative to integral GFCI protection or double insulation may be a program of improved installation guidelines and safety programs for vending machine operators. Such a program should complement, and not replace design improvements for new machines. Installation guidelines could, for example, instruct installers of older machines built prior to the requirement and without GFCI protection or a system of double insulation to connect the machines to receptacle outlets protected by GFCIs.

A requirement that GFCIs shall protect receptacles for vending machines, in lieu of the proposed product construction requirement sought herein, is not a satisfactory remedy. It would take an inordinate amount of time, measured in decades, before most receptacles have the fault protection needed to solve a present-day problem, given the general application of the ***NEC*** to new installations and wiring added to existing buildings.

The material cost for implementing the proposed requirement should not be an impediment to adopting the GFCI protection. The price of a weather resistant, rugged GFCI plug or GFCI in the cord is approximately $40 (retail). This one time cost when compared with the unit cost of a vending machine and the anticipated service life of the machine (reportedly 10-20 years before obsolescence or re-manufacturing) should be viewed in light of the benefit of protecting consumers from electrocution. The estimated number of electrocutions when consumers come in contact with the 3-4 million machines in use is two per year.

This proposal is submitted to the *NEC* Committee for adoption because the committee membership broadly represents the electrical community that can affect a solution to prevent these deaths in a timely manner on a national scale. The need for improved electrocution protection for consumers from electric vending machines is broader than

only upgrading construction requirements applicable to newly manufactured machines. Given the life expectancy of the machines at 10 or more years, and the likelihood that existing machines will be reconditioned or re-manufactured to extend their life, the proposal includes providing electrocution protection for machines built prior to incorporating electrocution protection as part of the machine itself. In accordance with the proposal, older machines would be connected to receptacle outlets provided with GFCI protection.