Technical Committee on Electrical Systems

MEMORANDUM

DATE: September 21, 2010

TO: Principal and Alternate Members of the Technical Committee on Electrical Systems

FROM: Jonathan Levin, Associate Fire Protection Engineer
Richard Bielen, Division Manager of Fire Protection Systems Engineering

SUBJECT: **AGENDA PACKAGE – NFPA 99 HEA-ELS A2011 ROC Meeting**

Enclosed is the agenda package for the Report on Comments (ROC) meeting for the Electrical Systems Technical Committee of NFPA 99, *Healthcare Facilities Code*. It is imperative that you review the comments in advance, and if you have alternate suggestions, please come prepared with the proposed changes and respective substantiations. In addition, if there are any specific discussion items that are not included on the agenda or in the public comments, please submit a copy to NFPA staff for distribution to the committee at least five days prior to the meeting.

Please feel free to contact Carol Sances for administrative questions at (617) 984-7951 or CSances@nfpa.org. For technical questions, please contact Richard Bielen at (617) 984-7279 or Jonathan Levin at (617) 984-7245. You can also reach Richard via e-mail at RBielen@nfpa.org and Jonathan at JLevin@nfpa.org. We look forward to working with everyone at the Drury Plaza Hotel River Walk in San Antonio, TX.

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Technical Committee on Electrical Systems

ROC Meeting

October 12-13, 2010
8:00 am – 5:00 pm
Drury Plaza Hotel River Walk
105 South St Mary's Street
San Antonio, TX 78205
(210) 270-7799

AGENDA

Tuesday, October 12, 2010

1. Call to Order – 8:00 AM
2. Introductions and Attendance
3. Committee Member Status and Update of Membership Roster
4. Review Proposed Agenda
5. NFPA Staff Liaison Presentation
6. Chairman Comments
7. Approval of A2011 ROP Meeting Minutes
8. Research Foundation Project on Wet Locations Presentation
9. Presentation on Wet Locations – For the current proposed language
10. Presentation on Wet Locations – Against the proposed language
11. Presentation on Selective Coordination – For the proposed language
12. Presentation on Selective Coordination – Against the proposed language
13. Act on Public Comments
14. Adjourn

Wednesday, October 13, 2010

1. Call to Order – 8:00 AM
2. Selective Coordination Discussion and resolution
3. Wet Location Discussion and resolution
4. Complete Action on Public Comments (if applicable)
5. Generate Committee Comments
6. Adjourn Meeting – 5:00 PM

Distribution by %

HEA-ELS Electrical Systems

Name	Company	Representation	Class	Office
Jan Ehrenwerth	Yale University	ASA	C	Principal
		Voting Number 1	**Percent** 4%	
Michael L. Savage, Sr.	Middle Department Inspection Agency, Inc.		E	Principal
		Voting Number 1	**Percent** 4%	
Dan Chisholm, Sr.	MGI Systems, Inc.		IM	Principal
Don W. Jhonson	Interior Electric, Inc.	NECA	IM	Principal
John Peterson	Utility Service Corporation	NETA	IM	Principal
		Voting Number 3	**Percent** 13%	
Stephen M. Lipster	The Electrical Trades Center	IBEW	L	Principal
		Voting Number 1	**Percent** 4%	
Herbert H. Daugherty	Electric Generating Systems Association	EGSA	M	Principal
Chris M. Finen	Eaton Electrical Corporation		M	Principal
James L. Wiseman	Square D Company/Schneider Electric		M	Principal
		Voting Number 3	**Percent** 13%	
Joseph P. Murnane, Jr.	Underwriters Laboratories Inc.	UL	RT	Principal
		Voting Number 1	**Percent** 4%	
Walter N. Vernon, IV	Mazzetti & Associates Inc.		SE	Chair
James H. Costley, Jr.	Newcomb & Boyd	NFPA/HCS	SE	Principal
Burton R. Klein	Burton Klein Associates		SE	Principal
Hugh O. Nash, Jr.	Nash Lipsey Burch, LLC		SE	Principal
Vincent M. Rea	TLC Engineering for Architecture		SE	Principal
Leonard W. White	Stanford White Associates Consulting Engineers, Inc.		SE	Principal
Robert Wolff	IES Engineers-Dewberry		SE	Principal
		Voting Number 7	**Percent** 30%	
Jason D'Antona	Partners HealthCare System Inc.		U	Principal

Distribution by %

HEA-ELS Electrical Systems

Name	Company	Representation	Class	Office
David A. Dagenais	Wentworth-Douglass Hospital		U	Principal
James J. Dunn, Jr.	University of Texas		U	Principal
Tony Easty	University Health Network		U	Principal
James E. Meade	US Army Corps of Engineers		U	Principal
Ronald M. Smidt	Carolinas HealthCare System	ASHE	U	Principal

Voting Number 6 **Percent** 26%

Total Voting Number 23

TC on Electrical Systems
ROP Meeting
Embassy Suites Phoenix, AZ
2630 E. Camelback Road
Phoenix, AZ
January 27-29, 2010

Attendees:

Walter Vernon
James Costley
Jason D'Antona
David Dagenais
Hubert Daugherty
James Dunn
Jan Ehrenwerth
Nancy Gunderson
Stephen Lipster
James Meade
Joseph Murnane
Hugh Nash
John Peterson
Vincent Rea
Ronald Smidt
Leonard White
James Wiseman
Robert Wolff
David Bredhold
Richard Bielen
Jon Levin

Guest:
Don Johnson
Gary Becksfrand
Tim Crnko
Douglas Erickson

1. Walter Vernon called the meeting to order. He stated we have public proposals to review for this meeting.

2. Richard Bielen gave the staff report. He reviewed the dates of the cycle and the actions the committee can take at the ROP meeting.

3. The minutes of the previous ROC meeting were approved.

4. The committee then acted on the public and committee Proposals. See the ROP for the official action on the comments.

5. There was no old business.

6. There was no new business.

7. Next meeting. TBD in the September/October timeframe

8. Meeting adjourned at 3:15 pm.

NFPA 99 Revision Cycle

Annual 2011

Comment Closing Date	September 3, 2010
Final Date for ROC Meeting	November 5, 2010
Ballots Mailed to TC	November 19, 2010
ROC Published	February 2, 2011
Intent to Make a Motion Closing (NITMAM)	April 8, 2011
Issuance of Consent Document (No NITMAMs)	May 31, 2011
NFPA Annual Meeting Boston, MA	June 2011
Issuance of Document with NITMAM	August 11, 2011

Note from the Staff Liaison

Dear Technical Committee Members:

We are very pleased that you will be participating in the processing of the 2012 Edition of NFPA 99. Development of the Code would not be possible without the participation of volunteers like you.

Materials You Will Need to Have for the Meeting

- 2005 Edition of NFPA 99
- Agenda package
- A2011 ROP
- Committee Officers' Guide (Chairs)
- Roberts’ Rules of Order (Chairs – abbreviated version may be found in the Committee Officer’s Guide)

"Nice to Have" Materials

- NFPA Annual Directory
- NFPA Manual of Style
- Prepared Committee Comments (If applicable)

Preparation

Prepared actions and statements will clarify your position and provide the committee with a starting point. Prepared actions and statements really help expedite the progress of the meeting.

Getting Things Done

Comments

Only one posting of comments will be made; it will be arranged in section/order and will be pre-numbered. This will be posted to the NFPA e-committee website. If you have

trouble accessing the website please contact Carol Sances at CSances@nfpa.org. Please bring the comments to the committee meeting.

The processing schedule to be followed by the committee is outlined in the schedule in this package. As the schedule is very tight, no extensions of the deadline for receipt of completed ballots or extensions of the period to change vote will be possible.

It is therefore suggested that those of you who must consult with others regarding your ballot do so based on the material passed out at the meeting, and your meeting notes. Do not wait for receipt of the ballot materials from NFPA.

Regulations and Operating Procedures

All actions at and following the committee meetings will be governed in accordance with the NFPA Regulations Governing Committee Projects. The latest Regulations (as of this printing) appear on pages 10-28 of the 2010 NFPA Directory.

All committee actions will be in accordance with the NFPA Regulations Governing Committee Projects. The style of NFPA 99 will comply with the Manual of Style for NFPA Technical Committee Documents. Failure to comply with these rules could result in challenges to the standards-making process. A successful challenge on procedural grounds could prevent or delay publication of NFPA 99. Consequently, committee's must follow the regulations and procedures.

Processing Comments

All comments must be acted upon. If a comment does not comply with Section 4.4.3 of the NFPA Regulations Governing Committee Projects (an incomplete comment), the committee may reject the comment. However, any of the standard actions may be taken. Please make sure that the committee's action and the committee's statement result in a complete action that can be readily understood.

Committee Actions

The following are the actions permitted by the Regulations Governing Committee Projects for disposition of comments. Please note that comments can be held for further study.

Accept

The committee accepts the comment exactly as written. Only editorial changes such as paragraph and section numbering, and corrections to spelling, capitalization, and hyphenation may be made.

If a comment is accepted without a change of any kind, except for editorial changes, the committee can simply indicate acceptance. The committee should add a committee statement explaining the action if, for example the committee does not agree with all of the substantiation or supporting data or has a number of different reasons for acceptance than those stated in the substantiation or supporting data. The absence of such a statement could mislead the reader by giving the impression that the committee agreed with all of the substantiation for the comment.

Reject

The comment is rejected by the committee. If the principle or intent of the comment is acceptable in whole or in part, the comment should not be rejected, it should be accepted in principle or accepted in principle in part. A complete reason for rejection of the comment must be supplied in the committee statement.

Accept in Principle

Accept the comment with a change in wording. The committee action must indicate specifically what action was taken to revise the proposed wording, and where the wording being revised is located (i.e., in the proposed wording or in the document). If the details are in the action on another comment, the committee action may simply indicate "Accept in Principle" but reference should then be made in the committee statement to the specific comment detailing the action.

Accept in Part

If part of a comment is accepted without change and the remainder is rejected, the comment should be "Accepted in Part." The committee action must indicate what part was accepted and what part was rejected and the committee statement must indicate its reasons for rejecting that portion.

Accept in Principle in Part

This is a combination of "Accept in Principle" and "Accept in Part" as shown above.

Hold

Comments can be held and processed as a proposal during the next revision cycle provided that one of the following conditions is met:

(a) The comment introduces a concept that has not had public review by being included in a related proposal as published in the Report on Proposals.
(b) The comment would change the text proposed by the TC to the point that the TC would have to restudy the text of the Report on Proposals or other affected parts of the Document.
(c) The comment would propose something that could not be properly handled within the time frame for processing the report.

Committee Statements

Any comment that is "Accepted in Principle", "Accepted in Part", "Accepted in Principle in Part" or "Rejected" must include a committee statement, preferably technical in nature that provides the reasons for the action.

References to the requirements of other documents as a reason for rejection should be to the specific sections of the document including the requirements. If there is more than one such section, the reference should include a least one, identified as an example.

It is a violation of the regulations for a committee to reject a comment simply because it accepted a different comment on the same subject. Reference in the committee statement

to another committee action is inappropriate unless the referenced comment contains all of the applicable technical justification for the action.

If the rejection or change was for the same reason that another comment was rejected or changed, the committee statement may refer to that comment giving the same reason for rejection or change. Please verify that cross references to other comments are correct.

The committee statement should not refer to another committee statement which, in turn, refers to some other committee statement. There may be a situation where the committee will want to refer to two, three, or more committee statements if they are all appropriate.

When the committee develops a committee action for a comment that is accepted in principle, the rationale must indicate why the wording submitted was not accepted. This reason should be technical in nature, unless the committee has simply rewritten the submitter's text, in which case the committee can state that the proposed wording should meet the submitter's intent.

The committee statement on a comment that is accepted in part should indicate specifically why that part of the comment was not accepted.

Easy Procedures for Handling a Motion

NFPA Committee Meetings are conducted in accordance with Roberts' Rules of Order. In order for a comment to be discussed, a motion must be made. A simplified procedure for discussion of motions is as follows:

Member

• Member Addresses the Chair
• Receives Recognition from the Chair
• Introduces the Motion
• (Another Member) Seconds the Motion.

Chair (Presiding Officer)

- States the Motion
- Calls for Discussion
- Takes the vote
- Announces the Result of the Vote

It is imperative that you review the comments before the meeting and develop proposed actions and statements. These prepared actions and statements will clarify your position and provide the committee with a starting point. Prepared actions and statements really help expedite the progress of the meeting.

Balloting Dos and Don'ts

Either fax or mail your ballot - Please do not do both. Don't return the entire package; just return the appropriate ballot page(s) and explanation of votes.

Alternate Members

At the end of each code cycle, the Standards Council reviews records of all members regarding their participation in the standards-making process. Therefore, it is important for alternate members to remember that return of ballots is expected, even though they know that their principal member will be attending meetings and returning their ballots.

General Procedures for Meetings

- Use of tape recorders or other means capable of producing verbatim transcriptions of any NFPA Committee Meeting is not permitted.
- Attendance at all NFPA Committee Meetings is open.
- All guests must sign in and identify their affiliation.
- Participation in NFPA Committee Meetings is generally limited to committee members and NFPA staff. Participation by guests is limited to individuals, who have previously requested of the chair time to address the committee on a particular item, or individuals who wish to speak regarding public proposals or comments that they submitted.

- The chairman reserves the right to limit the amount of time available for any presentation.
- No interviews will be allowed in the meeting room at any time, including breaks.
- All attendees are reminded that formal votes of committee members will be secured by letter ballot. Voting at this meeting is used to establish a sense of agreement, but only the results of the formal letter ballot will determine the official position of the committee on any comment.
- Note to Special Experts: Particular attention is called to Section 3.3(e) of the NFPA Guide for the Conduct of Participants in the NFPA Codes and Standards Development Process in the NFPA Directory that directs committee members to declare their interest representation if it is other than their official designation as shown on the committee roster, such as when a special expert is retained and represents another interest category on a particular subject. If such a situation exists on a specific issue or issues, the committee member shall declare those interests to the committee, and refrain from voting on any proposal, comment, or other matter relating to those issues.
- Smoking is not permitted at NFPA Committee Meetings.

99- Log #262 HEA-ELS Final Action:
(Entire Document)

Submitter: Steven Jalowiec, Waterbury Hospital
Comment on Proposal No: 99-8
Recommendation: Revise the term “wet location” to “wet procedure location” throughout the document.
Substantiation: The New England Society of Healthcare Engineers supports this proposal.

99- Log #35 HEA-ELS Final Action:
(2.9)

Submitter: David Tepen, Shive Hattery
Comment on Proposal No: 99-509
Recommendation: Delete 2.9 Tele-duct.
Substantiation: Use of made up words and terminology will only confuse those you are trying to educate. Stick with common terminology used in the trade. Or better yet simply state the intent: Cable tray shall be provided with adequate clearance for maintaining the cable tray and installation and removal of telecommunication cable.

99- Log #36 HEA-ELS Final Action:
(2.10)

Submitter: David Tepen, Shive Hattery
Comment on Proposal No: 99-509
Recommendation: Delete 2.10 Tele-vator.
Substantiation: Do not use made up terms and concepts. This will only further confuse those that you are trying to educate. Should only use common terminology for the trade providing the work. Just state what the intent of the made up concept is Tele-vator: TDRs (telecom distribution rooms) shall be stacked whenever possible. Stacked Telecom rooms provide for a more secure and protected telecom backbone that is vital to the continued operation of the facility.

99- Log #8a HEA-ELS Final Action:
(3.3.9 Anesthetizing Location)

Submitter: Technical Correlating Committee on Health Care Facilities,
Comment on Proposal No: 99-31
Recommendation: The scope of NFPA 99 does include all levels of anesthesia, therefore the definition must be all inclusive and the TC should review and change their action at the ROC stage. All the TC's should review their categories of patient care where anesthetics are used.
Substantiation: This is a direction from the Technical Correlating Committee on Health Care Facilities in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
This is not original material; its reference/source is as follows:
American Society of Anesthesiologists Practice Guideline for Sedation and Analgesia by non-Anesthesiologists. Anesthesiology 2002, 96:1004-17.

99- Log #280 HEA-ELS Final Action:

(3.3.44 Essential Electrical System, Critical Branch, Critical System, Equipment System, Life Safety Branch and Figure B.4.1)

Submitter: Jim Wiseman, Schneider Electric

Comment on Proposal No: 99-40

Recommendation: Identify “Revise Critical Branch” as applying to 3.3.26.

Identify “Delete Critical System” as applying to 3.3.29, and give proper instruction on how to deal with the term where it is used within the document.

Identify “Change the term Equipment System” as applying to 3.3.43, and give proper instruction on how to deal with the term where it is used within the document.

Identify “Revise Life Safety Branch” as applying to 3.3.96.

Identify “Delete Quiet Ground” as applying to 3.3.153.

Correct reference to “Figure B.4.1”. Reference apparently should have been to Figure C.4.1.

Substantiation: The Committee lumped too much into one Proposal, without proper identification to allow tracking changes. This will clarify and correct an error. This is a companion Comment to others I have made on Proposal 99-40 (Log #CP321).

99- Log #281 HEA-ELS Final Action:

(3.3.44 Essential Electrical System, Critical Branch, Critical System, Equipment System, Life Safety Branch and Figure B.4.1)

Submitter: Jim Wiseman, Schneider Electric

Comment on Proposal No: 99-40

Recommendation: In 4.5.2.2.1, second sentence, replace “emergency system and each critical system” with “essential electrical system”. Correlate with Proposal 99-39. (Now appears as 6.5.2.2.1.2 in the preprint.)

In 4.5.2.2.1, third sentence, delete “or systems” (Now appears as 6.5.2.2.1.3 in the preprint.)

In 4.5.2.2.3, all appearances – eight in total – change “critical system” to “equipment branch”. Correlate with Proposal 99-116. (These changes were made in the preprint.)

In 4.5.3.2.3, change “critical system” to “equipment branch”. (This change was NOT made in the preprint.)

In A.4.5.2.2.1, to address “critical system” and correlate with other changes, revise the paragraph as follows:

“A.4.5.2.2.1 Type 2 essential electrical systems are comprised of ~~two separate systems~~ three separate branches capable of supplying a limited amount of lighting and power service that is considered essential for the protection of life and safety and effective operation of the institution during the time normal electrical service is interrupted for any reason. These ~~two separate systems~~ three separate branches are the ~~emergency system and the critical system~~ life safety, critical, and equipment branches.

The number of transfer switches to be used shall be based upon reliability, design, and load considerations. Each branch of the ~~emergency~~ essential electrical system ~~and each critical system~~ shall have one or more transfer switches. One transfer switch shall be permitted to serve one or more branches ~~or systems~~ in a facility with a maximum demand on the essential electrical system of 150 kVA (120 kW).”

(Some of these changes were made in the preprint.)

In A.4.5.2.2.3.4, change “critical system” to “equipment branch”. (This change was NOT made in the preprint.)

Substantiation: None given.

99- Log #282 HEA-ELS Final Action:

(3.3.44 Essential Electrical System, Critical Branch, Critical System, Equipment System, Life Safety Branch and Figure B.4.1)

Submitter: Jim Wiseman, Schneider Electric

Comment on Proposal No: 99-40

Recommendation: In 4.4.2.2.1.2, 4.4.2.2.3 (4 appearances), 4.4.3.2.4, and A.4.4.1.1.7.3 (4 appearances), change "equipment system" to "equipment branch".

In 4.4.4.1.1.2(A), second sentence, replace "emergency and equipment systems" with "essential electrical system".

In A.4.4.1.1.1, second paragraph, replace "emergency and equipment systems" with "essential electrical system".

In A.4.5.2.2.1, to address "equipment system" and correlate with other changes, revise the paragraph as follows:

"A.4.4.2.2.1 Type 1 essential electrical systems are comprised of ~~two separate systems~~ three separate branches capable of supplying a limited amount of lighting and power service that is considered essential for life safety and effective facility operation during the time the normal electrical service is interrupted for any reason. These ~~two separate systems~~ three separate branches are the ~~emergency system and the critical system~~ life safety, critical, and equipment branches."

Substantiation: The Committee accepted proposals to change the term "Equipment System" to "Equipment Branch" in the definitions but did not address all the locations in which the term was used. Because not all of these locations are best addressed by a simple "change from a to b" instruction, suggestions are given above. This is a companion Comment to others I have made on Proposal 99-40 (Log #CP321).

99- Log #66 HEA-ELS Final Action:

(3.3.96 Life Safety Branch)

Submitter: Thomas Guida, TJG Services, Inc.

Comment on Proposal No: 99-40

Recommendation: Reword the following section of the Proposal as shown:

~~Revise Life Safety Branch as follows: A system of feeders and branch circuits supplying power for lighting, receptacles, and equipment essential for life safety that are automatically connected to alternate power sources by one or more transfer switches during interruption of the normal power source.~~

Revise Life Safety Branch as follows: A system consisting of feeders and branch circuits, meeting the requirements of Article 700 of NFPA 70, National Electrical Code, intended to provide adequate power needs to ensure safety to patients and personnel, that is automatically connected to alternate power sources during interruption of the normal power source.

Substantiation: This definition restores the wording of the present definition except for the deletion of the reference to emergency systems. The reference to Article 700 is very important because the emergency systems must be on line in 10 seconds. Other "alternate sources" e.g., Article 701 or 702 could lead to a substantially longer delay in the transfer of power.

This is not original material; its reference/source is as follows:
National Electrical Code.

99- Log #10a HEA-ELS Final Action:
(3.3.158 Relative Analgesia)

Submitter: Technical Correlating Committee on Health Care Facilities,
Comment on Proposal No: 99-67
Recommendation: The scope of NFPA 99 does include all levels of anesthesia, therefore the definition must be all inclusive and the TC should review and change their action at the ROC stage. All the TC's should review their categories of patient care where anesthetics are used.
Substantiation: This is a direction from the Technical Correlating Committee on Health Care Facilities in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
This is not original material; its reference/source is as follows:
American Society of Anesthesiologists Practice Guideline for Sedation and Analgesia by non-Anesthesiologists. Anesthesiology 2002, 96:1004-17.

99- Log #167 HEA-ELS Final Action:
(3.3.179 Wet Location)

Submitter: Diane Hughes, UAMS
Comment on Proposal No: 99-73
Recommendation: NFPA 99 defines "Wet location as a patient care area that is normally subject to wet conditions while patients are present. This includes standing fluids on the floor or drenching of the work area, either of which condition is intimate to the patient or staff. Routine housekeeping procedures and incidental spillage of liquids do not define a wet location. (ADM) "Think we need to document a risk assessment of our OR's procedure.
Substantiation: Anywhere in a facility could be determined by a facility to be a Wet Location. This is inclusive to Hydrotherapy or any area that meets the definition of a Wet Location, and may or may not be a Critical Care Area. Operating Rooms are by definition, Critical Care Area; however, they are not presently inferred either directly or indirectly as Wet Locations. Furthermore, the code does go out of its way to say that "incidental" spillage does not constitute a "wet location". This comment can prevent a regulatory or design assumption that Operating Rooms must be a Wet Location. Therefore, this office does not presume Operating Rooms to be Wet Locations.
This is not original material; its reference/source is as follows:
AHJ for Arkansas, Tom McConnell Sparks Hospital, Ft Smith, AR, Diane Hughes, UAMS

99- Log #43 HEA-ELS Final Action:
(3.3.185 Wet Locations)

Submitter: Jan Ehrenwerth, Yale University School of Medicine
Comment on Proposal No: 99-74
Recommendation: Revise text to read as follows:
, including standing fluids on the floor or ~~drenching~~ soaking of the work area.
Substantiation: Drenching is an inappropriate term for this definition. It implies massive amounts of fluids, as if the sprinkler system was activated.
Soaking better conveys the intention of the definition.

99- Log #197 HEA-ELS Final Action:
(Chapter 4)

Submitter: Burton R. Klein, Burton Klein Associates
Comment on Proposal No: 99-75
Recommendation: Accept proposal 99-75.
Substantiation: 1. I question whether readers of document will remember the list of paragraphs cited in proposal 99-78 (i.e., new paragraph 4.1.2) as applying to both new and existing HCFs. Placing the list in a separate chapter is much clearer.
2. How can 'maintenance' requirements apply to 'new' facilities when they are intended to be performed after a facility has been constructed and approved for occupancy.

99- Log #198 HEA-ELS Final Action:
(Chapter 4)

Submitter: Burton R. Klein, Burton Klein Associates
Comment on Proposal No: 99-77
Recommendation: Add requirements in Chapter 4 (Electrical Systems) relating requirements for (1) the normal electrical distribution system, and (2) the three Types of essential electrical system listed, with the four Categories listed in proposal 99-77.
Substantiation: 1. In reviewing the preprint for Chapter on Electrical System, there is no text connecting requirements in Chapter with 'Categories listed in proposal 99-77. This connection was done for the Chapter on Piped Gas & Vacuum Systems (In preprint – Chapter 5).
2. As an example in preprint, section 6.4, Essential Electrical Systems – Type 1, lists requirements for a Type 1 EES; but there is no text indicating which Category or Categories would require a Type 1 EES. Same question as to where the requirements in section 6.3 – Electrical System should be applied.

99- Log #295 HEA-ELS Final Action:
(Chapter 4)

Submitter: Dennis Mulrooney, Mulrooney Sales, Inc.
Comment on Proposal No: 99-400
Recommendation: Add new section as follows and renumber:
4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.
A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.
Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal.
OR's need to be considered and treated as wet locations. Patient safety is at risk with all the electrical devices close at hand in the OR.

99- Log #297 HEA-ELS Final Action:
(4.1.2)

Submitter: Mark R. Hilbert, Wolfeboro, NH
Comment on Proposal No: 99-78
Recommendation: Revise the proposed text by deleting the reference to 4.3.2.2.2.3 (6.3.2.2.2.3 in the preprint). The remainder of the proposed text remains unchanged.
Substantiation: Section 4.3.2.2.2.3 provides an allowance for circuits that do not have an equipment grounding conductor contained with the original wiring method to remain in use in existing conditions provided the performance requirements of 4.3.3.1 are met and there is annual verification. This allowance is clearly for existing conditions as 4.3.2.2.2.3 and therefore should not be included as a referenced section in the new 4.1.2. The text of 4.1.2 states the referenced sections apply to both new and existing construction. As written the proposed text implies the continued use of the system is permitted in new construction and could be interpreted to allow an extension of the existing circuit wiring.
If it is truly the intent to allow this system to operate only as existing the reference to 4.3.2.2.2.3 should be removed as recommended in this comment. It is not needed as part of 4.1.2 as it already applies to existing conditions as 4.3.2.2.2.3.

99- Log #263 HEA-ELS Final Action:
(4.3.2.2.1.3)

Submitter: Steven Jalowiec, Waterbury Hospital
Comment on Proposal No: 99-82
Recommendation: Add a new section to read as follows and renumber existing:
4.3.2.2.1.3 Access to Overcurrent Protective Devices. (A) Only authorized personnel shall have access to overcurrent protective devices serving Category 1 and Category 2 rooms. (B) Overcurrent protective devices serving Category 1 and Category 2 rooms shall not be permitted to be located in public access spaces. (C) Where used, such as in critical care areas, isolated power panels shall be permitted in those locations.
Substantiation: The New England Society of Healthcare Engineers supports this proposal.

99- Log #120 HEA-ELS Final Action:
(4.3.2.2.2.3)

Submitter: Chad E. Beebe, American Society for Healthcare Engineering
Comment on Proposal No: 99-83
Recommendation:
Substantiation:

99- Log #259 HEA-ELS Final Action:
(4.3.2.2.2.3)

Submitter: David A. Dagenais, Wentworth-Douglass Hospital
Comment on Proposal No: 99-83
Recommendation: Revise text to read as follows:
4.3.2.2.2.3 Separate Grounding Conductor. When existing construction does not have a separate grounding conductor, the continued use of the system shall be permitted, provided it meets the performance requirements in 4.3.3.1 ~~and is verified annually~~.
Substantiation: The requirement for annually testing is not justified with any technical data, no evidence of a problem exists and furthermore the outlet testing in 4.3.4.1 will find any problems in the ground path making this requirement redundant. There is no need to check something once a year just for the sake of testing it.

99- Log #256 HEA-ELS Final Action:
(4.3.2.2.4.3)

Submitter: Alan Manche, Schneider Electric
Comment on Proposal No: 99-88
Recommendation: This proposal should have been accepted.
Substantiation: We agree that surge protection is a design consideration across the entire facility; however, switching transients have a high probability of damaging and shortening the life of equipment that is connected to the emergency system. The committee statement also noted that the level of protection is not proposed in the text. The reason the level is not proposed is because we recognize the level may differ if the transfer equipment is located outside vs. near the loads that will be impacted. Once again, we recognize that effective surge protection is a design consideration and adding this requirement will drive that design consideration when the standard requires surge protection on the system.

99- Log #264 HEA-ELS Final Action:
(4.3.2.2.6.2)

Submitter: Steven Jalowiec, Waterbury Hospital
Comment on Proposal No: 99-90
Recommendation: Revise section 4.3.2.2.6.2 to read as follows:
4.3.2.2.6.2 Minimum Number of Receptacles. The number of receptacles shall be determined by the intended use of the patient care rooms in accordance with 4.3.2.2.6.2(A) through 4.3.2.2.6.2(E). (A) Receptacles for Patient Bed Locations in General Care Areas (Category 2). Each patient bed location shall be provided with a minimum of eight receptacles. (B) Receptacles for Patient Bed Locations in Critical Care Areas (Category 1). Each patient bed location shall be provided with a minimum of fourteen receptacles. (C) Receptacles for Operating Rooms (Category 1). Operating rooms shall be provided with a minimum of thirty-six receptacles. (D) Receptacles for Bathrooms or Toilets. Receptacles shall not be required in bathrooms or toilet rooms. (E) Receptacles for Special Rooms. Receptacles shall not be required in rooms where medical requirements mandate otherwise (e.g., certain psychiatric, pediatric, or hydrotherapy rooms). (F) Designated General Care Pediatric Locations. Receptacles that are located within the patient rooms, bathrooms, playrooms, and activity rooms of pediatric units, other than nurseries, shall be listed tamper-resistant or shall employ a listed tamper-resistant cover.
Substantiation: The New England Society of Healthcare Engineers supports this proposal.

99- Log #286 HEA-ELS Final Action:
(4.3.2.2.8.1(2))

Submitter: Marcel J. Tremblay, Bender Electronics, Inc.
Comment on Proposal No: 99-95
Recommendation: 1. Revise 4.3.2.2.8.1(2) to read as follows:
~~A power distribution system in which the power supply is interrupted if the ground-fault current does, in fact, exceed a value of 6 mA the trip value of a Class A GFCI.~~
~~2. Add new Annex A.4.3.2.2.8.1(2) to read as follows:~~
~~A.4.3.2.2.8.1(2) Class A GFCIs trip at currents between 4 and 6 mA.5.~~
Substantiation: The intent of 4.3.2.2.8.1* is to present two options as the means to provide special protection against electric shock <u>without</u> identifying the method of implementation, i.e., specifying GFCIs as the 2nd method violates the intent 4.3.2.2.8.1*. Accepting this proposed revision implies that the “isolated power systems (IPS)” method should also be added to the text in 4.3.2.2.8.1(1)!
Note: See my comment relating to proposal 99-97

99- Log #4 HEA-ELS Final Action:
(4.3.2.2.8.3)

Submitter: Alan Lipschultz, Christiana Care Health Services / Rep. Association for the Advancement of Medical Instrumentation (AAMI)
Comment on Proposal No: 99-96
Recommendation: Reject this proposal.
Substantiation: The committee has provided no rationale that a hazard exists in an anesthetizing location that would require the additional requirements for isolated power or GFCI. In the absence of any documentation of a safety hazard, it is irresponsible for the committee to impose a requirement for additional and expensive safety features onto the American healthcare system.

The existing text in NFPA 99 regarding wet locations and anesthetizing locations has stood for over 20 years. Healthcare facilities have been required to determine which areas of their facilities are wet locations. The vast majority of anesthetizing locations around the world do not have isolated power systems or GFCI. Outside of the USA, other countries have never required isolated power systems.

The primary reason that many anesthetizing locations in the USA had isolated power systems was because of the former requirement for conductive flooring which resulted from the use of flammable anesthetics, not because of electrical safety concerns.

There is a large body of documented experience over many decades from anesthetizing locations that do not have isolated power systems (or GFCI). The burden is on the committee to point to a evidence of electrical shock instances from these locations that would have been prevented if isolated power systems or GFCI had been present.

Before the NFPA imposed the requirement for GFCI in home bathrooms, unfinished basements, and pools; they had multiple cases of electrocutions and severe electrical shock in each of those areas. The same rationale should apply in this situation.

Proposal 99-72 makes mention of an electrical short circuit that happened when fluid dripped into an electrical device. The proposer to make the point that the isolated system limited the current flow preventing a possible fire. Unless the author is able to provide more engineering detail, the scenario described would not have been any different if an isolated power system had been present.

Isolated power systems are expensive and require additional maintenance and testing beyond conventional systems. Where is the benefit to off set this increased cost?

99- Log #65 HEA-ELS Final Action:
(4.3.2.2.8.3)

Submitter: Charles Workman, Healthcare Compliance Engineering
Comment on Proposal No: 99-96
Recommendation: Revise text to read as follows:

3.3.185 Wet Location: An Anesthetizing location (see 3.3.9) where surgical procedures are performed shall be ~~considered~~ formally assessed to determine if it meets ~~a~~ wet location criteria.

Substantiation: Not all procedures are considered “wet”. 90 percent of the two major services lines (Cardiology, and Orthopedic) do not generate a “wet” situation in the OR’s. The definition being “wet under normal operating conditions” should be included for clarification, not just the OR is designed to be wet during normal operating procedures.
Every working and walking surface must be maintained by the employer as per the Code of Federal Regulations listed below. We do not need another guideline that is already covered by the Federal Government, specifically OSHA. If the issue is the wet floor, then by making all OR’s wet locations is treating the symptom and not solving the problem. The employer has a Federal regulation that indicates how the working and walking surfaces should be maintained. In the worst case scenario, if an OR is 400 square feet, and the door cuts were 1 inch the room could only hold 248 gallons of water without the water leaving the OR and entering the surrounding corridors (400x.083 (1 inch) x 7.48 (gallon of water per cubic feet) = 248 gallons. I do not know and have inquired of clinicians of how this amount of water, or combination of body fluids could be obtained in an OR! We conduct risk assessments based on the use of the OR as we do in any other room design and construction. This requirement is unnecessary for All OR’s.

OSHA 1910.22

This section applies to all permanent places of employment, except where domestic, mining, or agricultural work only is performed. Measures for the control of toxic materials are considered to be outside the scope of this section.

1910.22(a)

"Housekeeping."

1910.22(a)(1)

All places of employment, passageways, storerooms, and service rooms shall be kept clean and orderly and in a sanitary condition.

1910.22(a)(2)

The floor of every workroom shall be maintained in a clean and, so far as possible, a dry condition. Where wet processes are used, drainage shall be maintained, and false floors, platforms, mats, or other dry standing places should be provided where practicable.

99- Log #121 HEA-ELS Final Action:
(4.3.2.2.8.3)

Submitter: Chad E. Beebe, American Society for Healthcare Engineering
Comment on Proposal No: 99-96
Recommendation: Revise text to read as follows:

4.3.2.2.8.3* Operating rooms shall not be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.

Substantiation: There is too much evidence showing that there is not a problem with operating rooms being wet locations. There should not be a requirement unless a problem is determined by the facility, in which they should have the ability to decide what necessary precautions need to be taken in order to mitigate the problem.

99- Log #174 HEA-ELS Final Action:
(4.3.2.2.8.3)

Submitter: Donald D. King, Kaiser Permanente
Comment on Proposal No: N/A
Recommendation: Revise text to read as follows:

~~Operating rooms shall be considered to be a wet procedure location unless~~ The health care governing body shall conduct a risk assessment for Operating rooms to determine whether the procedures to be conducted in the space require enhanced electrical protection due to wet conditions, equipment used, or other risk-elevating elements. ~~conducted by the health care governing body determines otherwise.~~ A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.

Substantiation: Please refer back to the comments on proposals submitted during the last COP round. In those proposals, there was extensive documentation from hospitals and healthcare organizations, demonstrating that there were no elevated risks from an operating room equipped with a conventional electrical system. Against the evidence of literally millions of operations conducted without enhanced protection and without electrical mishap, the committee received several hundred identical comments, observing only the wetness, BUT WITH NO RESULTING INJURIES. To the best of our knowledge, these comments about wetness did not include mention of any harm as a result. This lack of fact and data is further evidence that the use of conventional electrical systems in operating rooms does not present an elevated risk.

The language accepted by the Panel places a burden of proof on the fact that there is no risk. This is a costly, time consuming and potentially impossible burden on healthcare organizations. Logically, it is impossible to prove a negative.

In the case of Kaiser Permanente, we have used conventional grounded electrical systems for almost 20 years. We have over 70,000,000 square feet of buildings, including hospitals, medical offices and other building types. We have hundreds of operating rooms operating with conventional electrical systems. Many of the wettest ORs are in outpatient facilities, similar to the millions of ORs in ambulatory facilities around the country. In the millions of procedures we have operated in these spaces, we have not experienced the types of incidents that are being voiced to support the current language. I have been working in health care facilities throughout my 35 year professional career and have seen operating rooms in numerous facilities. I have many professional colleagues who operate even more facilities. Accordingly, I would like to be clear that:

1. Kaiser's operations are completely typical of operations of all healthcare providers; and
2. We have seen no evidence of enhanced risk of electrical incidents in our OR's; and
3. Our experience is ample evidence that no enhanced risk of electrical incidents exist in our OR's.

From my examination of the record, and of the evidence supported to the committee, I am unable to conclude that there was a need for this requirement. It appears to me that this requirement is rooted in anecdote and emotion rather than science, data and fact. Evidence based medicine is focused on the concept that we accept a treatment method if there is adequate evidence to document its usefulness and relative lack of complications. I am both confused and concerned why we would accept a building standard that is not similarly based on evidence.

In this era of healthcare reform and rigorous effort to control the costs associated with this country's healthcare system, it is imprudent to divert healthcare funds to support this requirement. The costs to retrofit existing and implement this requirement in new facilities will be exorbitant. While some argue that this requirement only applies to new facilities; we have been advised that if a national standards body like the NFPA were to declare these rooms to pose elevated risk, no amount of study would be enough to overcome that presumption. Thus, we would be forced to go back and retrofit our facilities with the isolated grounding panels.

We would prefer to invest in patient exam rooms, pre-natal care, patient lifts and other programs that have been proven to improve health outcomes, provide access to healthcare services and protect healthcare workers.

99- Log #302 HEA-ELS Final Action:
(4.3.2.2.8.3)

Submitter: Darrell Fugate, Saint Alphonsus Regional Medical Center
Comment on Proposal No: 99-96
Recommendation: Provide tool or algorithm to have an objective means to determine what constitutes a wet area.
Substantiation: Determining which areas are wet areas should have an objective means of evaluation. Clear guidance on when to use isolated power systems is necessary to avoid unnecessary cost and upkeep.

99- Log #327 HEA-ELS Final Action:
(4.3.2.2.8.3)

Submitter: John Hohman, Michigan Society for Healthcare Engineering
Comment on Proposal No: 99-96
Recommendation: Remove any requirement to identify operating rooms as wet locations.
Substantiation: Isolated power systems in operating rooms are not mandatory. We feel that each facility should determine if the O.R. is a wet location, most are considered not to be wet locations. This issue has been identified as one that has no support.

99- Log #81 HEA-ELS Final Action:
(4.3.2.2.8.3 [6.3.2.2.8.3])

Submitter: George E. Johnston, Loma Linda University Health Services
Comment on Proposal No: 99-96
Recommendation: Revise text to read as follows:
~~Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.~~
"Procedure areas, including operating rooms, hydrotherapy rooms and infusion centers shall be included in a risk assessment conducted by the health care facility's governing body to identify and designate wet procedure areas."
Substantiation: The health care facility's governing body should be responsible for identifying and designating wet procedure locations in its facility. Separating out operating rooms from other procedure areas for this purpose is not supported by data from documented experience. Requiring the health care facility to conduct the risk assessment and to implement any necessary special protection requirements more correctly aligns the responsibility.

99- Log #44 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.2.2.8.3)

Submitter: Jan Ehrenwerth, Yale University School of Medicine
Comment on Proposal No: 99-96
Recommendation: I agree with the committee proposal.
Substantiation: It is essential that operating rooms be considered a wet procedure location.
All evidence indicates that more fluids and blood are spilled on the floor and around the patient than ever before.
Because patients are anesthetized, it would not be obvious if they received a serious electrical shock.

99- Log #104 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: Wolfgang Hofheinz, Bender GmbH
Comment on Proposal No: 99-96
Recommendation: Add new section as follows and renumber:
4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.
A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.
Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal.
I support this proposal also from an international point of view, because the proposal represents the experience in e.g. German hospitals.
This is not original material; its reference/source is as follows:
Item 4 above repeats word-for-word the "Recommendation" proposed by the Technical Committee on Electrical Systems

99- Log #151 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: Edwardde Grasse, Diversified Electrical Representatives
Comment on Proposal No: 99-96
Recommendation: Add new section as follows and renumber:
4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.
A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.
Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal.

99- Log #163 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: Scott Brockman, Isolated Power Specialist
Comment on Proposal No: 99-96
Recommendation: Add new text to read as follows:
4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.
A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.
Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal. After 38 years in the Health Care Industry I see the need to maintain power inside the operating rooms. The hospital goes to great lengths to maintain power to equipment for life support to the patient, such as emergency generator back up power. If on grounded power when there is spillage of fluids on the floor it can trip the breaker, losing power to the life support equipment. It can even shock the patient or those working in the room. Fluids on the floor increase the chances of direct electrical contact to patient and personnel. In the case of a patient under anesthesia will not be able to tell you if they are being shocked. On isolated power they maintain power and get an alarm letting the operating room personal know they have a fault. The life support equipment still functions and patient does not receive a shock.
This is not original material; its reference/source is as follows:
Item 4 above repeats word-for-word the 'Recommendation' proposed by the Technical Committee on Electrical Systems.

99- Log #168 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: Al Kaufman, Bender
Comment on Proposal No: 99-96
Recommendation: Add new section as follows and renumber:
4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.
A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.
Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal.
My brother is an anesthesiologist working at a new hospital in Florida. He gave me a tour of the OR and I could not believe how much electrical equipment was in the room very close to the operating table. As an electrical engineer I would not want to be on the operating table without the proper protection against ground faults as a result of all of this electrical equipment being in a wet location environment,

This is not original material; its reference/source is as follows:
Item 4 above repeats word-for-word the "Recommendation" proposed by the Technical Committee on Electrical Systems.

99- Log #173 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: David Knecht, Bender Electronics Inc.
Comment on Proposal No: 99-96
Recommendation: Add new section as follows and renumber:
4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.
A.4.3.2.2.8.3 In conducting a risk assessment, the heath care governing body should consult with all relevant parties, including, but not limited to , clinicians, biomedical engineering staff, and facility safety engineering staff.
Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal.
I am perplexed that the discussion regarding ORs being deemed wet procedure locations is still in such great debate with opponents of this proposal claiming that the change is unsubstantiated and believe the health care governing body should determine if an operating room is wet or not on a case by case basis. Therefore, I pose a question, one similar to that I had asked my fellow AHA affiliated Society members during a session regarding 2012 NFPA 99 changes.
What is the difference and hardship with deeming operating rooms wet locations by default if the hospital's governing body is already doing their patients and staff justice by conducting the risk assessments and determining that an OR is wet or not?
With the proposed text the same would apply. The only change is that a greater burden of proof would be required by the health care governing body to substantiate that the OR being assessed is indeed a non-wet procedure location.

99- Log #175 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: Joseph M. Boardman, Bender Electronics Inc.
Comment on Proposal No: 99-96
Recommendation: Add new section as follows and renumber:
4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.
A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.
Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal.
For 20 years I have worked as an electrical engineer troubleshooting and helping customers protect themselves from hazardous situations caused by line-to-ground faults in grounded, high-resistance grounded and ungrounded electrical systems. In my experience, both in the US and internationally, the use of ungrounded (isolated power) systems in operating rooms provides the extra level of safety necessary during medical procedures, many of which are performed in a wet environment. I support this proposal since it confirms the need to conduct a risk assessment to insure that an operating room, by default, will have the electrical safety protection necessary to protect hospital staff and patients against electrical shock.

99- Log #176 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: Jeremy D. Masters, Bender TMC Services
Comment on Proposal No: 99-96
Recommendation: Add new section as follows and renumber.
4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.
A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.
Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal. As a technician in the field I believe I have an advantage in looking into the situation. Working in the operating suites I have seen GFCI's fail time and time again, due to the equipment that is constantly being added to the rooms. The only system that has continued to work has been isolated power. The unfortunate fact about GFCI's is that when they do become active in preventing electrical shock, they shut down and then cause a power failure instead of notifying the staff that there is a potential hazard. Often times they trip due to age of equipment and instead of sending an alarm, like isolated power and informing the staff. It shuts itself off and now creates a new and potentially fatal problem. We need a specialized way of protecting our patients and staff from electrical shock without the potential power loss. Isolated power provides that same electrical shock protection without the potential power loss due to equipment error, and also provides an early warning to the staff, that can be easily trouble shoot without potentially fatal power loss.

99- Log #178 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: David Bradley, Bender TMC Services
Comment on Proposal No: 99-96
Recommendation: Add new section as follows and renumber:
4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.
A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility/safety engineering staff.
Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal.
As service manager for Bender TMC Services, with 20 years of experience, I am often in Operating Rooms and witness standing fluids on floors and tables that are more then just mere spills. In my opinion, from my experience, I believe that operating rooms should be considered wet procedure location. As part of my job, I receive troubleshooting calls from hospital electricians and biomeds about different electrical issues including LIM alarms. In many cases, after diagnosing the problem, we find that it is due to fluid accumulation that is creating a line-to-ground fault in the system. This type of fault in a grounded system with GFCI protection would have resulted in power interruption, which in many cases would not be acceptable. Even worse, in a system without isolated power of GFCI protection it could have resulted in a hazardous situation. With more electrical medical devices being used in today's operating rooms, it is essential that these wet procedure environments offer the protection necessary to protect both staff members and patients from the dangers of electrical shock.

99- Log #187 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: Dennis Mulrooney, Mulrooney Sales, Inc.
Comment on Proposal No: 99-96
Recommendation: Add new text to read as follows:

4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.

A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.

Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal.

99- Log #252 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: Harvey Kostinsky, ECRI Institute
Comment on Proposal No: 99-96
Recommendation: Delete proposed new section and comment.
Substantiation: ECRI Institute sent over 8,000 e-mails (we estimate that over 1500 hospitals were represented in the mailing) requesting information on adverse events possibly preventable by use of isolated power systems (IPS). We did not receive a single response of a preventable adverse event. ECRI Institute has conducted extensive literature and database searches. Despite over 30 years of controversy over isolated power, there continues to be no documented evidence of events that justifies a modification of the standard. The rationale for the proposed change does not provide such information. Hospital resources spent on the additional isolated power systems that are installed as a result of this change will not be available for other, well recognized, problems and hazards.

The burden imposed by the need to implement isolated power is demonstrated by the selection of GFCIs by some hospitals as an alternative to the use of isolated power systems in operating rooms. Because GFCIs pose considerable risk of unintentional loss of power to critical devices, hospitals must accept this risk and put effort into electrical system design and implementation to reduce the risks of using of GFCIs in this application. Such effort would not have been pursued if isolated power was not considered to impose a significant burden.

Requiring hospitals to conduct a risk assessment for each circumstance where isolated power is not required is not a suitable solution. It will force hospitals to expend considerable extra, unnecessary, effort defending their position to various agencies and inspectors who may not have a good understanding of the underlying issues and it would encourage unnecessary installation of isolated power by facilities, consultants and agencies not familiar with the issues or lacking the resources to explain and defend such a decision in light of perceived concerns raised by the wording of the standard over safety and liability, even is such concerns are invalid.

In response to the proposed change, ECRI Institute searched its own Health Devices Alerts database of medical device problems and the U.S. Food and Drug Administration's (FDA) Manufacturer and User Facility Device Experience (MAUDE) database and found no reports of relevant electric shocks. Furthermore, ECRI Institute routinely receives reports of problems from hospitals and often discusses safety issues, including, but not limited to, electrical safety, with hospital personnel. Despite the fact that other adverse events are often mentioned by these hospital personnel, in over 35 years of such activity we know of only one documented case of electrical shock in the OR, which occurred in the early 1970s, and was possibly preventable by use of an IPS. (http://www.ncbi.nlm.nih.gov/pubmed/4684516) However, that incident was the result of an incorrectly wired plug and incorrectly wired receptacle and was therefore not unique to the OR or to wet locations and could have occurred in any location within the hospital. Furthermore, that incident would not likely occur today due to isolated input ECG machines and safety-focused equipment management programs.

There are anecdotal reports of shock, including four cases reported by Day (Day FJ. Electrical safety Revisited: a new wrinkle. *Anesthesiology* 1994 Jan;90(1):220-1). However, in two cases the author reports that "no wet surfaces were involved." The other two cases (one in which it is unknown whether wet surfaces were involved and one during vacuuming of a wet floor) were caused by equipment defects (a loose wire, a frayed power cord), which are not problems unique to the OR, and wet conditions would not be necessary for a shock to occur.

There is one verbal report that we are aware of involving electric shock while plugging or unplugging a device to an outlet on the floor. However, this is just one incident in over 30 years and there is not enough information available to determine whether this incident would have been prevented by an isolated power system.

There is no history of fires or other adverse events that would justify the installation of IPSs in all ORs. An earlier rationale for the proposed change included anecdotal evidence concerning one incident of fluid entry resulting in smoke being emitted from a device. Smoke does not necessarily mean that a fire would have occurred. Moreover, our understanding of the incident is that the fault that caused the smoke was not preventable with an IPS, as it was not caused by a line-to-ground fault. Indeed, the incident occurred despite the fact that an IPS was in use. And, the IPS would have limited current through a line-to-ground fault, making it unlikely that this would have been the cause of the smoke. The smoke was likely due to liquid across some other components of the device.

Hospital personnel report that IPS alarms do occur on occasion, and these alarms may foster a false belief that an accident has been prevented. Some individuals believe that an IPS will prevent microshock. It will not. The trip point of an IPS is around 5 mA, well above the 100 to 300 microampere level required for microshock prevention. Such incorrect perceptions should not result in an inappropriate revision to the standard.

IPSs create a risk to patients if OR personnel respond inappropriately to an alarm. Personnel may interrupt a procedure to determine the cause of the alarm or to replace a device believed to have caused the alarm. Such a delay

can be detrimental to the patient. Such incidents are likely to be infrequent if personnel are properly trained. However, the probability of harm from inappropriate personnel response to an alarm may well be equal to, or greater than, the low probability that an adverse event will ever be prevented by IPS installation.

Designating all ORs as wet locations may have another unintentional, undesirable outcome – installation of GFCIs in ORs. The lower cost of GFCIs makes them an attractive alternative to IPSs. However, when activated, GFCIs interrupt power to the circuit. This can result in patient injury or possibly death during a surgical procedure. For example, the loss of power caused by a tripped GFCI abruptly stops the operation of a medical device fulfilling a life-critical function (e.g., heart-lung unit, anesthesia unit).

IPSs impose a financial burden. Informal estimates from engineering personnel suggest that the additional cost of an IPS panel may be $4,000 to as much as $15,000, taking into account installation costs. While this is only a small fraction of the total cost of OR construction, this can represent hundreds of thousands of dollars in multi-OR suite construction and renovation.

Isolated power systems require more space than conventional power. Space in the OR and related areas are a limited and costly resource. Space required for isolated power may mean less space for more important clinical needs.

Failure to provide an adequate number and placement of receptacles leads to the use of extension cords, which increase the risk of shock, fire, and power interruption, regardless of whether isolated power is used.

In summary, ECRI Institute dedicated significant effort to identify evidence that would substantiate a need for modifying the wet location definition in the 2005 standard. Despite these efforts and more than 30 years of controversy over isolated power, there continues to be no documented evidence of events that justifies the proposed modification.

99- Log #284 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: Marcel J. Tremblay, Bender Electronics, Inc.
Comment on Proposal No: 99-96
Recommendation: Add new section as follows and renumber:

4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.

A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.

Substantiation: I fully support this proposal submitted by the Technical Committee on Electrical Systems and agree with the Substantiation included with the proposal.

Abstract

A substantial amount of technical material is included in support of this proposal. Included is some background and historical data on the birth of NFPA (circa 1941), AAMI (circa 1960s), and the NEC (circa 1953). This brief review leaves little doubt about the turbulent past behind the formulation of the current 2005 Edition of NFPA 99.

Perhaps not so obvious to the casual observer is the notion that moisture creates additional paths for current to flow between sources and, perhaps, the patient on the OR table destination. Included in this detailed report is a review of several research and subject testing articles on the magnitude of stray current levels and their impact on ventricular fibrillation. What stands out is the relationship between macroshock and microshock. In assessing the potential for ventricular fibrillation, the figure of 1000 is generally applied to the magnitude of macroshock current, i.e., as little as 100 µA of current will be diverted to the heart for, say, a hand-to-hand or hand-to-foot macroshock current of 100 mA. As clearly shown in the enclosed ATTACHMENT 99-96 Log #CP330 HEA-ELS, lethal levels of current with grounded power are possible under real world conditions. Such is not the case with isolated power; even with a solid ground fault, the fault current is limited to less than 5 mA. The current diverted to the heart will be as low as 5 µA using the aforementioned 1000:1 ratio thus providing, in a real sense, macroshock protection.

Detailed responses are provided to several questions on controversial topics including:

Aside from the IPS continuity of power advantage are GFCIs an equal match relative to shock hazard protection in the OR?

Is there a satisfactory answer for those naysayers who discount the value of IPSs on the basis of perceived deficiencies?

Are the added costs from using isolated power been blown out of proportions?

Why does the trend to eliminate isolated power in North America run counter to the movement in many parts of the world such as the EU, South America, Australia, and Asia to promote its use in accordance with the International Standard IEC 60364?

Note: Supporting material is available for review at NFPA Headquarters.

99- Log #298 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: Keith A. Van Kerckhove, PG LifeLink, Inc.
Comment on Proposal No: 99-96
Recommendation: Accept Proposal 99-96 for new sections:
4.3.2.2.8.3* Operating rooms shall be considered to be a wet procedure location unless a risk assessment conducted by the health care governing body determines otherwise.
A.4.3.2.2.8.3 In conducting a risk assessment, the health care governing body should consult with all relevant parties, including, but not limited to, clinicians, biomedical engineering staff, and facility safety engineering staff.
Substantiation: The current language in NFPA 99 regarding determination of wet locations has been a consistent source of confusion due to it's lack of clear guidance in this area. Under the current version, facilities may establish a blanket policy that none of their OR's are wet [procedure] locations without ever performing an official analysis or seeking input from those individuals that are most familiar with the intimacies of OR procedures. In fact, some would say "if it's not required by Code or Standard, then we don't feel it is necessary". Recognizing this fact, the Technical Committee has rightly chosen to apply a slightly higher standard and establish a default designation as the basis for new operating room designs.
These new sections 4.3.2.2.8.3 and A.4.3.2.2.8.3 effectively resolve this ambiguity in the current language and provide a clear path for designers and facilities to follow. First, they require health care facilities to formally review the intended use of newly constructed operating rooms to determine the likelihood that a procedure could result in a substantial amount of fluid being released around patients or staff causing an elevated risk of electric shock. Secondly, it suggests, in the form an annex note that other stakeholders including clinicians, biomedical engineers and facility safety staff be consulted as part of this risk assessment.
Individual facilities are still free to determine that a particular OR is not a wet location just as they can under the current edition of 99. The only difference is that this determination must now come about through a thoughtful and structured analysis. This is entirely consistent with the risk based category approach to determining the appropriate "levels of health care services or systems". (from Proposal 99-9) No undue burden is placed on the facility by this requirement.

99- Log #307 HEA-ELS Final Action:
(4.3.2.2.8.3 and A.4.3.2.2.8.3)

Submitter: William Morgan, St. Alphonsus R.M.C.
Comment on Proposal No: 99-96
Recommendation: This is the Operating room wet locations section 4.3.2.2.8.3 changes. I would like to see an assessment form added to this code to make sure we do not have an inspection from a code official that determines our reasoning isn't correct. We built our new facility without LIM protection because it wasn't a requirement. To go back now if a code update is required from a future project would require excessive construction impact and cost.
Substantiation: A risk assessment is based on opinion from the person or team doing the assessment. A process approved by the NFPA would eliminate the guesswork for compliance. We don't feel our rooms are wet. Someone else may differ with us.

99- Log #45 HEA-ELS Final Action:
(4.3.2.2.8.5)

Submitter: Jan Ehrenwerth, Yale University School of Medicine
Comment on Proposal No: 99-97
Recommendation: Add new text to read as follows:
In the operating room environment, if a GFCI is used as a means to mitigate risk, then only a single outlet shall be protected by a GFCI, or only one outlet shall be controlled by a single overcurrent protection device.
Substantiation: It is essential that if a GFCI trips that only one outlet is interrupted. Having the power interrupted to more than one outlet would result in confusion and loss of multiple pieces of equipment.
This would create a serious risk to patient safety.

99- Log #253 HEA-ELS Final Action:
(4.3.2.2.8.5)

Submitter: Harvey Kostinsky, ECRI Institute
Comment on Proposal No: 99-97
Recommendation: Retain section 4.3.2.2.8.5. as worded in 2005 edition.
Substantiation: GFCIs trip for reasons unrelated to an immediate electrical shock risk. It is not possible to avoid all such instances. This may occur as a result of any number of events including, for example, radiated electromagnetic interference, line transient, or a minor fault from hot to ground due to liquid spill on a device, plug, or outlet. Power loss to a device in the OR could result in immediate harm or fatality to the patient. A heart lung machine, ventilator or anesthesia machine could stop operating. Confusion, attention paid to trying to determine the reason for malfunction, lack of experience with a particular device, and unusual patient distress or condition are just some reasons that such a minor incident can escalate into a major injury or fatality. Loss of power to a surgical device (e.g., ophthalmic unit, laser, electrosurgical unit) could distract the surgeon, again possibly leading to a serious injury or fatality. Even loss of power to a less critical device can divert attention from the patient and lead to confusion.
ECRI Institute experience in medical device problem and accident investigations indicate that patient harm is often precipitated by an unusual or unexpected course of events. Even if the increase in complication rates is low, with the large number of procedures performed annually, there can be a significant number of preventable adverse incidents.
If NFPA 99 is modified to require all ORs to be treated as wet locations, there will be a greater number of organizations looking to provide the required protective electrical systems and possibly turning to GFCIs instead of isolated power systems. In existing construction where isolated power systems are in use, each alarm of the isolated power system would likely have resulted in loss of power if GFCIs were used instead of isolated power. In an area that is truly a wet location, the risk of tripping of the GFCI when no electric shock risk exists is increased due to splashing and spills. In such areas the protection of an isolated power system is required – to protect staff and patients from electrical shock risks and to protect the patient against the risk of unnecessary power interruption to medical devices. Power loss cannot be tolerated and GFCIs must not be used.
There may be some measures that can be employed to reduce the risk of unnecessary power interruption. Some devices can be equipped with back-up battery power. However, batteries are notoriously unreliable, especially if they are not carefully maintained. Power runs can be kept short and each GFCI connected to a single receptacle. While this reduces the risk of multiple devices losing power simultaneously, it does not guarantee power loss will not occur to any device(s) connected to the receptacle. Thus, while careful design and implementation can help reduce the likelihood of an adverse even, the patient is still placed at an unnecessary higher risk for injury and fatality.

99- Log #285 HEA-ELS Final Action:
(4.3.2.2.8.5 and A.4.3.2.2.8.5)

Submitter: Marcel J. Tremblay, Bender Electronics, Inc.
Comment on Proposal No: 99-97
Recommendation: Recommendation: Retain ~~Delete~~ section 4.3.2.2.8.5*
Where power interruption under first fault condition (line-to-ground fault) is tolerable, the use of a ground-fault circuit interrupter (GFCI) shall be permitted as the protective means that monitors the actual ground-fault current and interrupts the power when that current exceeds ~~6 mA~~ the trip value of a Class A GFCI per the requirements in UL 943 Ground-Fault Circuit Interrupters.
Add new Annex A.4.3.2.2.8.5 to read as follows:
A.4.3.2.2.8.5 Class A GFCIs have a nominal trip range of 4 to 6 ma.
Substantiation: Per the Substantiation, "The committee wishes to reinforce that both GFCI and isolated power systems are an acceptable means for mitigating risk and protecting the environment".
4.3.2.2.8.1* Two options are presented as the means to provide special protection against electric shock without identifying the method of implementation.
4.3.2.2.8.4 The use of an isolated power system (IPS) is the 1st method
4.3.2.2.8.5 The use of GFCIs is the 2nd method. That is why, for consistency, 4.3.2.2.8.5 should be retained but revised as indicated.
Note: I realize that the revised text is similar to that proposed in 99-95. See my comment relating to 99-95.

This is not original material; its reference/source is as follows:
Some of the text was extracted from 4.3.3.2.2.8.5 of NFPA 99, 2005 edition

99- Log #165 HEA-ELS Final Action:
(4.3.2.2.8.6)

Submitter: Vincent M. Rea, TLC Engineering for Architecture
Comment on Proposal No: 99-98
Recommendation: Revise text to read as follows:
4.3.2.2.8.6 Operating rooms defined as wet procedure locations shall be protected by ~~either~~ isolated power systems when first fault conditions cannot be tolerated.~~or ground fault circuit interrupters.~~
Substantiation: GFCI's cannot be considered an equivalent to isolated power systems when first fault conditions cannot be tolerated.

99- Log #171 HEA-ELS Final Action:
(4.3.2.2.8.6)

Submitter: James E. Meade, Alexandria, VA
Comment on Proposal No: 99-98
Recommendation: Revise text to read as follows:
4.3.2.2.8.6 Operating rooms defined as wet procedure locations shall be protected by either isolated power or ground fault circuit interrupter protection for personnel if interruption of power under first fault conditions can be tolerated, or be served by an isolation power system if such interruption cannot be tolerated.
Substantiation: 99-97 Log #CP322. This action deletes the text in paragraph 4.3.2.2.8.5 which could leave the reader with a misunderstanding of the difference of power continuity provided by GFCI systems and isolated power systems. This change reinstates the safety guidance on the application of two form of protection.

99- Log #254 HEA-ELS Final Action:
(4.3.2.2.8.6)

Submitter: Harvey Kostinsky, ECRI Institute
Comment on Proposal No: 99-98
Recommendation: Revise the proposed text as follows:
4.3.2.2.8.6 Operating rooms defined as wet procedure locations shall be protected by ~~either isolated power or ground fault circuit interrupters.~~ isolated power. Ground fault circuit interrupters shall not be used in operating rooms or other locations where power loss cannot be tolerated unless appropriate precautions against inadvertent power loss are taken and a risk assessment conducted by the health care governing body determines that patient safety concerns associated with power loss events have been adequately addressed. The following requirements must be met where GFCIs are installed in any OR or other area where power loss may pose a risk to patients.
4.3.2.2.8.6.1 Each GFCI must provide power to only one single outlet receptacle.
4.3.2.2.8.6.2 Multiple Outlet Connections (two or more power receptacles supplied by a flexible cord) shall not be permitted in such locations.
4.3.2.2.8.6.3 Following installation or modification, and prior to clinical use, testing will be conducted to ensure that inbalance in current to ground from the hot and neutral lines of each GFCI branch circuit is low enough that the risk of inadvertent GFCI tripping is unlikely even when devices are plugged into the circuit.
4.3.2.2.8.6.4 The testing described in 4.3.2.2.8.6.3 shall be repeated annually.
4.3.2.2.8.6.5 Provision for access to the GFCIs shall be made and training provided to personnel to ensure that a tripped GFCI can be addressed promptly.
Add corresponding appendix text:
G FCIs trip for reasons unrelated to an immediate electrical shock risk. It is not possible to avoid all such instances. Confusion, attention paid to trying to determine the reason for malfunction, lack of experience with a particular device, and unusual patient distress or condition can cause such an incident to escalate into a major injury or fatality. Protective preventive measures must be implemented if GFCIs are used in an operating room or other area where power loss cannot be tolerated to reduce the risk of unnecessary power interruption. Some devices can be equipped with back-up battery power and procedures must be implemented to ensure that they are properly maintained. Power runs must be kept short and each GFCI connected to a single receptacle. While this reduces the risk of multiple devices losing power simultaneously, it does not guarantee power loss will not occur to any device(s) connected to the receptacle. Consideration must be given to ensuring ready access to the GFCI so that a tripped unit can be quickly addressed, but so as to avoid unintended access to the GFCIs.

Substantiation: There is risk that a GFCI can trip and the resultant power loss to a medical device lead to serious patient injury or death. I highly recommend that GFCIs be prohibited in operating rooms and other locations where power loss may pose a risk to the patient and have submitted a comment on this regarding proposal 99-97. A detailed rationale is provided in that comment. However, if the standard is revised to allow GFCIs in such locations, requirements for adequate protective measures must be included and the risks explained in the appendix. This is even more essential if the standard is revised to require operating rooms to have special protective measures as there is limited experience with the safe implementation of GFCIs in these areas.

99- Log #265 HEA-ELS Final Action:
(4.3.2.2.8.6)

Submitter: Steven Jalowiec, Waterbury Hospital
Comment on Proposal No: 99-98
Recommendation: Add new section to read as follows:
4.3.2.2.8.6 Operating rooms defined as wet procedure locations shall be protected by either isolated power or ground fault circuit interrupters.
Substantiation: The New England Society of Healthcare Engineers supports this proposal.

99- Log #288 HEA-ELS Final Action:
(4.3.2.2.8.6)

Submitter: Marcel J. Tremblay, Bender Electronics, Inc.
Comment on Proposal No: 99-98
Recommendation: Delete text to read as follows:
~~4.3.2.2.8.6 Operating rooms defined as wet procedure locations shall be protected by either isolated power or ground fault circuit interrupters.~~
Substantiation: See my comments to proposals 99-95 and 99-97. All these proposals including this one are on the same topic. As per my comments, some of the proposed changes violate the intent of 4.3.2.2.8.1* which is to present two options as the means to provide special protection against electric shock without identifying the method of implementation.
4.3.2.2.8.4 is very clear in allowing the use of IPSs when power interruption cannot be tolerated.
4.3.2.2.8.5 is very clear in allowing the use of GFCIs when power interruption is tolerable.
The proposed 4.3.2.2.8.6 addition is superfluous and redundant. My comments to proposals 99-95 and 99-97, if accepted, satisfy the intent voiced in proposals 99-95, 99-97, and 99-98.

99- Log #299 HEA-ELS Final Action:
(4.3.2.2.8.6)

Submitter: Keith A. Van Kerckhove, PG LifeLink, Inc.
Comment on Proposal No: 99-98
Recommendation: Add text to read as follows:
4.3.2.2.8.6 Operating rooms defined as wet procedure locations shall be protected by either isolated power or ground fault circuit interrupters.
A.4.3.2.2.8.6 When evaluating the type of special protection against electric shock employed in wet procedure locations, consideration should be given to the risk to patients and caregivers if interruption of power to critical equipment or systems occurs as a result of a first fault to ground.
Substantiation: Section 4.3.2.2.8.5 (deleted per proposal 99-97) qualified the use of ground fault circuit interrupters as contingent on situational tolerance to circuit interruption under fault conditions. The new section 4.3.2.2.8.6 (added per proposal 99-98) does not provide such qualification guidance.
This additional explanatory section is consistent with the concept of Category 1 Systems in the proposed new text (from preprint): “failure of equipment or systems is likely to cause major injury or death”, and “Category 1 Systems are expected to work or be available at all times to support patient needs.”.

99- Log #287 HEA-ELS Final Action:
(4.3.2.6.3.4)

Submitter: Marcel J. Tremblay, Bender Electronics, Inc.
Comment on Proposal No: 99-99
Recommendation: Recommendation: Move the last sentence:
“It is desirable to locate the ~~ammeter~~ total hazard current display such that it is conspicuously visible to persons in the anesthetizing location.” to new A.4.3.2.6.3.4.
Substantiation: Today’s LIMs generally do not have an ammeter as illustrated in the photo below.

Insert Figure 99_L287_S here

99- Log #199 HEA-ELS Final Action:
(4.3.3.1.3)

Submitter: Burton R. Klein, Burton Klein Associates
Comment on Proposal No: 99-100
Recommendation: Make the same in 4.3.3.1.3 as was made in 4.3.3.1.4: change “in a patient care vicinity” to read “within the room.”
Substantiation: I concur with change made to 4.3.3.1.4 for impedance measurement. The same change should also be made to 4.3.3.1.4. Since a bed or exam table or operating-room table is moved around, ‘exposed fixed electrical equipment with conductive surfaces’ can sometimes be in a patient care vicinity. Thus, change to ‘within the room’ is warranted.

99- Log #293 HEA-ELS Final Action:
(4.3.3.1.6.2)

Submitter: Nancy W. Gunderson, Square D Company/Schneider Electric
Comment on Proposal No: 99-94
Recommendation: Revise text to read as follows:
4.3.3.1.6.2 Impedance limit shall be 0.2 ohms for ~~quiet ground~~ systems containing isolated ground receptacles and 0.1 ohms for all others.
A.4.3.2.2.1 At the time of installation of regular voltage wiring, steps should be taken to ensure that the insulation on each conductor intended to be energized, ~~or on quiet grounds~~ and on the equipment grounding conductor in systems containing isolated ground receptacles, has not been damaged in the process of installation. When disconnected and unenergized, the resistance should be at least 20 megohms when measured with an ohmmeter having an open-circuit test voltage of at least 500 V dc.
A.4.3.2.2.7.1 Care should be taken in specifying ~~such~~ a ~~quiet grounding~~ system containing isolated ground receptacles because the grounding impedance is controlled only by the grounding wires and does not benefit from any conduit or building structure in parallel with it.
Substantiation: The Committee accepted proposals to delete the term “quiet ground” from the definitions and some paragraphs, but the ones noted here were overlooked. For consistent use of terminology, “quiet ground” should be replaced as shown. Paragraph numbers used in this comment are the existing paragraph numbers. From the Preprint edition, paragraph numbers are 6.3.3.1.6.2, A.6.3.2.2.1, and A.6.3.2.2.7.1, respectively.

99- Log #200 HEA-ELS Final Action:
(4.3.4.1.2)

Submitter: Burton R. Klein, Burton Klein Associates
Comment on Proposal No: 99-102
Recommendation: Revise 4.3.4.1.2 to read: “Additional testing of receptacles in patient care areas shall be performed at intervals defined by documented performance data, but not exceeding 5 years.”
Substantiation: 1. This paragraph applies only to patient care areas, not the entire facility (as mentioned in TC substantiation).
2. While documented performance data could show that receptacles in some patient care areas could be 6 or even more years, prudence suggest some maximum number of years that receptacles providing electric power in patient care areas to patient care equipment should be tested.

99- Log #80 HEA-ELS Final Action:
(4.4.2.1.2)

Submitter: James E. Degnan, Sparling
Comment on Proposal No: 99-107
Recommendation: Delete the proposed paragraph 4.4.2.1.2 "~~Overcurrent protective….series[70:700.27]~~"
Add text to read as follows in Section 4.4.4.2.2.2:
Overcurrent protective devices serving the essential electrical system shall selectively coordinate for the period of time that a fault's duration extends beyond 0.1 seconds. [70:100 Coordination(Selective)]
Substantiation: The proposal requires a practical level of selective coordination for the entire essential system. This is reasonably achievable for most healthcare facilities with the exception of the portion of the equipment branch that serves xray, radiology and other imaging equipment. A panel dedicated to these loads will probably have to be oversized to achieve selective coordination. Moving the requirement to the suggested location eliminates selective coordination from the equipment branch. (If Proposal 99-108 is accepted the proposed language would have to be added to the new paragraphs on life safety and critical branches.)
The original language is also revised. The term "down to" is somewhat unclear, and could be interpreted to be from inception of a fault "down to" 0.1 seconds, not the time period beyond 0.1 seconds.
Selective coordination is not defined in NFPA 99, so a reference to where it is defined in NFPA 70 would be helpful. It is the submitter's opinion that the definition of Coordination (Selective) negates the need for proposed paragraphs 4.4.2.1.2(1) and (2), as both of these circumstances are permitted by analyzing them against the definition's language.

99- Log #164 HEA-ELS Final Action:
(4.4.2.1.2, 4.5.2.1.1, 4.6.2.1.1, A.4.4.2.1.2, A.4.5.2.1.1, and A.4.6.2.1.1)

Submitter: Bob Herzig, Herzig Engineering
Comment on Proposal No: 99-107
Recommendation: Proposal 99-107 should be rejected.
Substantiation: As a practicing consulting engineer, I am Sincerely worried about the significant increased liability that will occur for all consulting engineers if Proposal 99-107 is passed.
Imagine a consulting engineer in front of a lawyer and jury being asked why the design was less than that which is required for all other building types. "Mr. Engineer, my client would not have been (injured, killed, or?) if the electrical system had not failed. Yet you designed a system that you knew, or should have known, could fail, and you knew, or should have known, that such a design would not be permitted for office buildings, hotels, university buildings, or other large places of assembly. You knew, or should have known, that buildings with very valuable contents have been designed for decades so that their systems would not fail and allow harm to their valuable contents. Why did you not provide the same protection (selective coordination) for my client that you are required to provide for people in a hotel, office building, or university which are required to meet the NEC?"
The dilemma that this proposal, if passed, will create, is one that places the consulting engineer between two opposing and mutually exclusive alternatives. On one side, the consulting engineer will know that he or she must design for total selective coordination, in order to properly protect the health care facility occupants. On the other hand, the consulting engineer will be pressured by the owner to design for the minimum cost, and selective coordination down to only 0.1 seconds is often less expensive than total selective coordination. And since total selective coordination won't be required by NFPA 99, it will be hard to argue with the owner. Yet, as a professional engineer, I have a responsibility to provide a system that is safe, certainly as safe as I would design for all non-healthcare facilities.
I can and do design for total selective coordination, equipment protection, arc-fiash protection, and minimal downtime, as can any engineer that knows the business and is willing to put in the extra time to do it right. Please don't put consulting engineers in the position of choosing between proven safety and cost.

99- Log #170 HEA-ELS Final Action:
(4.4.2.1.2, 4.5.2.1.1, 4.6.2.1.1, A.4.4.2.1.2, A.4.5.2.1.1, and A.4.6.2.1.1)

Submitter: Malcolm Allison, National Electric Fuse Assn.
Comment on Proposal No: 99-107
Recommendation: Do not accept this proposal.
Substantiation: This proposal, if accepted, will allow non-coordinated operation of multiple levels of overcurrent protective devices (cascading) under fault current conditions which reduces the reliability of the system to deliver power to vital loads. This proposal provides coordination for only overloads and does not provide assurance that typical ground faults, arcing faults, or short circuits will not cascade multiple levels of overcurrent protective devices, thereby unnecessarily shutting down power to critical loads. While overloads may cause the majority of overcurrent interruptions on branch circuits, the predominance of overcurrent interruptions on feeder and service circuits are faults (of all types). Graphs A and B depict the time-current curves of the same system. Graph A shows the portion of the circuit breaker time-current curves that would be analyzed for coordination per this proposal (times down to 0.1 seconds). Graph B depicts the same circuit breaker curves showing the crossover of the circuit breakers in their instantaneous trip(fault) region. Unless there is circuit breaker manufacturers' coordination data to the contrary, the cross over indicates a lack of selective coordination for overcurrents at that level and greater. Graph B shows no coordination between the 30A and 200A circuit breakers for ground, arcing, and any combination of phase faults as low as 800A. Any type of fault as low as 2200A can result in the 800A circuit breaker opening as well. These are relatively low available fault currents easily achieved in almost every essential electrical system via a line-ground fault, line-line fault or three phase fault.

All circuit breakers with an instantaneous trip will open in less than 0.1 seconds when fault current is above the instantaneous trip setting. This NFPA 99 proposal, if accepted, will permit the design of essential electrical systems without proper engineering attention being given to the instantaneous trip region.

Note: Supporting material is available for review at NFPA Headquarters.

99- Log #172 HEA-ELS Final Action:
(4.4.2.1.2, 4.5.2.1.1, 4.6.2.1.1, A.4.4.2.1.2, A.4.5.2.1.1, and A.4.6.2.1.1)

Submitter: Malcolm Allison, National Electric Fuse Assn.
Comment on Proposal No: 99-107
Recommendation: Do not accept this proposal.
Substantiation: If Proposal 99-107 is accepted, the same type of systems that cannot be accidentally "blacked out" in non-healthcare facilities will no longer receive that same level of protection in healthcare facilities, because these healthcare systems will require selective coordination only for overloads. It will be permissible for a fault on a 20A branch circuit to unnecessarily open a 400 ampere feeder overcurrent protective device at the next level and a 1000 ampere main overprotective device upstream of that. Many loads vital for life safety will be permitted to be unnecessarily "blacked out".

Healthcare facilities have systems/loads for emergency egress and emergency responders ingress and these requirements must not be less stringent than NEC 700.27 or 708.54 (if COPS). The same goes for multiple elevators fed by a feeder (NEC 620.62). Since many healthcare facilities will be designated as COPS (Critical Operations Power Systems) the acceptance of this proposal will create significant discrepancies between the two Standards (NFPA 99 and NFPA 70). Such discrepancies will not sit well with ANSI. Without valid substantiation, Proposal 99-107 lessens the selective coordination requirements compared to those in the NEC.

The substantiation provided is not correct; selective coordination, where mandatory in the NEC, is not the "sole determining factor" for selecting overcurrent protective devices. The NEC does not have provisions or exceptions that permit overcurrent protective devices to be selected without complying with other NEC requirements including 110.9, 110.10, 110.16 and personnel protection requirements in NFPA 70E. Selective coordination requirements in NEC Sections 700.27, 701.27, 708.54, and 620.62 were added as an additional mandatory requirement in overcurrent protective device selection for those circuits where it enhances system reliability for life safety or national security.

By what authority can the NFPA 99 Committee allow for less stringent requirements than the NEC, especially for life-safety systems that require special consideration in non-healthcare facilities? Three NEC Code Panels independently accepted mandatory selective coordination requirements through several cycles of the consensus standards process. The NFPA 99 Technical Committee should have responsibility for the electrical requirements in operating rooms, patient rooms, and other areas specific to healthcare facilities. However, for life-safety systems such as emergency systems, elevators, and critical operations power systems, the NFPA 99 committee should only be able to enact requirements that are more stringent than the NEC.

Accepting Proposal 99-107 will increase the liability for engineers, contractors, inspectors and owners. Imagine a healthcare facility is designed and installed to minimally comply with Proposal 99-107 and an overcurrent protective device cascading incident occurs during an emergency situation, with serious injuries to people. How does the engineer, contractor, owner, and inspector defend what they designed/built/approved, since it is to a lesser requirement than the NEC (Articles 620, 700, 701, 708)? There is simply no need to increase everyone's liability, especially when considering the recent judgments against engineers and owners who complied with the most stringent consensus standards and still lost.

Selective coordination for the full range of overcurrents is absolutely achievable with modern circuit breakers and fuses. Other important requirements in the NEC for overcurrent protection are still in force and are certainly being met. Selective coordination for elevator circuits was first placed in the 1993 NEC. Selective coordination for emergency systems and legally required systems was added in the 2005 NEC. Then in the 2008 NEC, the requirement was included in critical operations power systems. The overcurrent protection device manufacturers and other equipment manufacturers have adjusted to make total selective coordination compliance easier with new products and improved tools and application methods. For example, some automatic transfer switch manufacturers have upgraded their equipment with 30 cycle withstand ratings. And the NEC itself has changed to address one of the major concerns in the NFPA 99 Committee statement - the new 2011 NEC Section 240.87 requires circuit breakers without an instantaneous trip to be provided with provisions to reduce the incident energy under arcing fault conditions.

99- Log #177 HEA-ELS Final Action:
(4.4.2.1.2, 4.5.2.1.1, 4.6.2.1.1, A.4.4.2.1.2, A.4.5.2.1.1, and A.4.6.2.1.1)

Submitter: James S. Nasby, Skokie, IL
Comment on Proposal No: 99-107
Recommendation: Please Reject Proposal 99-107.
Substantiation: There is no reason given why full selective coordination, including less than 6 cycles (100 mSec) should not continue to be required. Namely, no evidence is given to support the claim of reduced reliability.

1) Full coordination can be and is being accomplished using either fuses, circuit breakers or a combination of these. Numerous papers by fuse and breaker manufactures detail how to.

2) Full coordination has been required in major cities for many decades.

3) NFPA-70 has required this since the 1995 Edition in Articles 700.27 (Emergency Systems) & 701.18 (Legally Required Standby Systems) since the 1995 Edition; Article 620.62 (elevators) since the 1996 edition, and now 708.54 (Critical Operations Power Systems - COPS) in the latest (2008) edition.

4) There is no reason to allow short circuit events to propagate upstream and disable even more emergency systems, many of which are critical to both personnel life safety and patient life safety.

5) High fault short circuits can and do occur, especially in the case of either large gen sets, or hot emergency bus systems. Fire pump motors are one example.

6) Making NFPA-99 different in this regard from NFPA-70 (the NEC) creates a substantial and a serious conflict. NFPA 99 requirements for vital loads should not be permitted to be less stringent than the NEC requirements for systems servicing the same functions. The NEC requires selective coordination for the full range of overcurrents for specific critical circuits or systems vital for life safety or public safety/national security. The NEC selective coordination requirements are for any overcurrent that could occur on a system: overload or short-circuit, or ground fault. Healthcare facilities, as any facility with large numbers of people, have the need for continuous operation of all emergency systems. The failure of any one such system (lighting, fire protection, alarm systems, emergency operating room systems, elevators, and etc.) must not be allowed to pose a threat to any other emergency system.
[File Name: Comment_on_P99-107_JSN.doc - sheet 1 fo 2]

7) Continuous emergency system operation is no less critical in healthcare facilities than in other types of facilities.

8) Elevators are critical for building emergency egress and emergency responders: why is NFPA 99 permitted to have less stringent requirements where life safety is concerned? Many new hospitals will be designated as Critical Operations Power Systems per NEC Article 708.

9) Proposal 99-107 creates the question of which requirements apply, the more stringent in either the NEC or the less ones in NFPA 99. E.g.: Which has precedence?

10) Healthcare facilities must not be allowed to be less safe than similar facilities that do not care for patients.

11) The proposed 2012 NFPA 99 does not use the term “emergency systems” as in NEC Article 700. However, healthcare facilities have the same loads for emergency egress that need to be served by high reliability systems as in NEC Article 700. The terminology may vary, but healthcare facilities still have the same needs and must also follow Article 700. Isolating short circuit events and preventing them from propagating upstream is irrespective of differences in terminology.

12) The arguments given in the two Negative votes are both cogent and important considerations.

13) Many consulting engineers and engineering firms can and do design fully coordinated electrical systems, both the normal source and emergency source supplied systems, and have done so for many years. See #2) above.

14) In health care facilities, the fire pump controller(s) are invariably combination fire pump controller-transfer switch controllers (NFPA-20 Arrangement I) or are fed via a Fire Pump Transfer Switch (Arrangement II). When a short circuit occurs in the fire pump circuit (usually the motor), which does and will happen, the transfer switch will, of necessity, transfer the short circuit to the Emergency power source. Full selective coordination is required to prevent such a short circuit from propagating upstream and knocking out other emergency services.

99- Log #206 HEA-ELS Final Action:
(4.4.2.1.2, 4.5.2.1.1, 4.6.2.1.1, A.4.4.2.1.2, A.4.5.2.1.1, and A.4.6.2.1.1)

Submitter: Mark R. Hilbert, Wolfeboro, NH
Comment on Proposal No: 99-107
Recommendation: Reject Proposal 99-107.
Substantiation: Banking centers, data centers, and military facilities, which can also be critical operations centers, consistently achieve the highest degree of system reliability through selective coordination while still meeting the other factors listed in the Committee Substantiation (requirements for arc-flash hazards, equipment protection, and reduced risk of extended outages). This coordination is done to assure the highest level of integrity possible for the electrical system supplying their manufacturing process, data system, or where the responsibility to human life safety is so great that an absolute effort to minimize electrical shutdown is paramount.
Is it not the responsibility of the Standard which sets the bar of integrity for health care facility systems, NFPA 99, to provide the same level of reliability for the system which is the heart of critical health care facility systems?

99- Log #188 HEA-ELS Final Action:
(4.4.2.1.2, 4.5.2.1.1, 4.6.2.2.2, A.4.4.2.1.2, A.4.5.2.1.1, and A.4.6.2.2.2)

Submitter: Gary A. Beckstrand, Salt Lake City, UT
Comment on Proposal No: 99-107
Recommendation: Reject Proposal 99-107.
Substantiation: The NFPA 99 committee should have jurisdiction over electrical requirements relating to special shock and procedural issues for health care installations, for example, the electrical requirements of a wet procedure area or an operating room. They must not, however, be given jurisdiction over electrical requirements addressing occupancy safety by eliminating rules designed to protect staff, patients, maintenance workers, or the public during an emergence. For example, emergency egress lighting and evacuation from the hospital building, unless the requirements for emergency egress of healthcare facilities are more restrictive, or safer, than those for other types of buildings. Without selective coordination on electrical systems, emergency systems can be comprised during an electrical event due to cascading faults. Reject Proposal 99-107 and have healthcare facilities comply with the applicable NEC requirements for selective coordination.

99- Log #251 HEA-ELS Final Action:
(4.4.2.1.2, 4.5.2.1.1, and 4.6.2.1.1)

Submitter: Ed Larsen, Square D Company/Schneider Electric
Comment on Proposal No: 99-107
Recommendation: Continue to support the committee action.
Substantiation: This Committee action has taken steps to move the industry in the right direction. We fully support that action. See my previous comment, ROC 99-424, submitted in the 2009 cycle.

99- Log #201 HEA-ELS Final Action:
(4.4.2.1.2, 4.5.2.1.1, and 4.6.2.2.2)

Submitter: Burton R. Klein, Burton Klein Associates
Comment on Proposal No: 99-107
Recommendation: 1. Delete new 4.4.2.1.2.
2. Delete new 4.5.2.1.1.
3. Delete new 4.6.2.2.2.
Substantiation: 1. Change would conflict with 4.3.2.5.2, which requires “ground-fault protection for operation of service and feeder disconnecting means (to be) fully selective such that the downstream device and not the upstream device (to) open for downstream ground faults.” Selecting a single time value for all faults will permit some faults to trip all over-current devices almost simultaneously.
2. Proposal negates the requirement that ground-fault protection be ‘fully selective.’
3. The following information and diagrams were submitted as background data to some members of NEC Panel 13 relating to various proposals submitted to change the requirements in 700.27 for the 2011 NEC. Proposal 13-195 in the 2010 Report on Proposals for the NEC stated as follows: “The 0.1 second limit in this proposal could reduce the level of safety by limiting the types of overcurrents that would need to be isolated to the nearest upstream device. Requiring selective coordination down to only 0.1 seconds will cover only overloads and a few minor phase-to-phase and minor ground faults.”
4. All proposals and comments for the 2011 NEC dealing with this issue were rejected as acceptance of the 0.1 second level would dramatically reduce safety for emergency systems covered by Article 700 and would reduce safety for hospital critical branches. The diagrams provided in this comment show the reduction of selective coordination levels from 0.01 to 0.1 for specific sizes of overcurrent devices. Overcurrent protective devices that are not appropriately coordinated in a critical branch may permit a cascading affect upstream from the overcurrent protective device that should have been the only device to clear, thus de-energizing circuits that are not involved in the faulted circuit. In a hospital, for example, a person on life support, or even vital monitoring equipment, would be greatly affected by a loss of electrical power from a feeder or service overcurrent protective device that opened due to a downstream device not properly coordinated with the upstream device.

This is not original material; its reference/source is as follows:
Diagrams are from article "Overcurrent Protection Basics, Part 1" By Tim Crnko, IAIE News, Mar-Apr 2007

99- Log #289 HEA-ELS Final Action:
(4.4.2.1.2, 4.5.2.1.1, and 4.6.2.2.2)

Submitter: Stephen Lipster, International Brotherhood of ELectrical Workers
Comment on Proposal No: 99-107
Recommendation: Revise and renumber as follows:

4.4.2.1.2* Selective Coordination.

~~4.4.2.1.2.1 Overcurrent protective devices serving the essential electrical systems shall be selectively coordinated down to 0.1 second.~~

4.4.2.1.2.~~2~~1 Selective coordination shall not be required as follows:

(1) Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary. [70:700.27]

(2) Between overcurrent protective devices of the same size (ampere rating) in series. [70:700.27]

4.5.2.1.1.* Selective Coordination.

~~4.5.2.1.1.1 Overcurrent protective devices serving the essential electrical systems shall be selectively coordinated down to 0.1 second.~~

4.5.2.1.1.~~2~~ 1Selective coordination shall not be required as follows:

(1) Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary. [70:700.27]

(2) Between overcurrent protective devices of the same size (ampere rating) in series. [70:700.27]

4.6.2.1.1* Selective Coordination.

~~4.6.2.1.1.1 Overcurrent protective devices serving the essential electrical systems shall be selectively coordinated down to 0.1 second.~~

4.6.2.1.1.~~2~~ 1 Selective coordination shall not be required as follows:

(1) Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary. [70:700.27]

(2) Between overcurrent protective devices of the same size (ampere rating) in series. [70:700.27]

Delete the associated annex material.

Substantiation: Section 700.27 of the National Electrical Code requiring selective coordination on all emergency systems first made an appearance in the 2005 edition of the Code. Since the release of the 2005 NEC the American Hospital Association reports the following design/construction history:

Insert Table 99_L289_Tb_S here

The American Hospital Association data suggests a total of 30,050 healthcare projects have been designed or constructed since Section 700.27 was introduced in the 2005 National Electrical Code. Generously assuming a 20% matriculation rate from design to completion in this time period (projects that may have been “counted twice”) leaves us with a strong 24,000 projects that have been designed and or built with selective coordination imbedded in the essential electrical systems. Selective coordination is an accepted fact of modern healthcare design, proven by these telling numbers.

In this period there have been no reports of an arc flash injury sustained in a selectively coordinated system. In fact the 2011 National Electrical Code, Section 240.87, requires the use of a zero time delay “maintenance switch” in large frame circuit breakers to lessen incident energy exposure to workers performing permitted energized tasks, thus removing any additional exposure concerns selectively coordinated systems may have had.

The sheer weight of these numbers proves that the benefits of a selectively coordinated system outweigh the design difficulties encountered by engineers – fully 24,000 projects are selectively coordinated – proving the electrical design community has mastery of these systems.

There are no technical issues that warrant the increase of the selective coordination threshold to .1 second.

There are no design issues that warrant the increase of the selective coordination threshold to .1 second.

There are no safety issues that warrant the increase of the selective coordination threshold to .1 second.

Selective coordination is a proven design concept that has shown value in not only 24,000 healthcare facilities, but in countless emergency systems designed since 2005.

Reducing the effectiveness of selective coordination to a .1 second in healthcare facilities is simply bad code.

This is not original material; its reference/source is as follows:
American Hospital Association.

99- Log #268 HEA-ELS Final Action:
(4.4.2.1.2.1)

Submitter: Kenneth L. Lovorn, Lovorn Engineering Associates, LLC
Comment on Proposal No: 99-107
Recommendation: Revise text to read as follows:
Overcurrent protective devices serving the essential electrical systems shall be selectively coordinated ~~down to 0.1 seconds~~.
Substantiation: Failure to fully, selectively coordinate the overcurrent devices defeats the entire reason for having selective coordination for the devices. If they are not coordinated below 0.1 seconds, all the devices in series will trip simultaneously on their instantaneous trip elements, thus taking out much more of the essential electrical system than would occur if they were fully, selectively coordinated. Requiring complete, selective coordination does not force the use of fuses and prevent the use of breakers, since some breakers have short time ratings and may have their instantaneous trip functions disabled. Due to the great importance of maintaining power to as much of the essential electrical system, arbitrarily selecting 0.1 seconds as a cut off, only encourages the use of lower quality distribution equipment. I am a health care design engineer and I routinely utilize power air circuit breakers to make sure the system is selectively coordinated throughout its entire range. If this is adopted, I will continue to design essential electrical systems that are completely, selectively coordinated, since their continued operation has a direct bearing on patient lives.

99- Log #79 HEA-ELS Final Action:
(4.4.2.2)

Submitter: James E. Degnan, Sparling
Comment on Proposal No: 99-108
Recommendation: Revise text to read as follows:
~~4.4.2.2.3.3~~ 4.4.2.2.4 Critical Branch
(Subsequent renumbering as appropriate)
Substantiation: I support the comment; however there appears to be a problem with the paragraph numbering.

99- Log #283 HEA-ELS Final Action:
(4.4.2.2)

Submitter: Jim Wiseman, Schneider Electric
Comment on Proposal No: 99-108
Recommendation: In proposed 4.4.2.2.1.4(B), delete “or systems” (Made redundant by other changes.
In proposed 4.4.2.2.4.1 and 4.4.2.2.4.2(A), change “equipment system” to “equipment branch”.

Substantiation: To correlate with Proposal 99-40 and other changes.

99- Log #300 HEA-ELS Final Action:
(4.4.2.2.2.1 [6.4.2.2.2.1])

Submitter: Mark R. Hilbert, Wolfeboro, NH
Comment on Proposal No: 99-108
Recommendation: Revise the proposed text as follows:
4.4.2.2.2.1 A single feeder supplied by a local or remote alternate source shall be permitted to supply the essential electrical system ~~to the point at which the life safety, critical, and equipment branches are separated~~ in accordance with (A) or (B).
(A) From the source to the second point of distribution within the building where the alternate source is located within the building.
(B) From the source to the first point of distribution at the building supplied where the alternate source is located remote from the building supplied.
Substantiation: Revising the test as recommended would address the concern raised in the committee statement relative to feeders in central plant applications while maintaining some limitation on the number of layers of distribution. The proposed revision would allow the combined loads of the essential system to remain that way to the point where they reach the building supplied in central plant applications. Then from the distribution equipment at the building supplied, the branches would be separated. As worded in Proposal 99-108 the single feeder can have unlimited layers of distribution which can compromise the system integrity.
Whether the alternate source is located remote from or within the building supplied, the proposed revision allows a single feeder(s) to be run from the alternate source(s) to the paralleling gear (1st level of distribution) and then to the switchgear for distribution as separate branches (2nd level of distribution) in paralleling applications.

99- Log #266 HEA-ELS Final Action:
(4.4.4.1.1.1 and 4.4.4.1.1.2)

Submitter: Steven Jalowiec, Waterbury Hospital
Comment on Proposal No: 99-115
Recommendation: Revise as follows:
4.4.4.1.1.1 Maintenance of Alternate Power Source. The generator set or other alternate power source and associated equipment, including all appurtenance parts, shall be so maintained as to be capable of supplying service within the shortest time practicable and within the 10-second interval specified in 4.4.1.1.10 and 4.4.3.1. 4.4.4.1.1.2 The 10-second criteria shall not apply during the monthly testing of an essential electrical system. If the 10-second criteria is not met during the monthly test, a process shall be provided to annually confirm the capability of the life safety and critical branches to comply with 4.4.3.1. Maintenance shall be performed in accordance with NFPA 110, Standard for Emergency and Standby Power Systems, Chapter 8.
Substantiation: The New England Society of Healthcare Engineers supports this proposal.

99- Log #270 HEA-ELS Final Action:
(4.5.2.1.1.1)

Submitter: Kenneth L. Lovorn, Lovorn Engineering Associates, LLC
Comment on Proposal No: 99-107
Recommendation: Revise text to read as follows:
Overcurrent protective devices serving the essential electrical systems shall be selectively coordinated ~~down to 0.1 seconds.~~
Substantiation: Failure to fully, selectively coordinate the overcurrent devices defeats the entire reason for having selective coordination for the devices. If they are not coordinated below 0.1 seconds, all the devices in series will trip simultaneously on their instantaneous trip elements, thus taking out much more of the essential electrical system than would occur if they were fully, selectively coordinated. Requiring complete, selective coordination does not force the use of fuses and prevent the use of breakers, since some breakers have short time ratings and may have their instantaneous trip functions disabled. Due to the great importance of maintaining power to as much of the essential electrical system, arbitrarily selecting 0.1 seconds as a cut off, only encourages the use of lower quality distribution equipment. I am a health care design engineer and I routinely utilize power air circuit breakers to make sure the system is selectively coordinated throughout its entire range. If this is adopted, I will continue to design essential electrical systems that are completely, selectively coordinated, since their continued operation has a direct bearing on patient lives.

99- Log #269 HEA-ELS Final Action:
(4.6.2.1.1.1)

Submitter: Kenneth L. Lovorn, Lovorn Engineering Associates, LLC
Comment on Proposal No: 99-107
Recommendation: Revise text to read as follows:
Overcurrent protective devices serving the essential electrical systems shall be selectively coordinated ~~down to 0.1 seconds.~~
Substantiation: Failure to fully, selectively coordinate the overcurrent devices defeats the entire reason for having selective coordination for the devices. If they are not coordinated below 0.1 seconds, all the devices in series will trip simultaneously on their instantaneous trip elements, thus taking out much more of the essential electrical system than would occur if they were fully, selectively coordinated. Requiring complete, selective coordination does not force the use of fuses and prevent the use of breakers, since some breakers have short time ratings and may have their instantaneous trip functions disabled. Due to the great importance of maintaining power to as much of the essential electrical system, arbitrarily selecting 0.1 seconds as a cut off, only encourages the use of lower quality distribution equipment. I am a health care design engineer and I routinely utilize power air circuit breakers to make sure the system is selectively coordinated throughout its entire range. If this is adopted, I will continue to design essential electrical systems that are completely, selectively coordinated, since their continued operation has a direct bearing on patient lives.

99- Log #222 HEA-ELS Final Action:
(6.1.1 and 6.1.2)

Submitter: Sharon S. Gilyeat, Koffel Associates, Inc.
Comment on Proposal No: 99-381
Recommendation: This chapter shall apply to all health care facilities, as specified in Section 1.3.
~~The following sections of this chapter shall apply to new and existing health care facilities:~~
~~6.3.2.2.3, 6.3.2.2.4.2, 6.3.2.2.6.1, 6.3.2.2.6.2(F), 6.3.2.2.8.4(B)(2)(3)(4), 6.3.2.2.8.6, 6.3.4, 6.4.1.1.17.5, 6.4.2.2.5.2(C), 6.4.2.2.5.3, 6.4.4, 6.5.4, 6.6.2.2.3.2, 6.6.3.1, 6.6.4~~
Substantiation: The reference to Section 1.3 and the proposed changes to Section 1.3 address how to apply the electrical provisions (as well as all the 99 system provisions) to new and existing conditions. The specific reference to sections is cumbersome and there is no reason to repeat the provisions in Section 1.3. The actual text within this chapter also clarified if it is applicable to existing specifically. The general language in Section 1.3 allows for the chapter to clarify or modify application to existing and this is done within the specific text of this chapter.

99- Log #223 HEA-ELS Final Action:
(6.3)

Submitter: Sharon S. Gilyeat, Koffel Associates, Inc.
Comment on Proposal No: N/A
Recommendation: Add text to read as follows:
6.3 Building System Categories
6.3.1 Building system categories shall be designated as indicated in this chapter.
6.3.2 Facilities housing any critical care areas shall be classified as Category 1.
6.3.3 Facilities housing general care areas but no critical care areas, shall be classified as Category 2.
6.3.4 Facilities housing only basic care areas shall be classified as Category 3.
Substantiation: The application of the electrical requirements shall be based on the facility and the category of care provided within the facility. The definition/application of category 1, 2, and 3 should be defined early in the chapter as a framework for all the requirements. Note that when the standard got away from occupancy for application of requirements, they basically reduced the impact of some of the requirements to specific use areas vs. the entire facility housing the use area. I do not believe that was their intent. The classification of categories here lays the framework for application of EES systems to facilities housing various types of care.

99- Log #224 HEA-ELS Final Action:
(6.3.2.2.1.3)

Submitter: Sharon S. Gilyeat, Koffel Associates, Inc.
Comment on Proposal No: N/A
Recommendation: Revise text to read as follows:
6.3.2.2.1.3 Access to Overcurrent Protective Devices.
(A) Only authorized personnel shall have access to overcurrent protective devices serving critical care and general care ~~Category 1 and Category 2~~ rooms.
(B) Overcurrent protective devices serving critical care and general care ~~Category 1 and Category 2~~ rooms shall not be permitted to be located in public access spaces.
Substantiation: Remove reference to category and rely on actual patient care definitions to carry these requirements. Categories should refer to entire facility, not a specific patient care area.

99- Log #155 HEA-ELS Final Action:
(6.3.2.2.2.3)

Submitter: James S. Peterkin, Heery International-HLM Design
Comment on Proposal No: 99-83
Recommendation: Revise text to read as follows:
6.3.2.2.2.3 Separate Grounding Conductor. When existing construction does not have a separate grounding conductor, the continued use of the system shall be permitted, provided it meets the performance requirements in Section 6.3.3.1. ~~and is verified annually.~~
Substantiation: There is no technical substantiation that this is a current problem that warrants the expense of annual testing.

99- Log #225 HEA-ELS Final Action:
(6.3.2.2.6.2)

Submitter: Sharon S. Gilyeat, Koffel Associates, Inc.
Comment on Proposal No: N/A
Recommendation: Revise text to read as follows:
6.3.2.2.6.2 Minimum Number of Receptacles. The number of receptacles shall be determined by the intended use of the patient care rooms in accordance with 6.3.2.2.6.2(A) through 6.3.2.2.6.2(E).
(A) Receptacles for Patient Bed Locations in General Care Areas ~~(Category 2).~~ Each patient bed location shall be provided with a minimum of eight receptacles.
(B) Receptacles for Patient Bed Locations in Critical Care Areas ~~(Category 1).~~ Each patient 127 NFPA 99 Preprint A2011 ROP bed location shall be provided with a minimum of fourteen receptacles.
(C) Receptacles for Operating Rooms ~~(Category 1~~). Operating rooms shall be provided with a minimum of thirty-six receptacles.
Substantiation: Removed category reference as the category should be defined by facility and should be defined based on the patient care housed in the facility. It is the classification of the facility, not a specific area. Individual requirements can still be applied by classification of patient care areas.

99- Log #30 HEA-ELS Final Action:
(6.3.2.2.8.3)

Submitter: Mike Daniel, Daniel Consulting, LTD
Comment on Proposal No: 99-96
Recommendation: Add new text to read as follows:
<u>The health care governing body shall conduct a risk assessment to specifically delineate wet procedure locations.</u>
Substantiation: The health care governing body needs to specifically delineate all wet procedure locations for the application of special protection requirements. Mandating the risk assessment will accomplish this. Listing one specific area sends the wrong message. This proposed revision places the responsibility for making the determination on the organization where it belongs as opposed to the Committee.

99- Log #226 HEA-ELS Final Action:
(6.3.2.2.10)

Submitter: Sharon S. Gilyeat, Koffel Associates, Inc.
Comment on Proposal No: N/A
Recommendation: Revise text to read as follows:
6.3.2.2.10 Essential Electrical Systems (EES).
6.3.2.2.10.1 ~~Critical care rooms (Category 1 Room)~~ Category 1 facilities shall be served only by a Type I EES.
6.3.2.2.10.2 ~~General care room (Catetory 2 Room)~~ Category 2 facilities shall be served by a Type I or Type II EES.
6.3.2.2.10.3 A Type I EES serving a critical care area ~~(Category 1 Room~~) shall be permitted to serve general care areas in the same facility.
6.3.2.2.10.4 ~~Basic Care Rooms shall not be~~ Category 3 facilities shall be served by a Type III EES. ~~not be required to be served by an EES~~.
Substantiation: The changes reflect the application of the requirement to the facility housing the care area and not just the care area. The electrical system is the infrastructure of the facility and as such, all operations within the facility should be provided with emergency power to support that care. When requirements were applied by occupancy, this was clear; these proposed changes make it very unclear and possibly not what the committee intended.

99- Log #227 HEA-ELS Final Action:
(6.3.2.2.10.5)

Submitter: Sharon S. Gilyeat, Koffel Associates, Inc.
Comment on Proposal No: N/A
Recommendation: Delete the following text:
~~6.3.2.2.10.5 Rooms other than patient care rooms shall not be required to be served by an EES.~~
Substantiation: Remove this section, as applying emergency power requirements to just patient care areas does not make sense when it is the entire facility infrastructure that supports the patient care areas. Not all patient related facilities required to support the patient care are classified as patient care areas. Areas such as sterile processing are critical to the facility but could be without emergency power supply if this section is applied as previously written.

99- Log #228 HEA-ELS Final Action:
(6.4)

Submitter: Sharon S. Gilyeat, Koffel Associates, Inc.
Comment on Proposal No: N/A
Recommendation: Revise text to read as follows:
6.4 Electrical System.
6.3~~4~~.1 Sources. Each ~~hospital~~ health care appliance requiring electrical line power for operation shall be supported by power sources ~~and distribution systems~~ that provide power adequate for each service.
Substantiation: Removes reference to distribution as these requirements are found in another section. Also removes reference to hospital and uses the more general term health care. Requirements are to be based on category of hazard, not occupancy.

99- Log #229 HEA-ELS Final Action:
(6.4.2)

Submitter: Sharon S. Gilyeat, Koffel Associates, Inc.
Comment on Proposal No: N/A
Recommendation: Revise text to read as follows:
6.~~3~~4.2 Distribution. Each health care appliance requiring electrical line power for operation shall be supported by distribution systems that provide power adequate for each service.
Substantiation: Adds a requirement/application for distribution similar to the section "Source." Entire section requires renumbering.

99- Log #245 HEA-ELS Final Action:
(Chapter 7)

Submitter: Sharon S. Gilyeat, Koffel Associates, Inc.
Comment on Proposal No: N/A
Recommendation: Revise text to read as follows:
Information Technology and Communications Systems ~~for Healthcare Facilities~~
Substantiation: Remove reference to health care facilities for consistency between code chapters.

99- Log #56 HEA-ELS Final Action:
(7.3.1.2.1.4(H) (New))

Submitter: Bill Payne, Alamance Regional Medical Center
Comment on Proposal No: N/A
Recommendation: Add new text to read as follows:
(H) Security systems, Nurse Call systems, Cable TV systems, Patient Education systems and other low voltage systems may be part of the EF, TR and other TERs.
Substantiation: The EF and other data closets are widely used to house and distribute systems that use either Cat5/6, Coax or twisted pair low voltage systems. It is not clear if items other than the phone system and IT systems are included in this chapter.

99- Log #57 HEA-ELS Final Action:
(7.3.1.2.2)

Submitter: Bill Payne, Alamance Regional Medical Center
Comment on Proposal No: N/A
Recommendation: Revise text to read as follows:
7.3.1.2.2 ~~Telecommunications Equipment Room (TER)~~ Main Distribution Frame (MDF) .
Substantiation: Telecommunications Equipment Room implies that this section only applies to a telephone switch, which will one day be obsolete. The terms Main Distribution Frame (MDF) and Intermediate Distribution Frame (IDF) are broader terms and will be relevant to Information Systems.

99- Log #58 HEA-ELS Final Action:
(7.3.1.2.3)

Submitter: Bill Payne, Alamance Regional Medical Center
Comment on Proposal No: N/A
Recommendation: Revise text to read as follows:
7.3.1.2.3 ~~Telecommunications Equipment Room (TER)~~ Main Distribution Frame (MDF) .
Substantiation: Telecommunications Equipment Room implies that this section only applies to a telephone switch, which will one day be obsolete. The terms Main Distribution Frame (MDF) and Intermediate Distribution Frame (IDF) are broader terms and will be relevant to Information Systems.

99- Log #110 HEA-ELS Final Action:
(7.3.1.2.4.3)

Submitter: James H. Costley, Jr., Newcomb & Boyd Consultants & Engineers
Comment on Proposal No: 99-380
Recommendation: Delete 7.3.1.2.4.3. Renumber subsequent paragraph as appropriate.
Substantiation: Subparagraph 7.3.1.2.4.3. is a repetition of 7.3.1.2.4.2. immediately preceding it.

99- Log #59 HEA-ELS Final Action:
(7.3.1.2.4.4)

Submitter: Bill Payne, Alamance Regional Medical Center
Comment on Proposal No: N/A
Recommendation: Delete the following text:
~~7.3.1.2.4.4 Conduits shall be provided in open ceiling spaces for cable protection.~~
Substantiation: It would be impractical to enclose all low voltage cables in conduit. Ladder racks and J-hooks balance protection and flexibility. Once cables or fiber has been pulled into a conduit, it is very hard to add additional cables at a later date. Hospitals are constantly adding cables from one location to another.

99- Log #111 HEA-ELS Final Action:
(7.3.1.2.4.4)

Submitter: James H. Costley, Jr., Newcomb & Boyd Consultants & Engineers
Comment on Proposal No: 99-380
Recommendation: Revise “Conduits” to Raceways or cable trays”, as follows:
7.3.1.2.4.4. ~~Conduits~~ Raceways or cable trays shall be provided in open ceiling spaces for protection.
Substantiation: While protection is desirable in open ceiling spaces, it should not be limited to conduit only.

99- Log #127 HEA-ELS Final Action:
(7.3.1.2.4.4)

Submitter: Chad E. Beebe, American Society for Healthcare Engineering
Comment on Proposal No: 99-380
Recommendation: Revise text to read as follows:
7.3.1.2.4.4 When cable is exposed to potential damage Conduits or raceways shall be provided in open ceiling spaces for cable protection.
Substantiation: To require all IT cabling to be in conduit is excessive. What is the definition of "open space" that could be interpreted as interstitial space or space without a finished ceiling? What about cables that are below a ceiling? And does this need to apply to cables that are out of reach of people or equipment?

99- Log #109 HEA-ELS Final Action:
(7.3.3.1.6.1 through 7.3.3.1.6.3 and 7.4.3.1.5.1 through 7.4.3.1.5.3)

Submitter: James H. Costley, Jr., Newcomb & Boyd Consultants & Engineers
Comment on Proposal No: 99-380
Recommendation: Replace "Life safety and critical branches" in each of the six subparagraphs with "Emergency" as follows:
~~Life safety and critical branches~~ Emergency calling devices shall be provided...".
Substantiation: "Life safety and critical branches" is not an appropriate descriptor of nurse call system emergency calling devices. The location of these subparagraphs under 7.3 (Category 1 Systems) and 7.4 (Category 2 Systems) already identifies the application.

99- Log #60 HEA-ELS Final Action:
(7.3.3.2)

Submitter: Bill Payne, Alamance Regional Medical Center
Comment on Proposal No: N/A
Recommendation: Add the following to the end of the section:
Staff carried wireless devices (such as wireless phones or pagers) that are connected to the nurse call system may satisfy this requirement.
Substantiation: Telecommunications Equipment Room implies that this section only applies to a telephone switch, which will one day be obsolete. The terms Main Distribution Frame (MDF) and Intermediate Distribution Frame (IDF) are broader terms and will be relevant to Information Systems.

99- Log #205 HEA-ELS Final Action:
(13.4.1.2.6.1(E))

Submitter: Burton R. Klein, Burton Klein Associates
Comment on Proposal No: 99-464
Recommendation: Revise 13.4.1.2.6.1(E) to read:

(E) Battery-powered emergency lighting units.

1. One or more battery-operated emergency lighting units shall be provided within each operating room.
2. The lighting level of each unit shall be sufficient to terminate procedures intended to be performed within the operating room.
3. The sensor for units shall be wired to the branch circuit(s) serving general lighting within the room.
4. Units shall be capable of providing lighting for 1 ½ hours.
5. Units shall be tested monthly for 30 seconds, and annually for 30 minutes.

Substantiation: 1. While 99-439 deletes Chapters 13 to 19 and Chapter 21 (and thus the requirement for these units), I wonder what operating staff will do (and say) if a risk assessment determines that the risk of general lighting in an operating room being interrupted is so low as to not have such units installed. The requirement for such units was proposed by anesthesiologist on TC who very concerned about having some lighting interrupted for even 10 seconds (or longer if the emergency power did not start immediately; or even longer if the interruption was the result of an internal disruption of wiring to general lighting.)

2. I found no requirement in the preprint suggesting a risk assessment for battery-powered emergency lighting units in operating rooms. Will this result in such units no longer installed in operating rooms since the subject of such units will no longer be mentioned in NFPA 99?

3. Testing requirements previously proposed were based on exit lighting units (as called out in NFPA 101). I don't believe this are appropriate for units since they are not part of the normal or essential electrical distribution system. A 30 second test done once a month should be sufficient to determine that units are functioning; a 30 minute test once a year is also considered adequate for the purpose; considering the intent of these units is to provide some temporary lighting during interruption of power to general lighting.