RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

ELECTRICAL SAFETY RESEARCH ADVISORY COMMITTEE

Meeting Minutes

RESEARCH PLANNING MEETING

SAN DIEGO, CALIFORNIA

SATURDAY, 27 OCTOBER 2018; 8:00 AM – 12:00 PM

1. Call to Order, Agenda, and Attendees. The meeting was called to order at 8:00 AM by Donny Cook, Chair of the Electrical Safety Research Advisory Committee (ESRAC). The meeting agenda was briefly reviewed and this is included as Attachment A. A summary of the attendees is included in Attachment B.

2. Welcome and Meeting Overview: Donny Cook welcomed everyone and provided a brief overview of the ESRAC. It was clarified that the membership of the ESRAC is open. An overview summary of the ESRAC was circulated and this is included as Attachment C.

   Casey Grant used slides to review additional overview information describing the role of the Foundation. These slides are included as Attachment D, and were used throughout the remainder of the meeting to help focus the meeting discussions.

   Of particular importance is the "Project Idea Form" that is included as Attachment E. This is a key instrument for anyone to submit a proposed project to the Research Foundation. Further, it assists with the packaging and clarification of the proposed effort.

3. Review of Active and Recently Completed Research Activities. Casey Grant provided a review of the active and recently completed FPRF research activities. This included a more detailed explanation of the following projects:
   - Fire Resistance of Concrete for Electrical Conductors
   - Residential Electrical Fire Problem: The Data Landscape
   - Evaluation of Electrical Feeders and Branch Circuit Loading: Phase 1
   - Marina Risk Reduction
   - Power or the Ethernet

4. Review of Previously Proposed Research Activity. Casey Grant indicated that the last time the ESRAC compiled their research priorities was in January of 2018, and prior to that was in June of 2016. Both of these summaries were reviewed in further detail, and are included in Attachments F and G. Some additional examples of proposed research projects are still being considered.

5. Power Over the Ethernet: This is seen as an important issue involving emerging technology, and involves the combined use of cables and conductors for both electrical power and communication. This has potentially sweeping implications for the NEC, as well as other NFPA codes and standards such as NFPA 72 (National Fire Alarm and Signaling Code). Further this involves codes and standards from other organizations, adding to the complexity of this issue. The October 2017 workshop in Durham NH and the June 2018 Las Vegas Summit were both referenced.

   It was clarified that the Correlating Committee for the NFPA 72 project have a task group developing the fundamental principles that to assist new emerging technology when working with fire alarm systems. It was proposed that similar fundamental principles would likewise benefit the NEC.

   An example was provided of fundamental principles now being considered by the Fire Alarm community (NFPA 72). This is still under development and is offered here as an example, and includes the following possible key fundamental principles being considered by NFPA 72, National Fire Alarm Code

   System goals and objectives:
   - Sensing and Detecting a Hazard: Fire, Smoke, Haz Mat Event, Active Shooter, etc.
   - Notifying and Directing Occupants: Egress, Shelter in Place, etc.
   - Notifying and Directing Emergency Responders: Hazard, Building Conditions, Occupant Location, etc.

   Key safety concerns:
   - Electrical: Arcing, Shock, Surge, etc.
   - Fire: Ignition, Fuel Load, Flame Spread, Products of Combustion, etc.

   Key performance attributes:
   - Availability: Ability to be obtained.
   - Compatibility: Ability to co-exist with similar equipment.
   - Durability: Ability to last.
   - Interoperability: Ability to function on a common platform with similar equipment.
   - Maintainability: Ability to be serviced.
   - Operability: Ability to function.
   - Stability: Ability to not introduce problems.
   - Reliability: Ability to perform as expected.

   Accordingly, an exercise was conducted with the meeting attendees providing their thoughts on potential Fundamental Principles for the NEC. This resulted in the following:

   Proposed Fundamental Principles for Consideration
   - Protect people and property from the hazards of electrical systems

- Provide protection from the use of electricity, for: fire, electric shock, arcing events arc flash and arcing faults
- Safety of electrical workers
- Installation free of defects
- Life safety
- Article 90: Promoting the safe working of persons and property from hazards from the use of electricity. The purpose is to be written and adopted so inspectors will enforce it.
- Understandable prescriptive requirements that when followed promote safe products and installations.
- Securability: The exclusion of invasive intrusion, corruption, and disruption (note: this is similar to compatibility)

Comments and Questions on Fundamental Principles

- Practical understanding of NEC for the user of the code.
- The code needs to say what it means and means what it says.
- Do PoE systems need to be grounded in reality?
- Should the NEC be concerned with the ability of a signal (digital) to get through (e.g., security, fire alarm, etc.)?
- Free from hazards… is PoE?

6. Marina and Pool Electrical Safety: The need to address ESD (electric shock drowning) remains a significant concern among the electrical community. Late last year the Foundation published the report on Marina Risk Reduction, and this now provides a critical baseline that compares the risk and overall value of the full spectrum of mitigation measures for this particular application. In plenary session the group addressed several possible research areas relating to this topic area. This includes the following:

   Marinas

   - Equipment lifespan
   - Development of an electric field alarm
     - Provide operational scenarios and performance measures
     - Validation of functionality
     - Demonstrate ability to identify and mitigate hazards
   - Consolidation of state based engineering assessments
   - Promote optimum design and installation
   - Training Development (for installers, enforcers, etc.)

   Pools

   - Need to address pool bonding
   - Development of a test for bonding with existing pools (e.g., similar to the ETI test method already established by Chuck Mello)
   - Interaction of new and existing equipment
   - Validation of bonding approaches
   - Equipment corrosion
   - Enforcement beyond initial installations
   - Review of testing infrastructure (i.e., comparison with European approach)

7. Overall Review of Proposed Electrical Projects. A general discussion was held on possible new projects, and the resurrection of previously proposed project ideas that are still relevant. During discussion in plenary session, this led to mention of projects such as (i) methods for sizing conductors, (ii) receptacles in kitchens on islands, and (iii) handicap accessibility with equipment operation. This led to an exercise to address whatever issues the attendees believed to be important (using post-its on flipcharts), and this generated the following list:

   Equipment Grounding Conductors (98)
   - Sizing equipment and grounding conductors in parallel installations
   - Sizing conductors used for fault current

   Grounding Electrodes (58)
   - Ground rod lengths
   - Chapter 8 has exception for 5 ½ foot length
   - Clarify length of ground rod that is sufficient.
   - Prohibit use of reinforced steel for pools as a grounding electrode

   Ampacity (54)
   - Ampacity bus versus cable

   Standards/Codes/Regulatory/Licensing (105)
   - Post fire evaluation of electrical equipment (not just electrical fires)
   - Re-use of electrical equipment that has been flooded or wet from a sprinkler
   - Correlating "other" code requirements with electrical installations (develop a table)
   - Clarify installation licensing and code adoption and how they support each other
   - Classification of license types for power versus low voltage
   - Enforcement beyond initial installation (not AHJ)
   - Clarify how field evaluation equate to listing requirements of the NEC

   Equipment for Emergency Response (61)
   - Remote disconnect of mains as a result of natural disasters such as floods or hurricane, when mains are installed in basements or cellars.

   Data Collection (68)
   - Fire reporting data collection
   - Clarification of how to identify an electrical fire

   Hazards with Cord Connected Appliances (80)
   - Receptacle placement to address kids in kitchens, pulling pots from counters by cords
   - Location of receptacles on islands and elsewhere in kitchens

   EV: Electric Vehicles (28)
   - Use of an EV as a back-up power system for home

   Marinas (86)
   - Marina legislative requirements
   - Developing and validating alarms systems for boat-docks and marinas for energized water.

   After the group placed there proposed research topics on the flipcharts, they were then grouped by similar topic areas. This resulted in nine general topic areas. To clarify the general priority, each

attendee indicated their individual score for each topic area, using a score of 9 through 1 with 9 being the most important and 1 being the least. Once tabulated, this resulted in the following priority list:

1) Standards/Codes/Regulatory/Licensing (105)
2) Equipment Grounding Conductors (98)
3) Marinas (86)
4) Hazards with Cord Connected Appliances (80)
5) Data Collection (68)
6) Equipment for Emergency Response (61)
7) Grounding Electrodes (58)
8) Ampacity (54)
9) EV: Electric Vehicles (28)

It was mentioned that this list provides general guidance, and ultimate implementation will also take into account additional factors such as other input from other sources (e.g., NEC Correlating Committee), availability of funding, clarification of already completed research that addresses the problem area, etc.

8. Concluding Remarks and Adjournment. Donny Cook reminded all interested parties to participate in these activities and let the Research Foundation know about possible sponsors and other important details. Casey Grant indicated that the Foundation will be looking into moving forward on certain issues that are viewed as priorities. If possible, it was suggested to repeat this ESRAC meeting at the upcoming 2019 NFPA C&E, since the NEC will be reporting at that meeting. The possibility of scheduling an ESRAC meeting will be explored, contingent on other conflicting meetings.

   ESRAC attendees were thanked for their participation and contribution to this meeting. A meeting summary will be prepared by staff and circulated. The meeting was adjourned at 11:35 pm.

(Meeting Summary by C. Grant, 20/Nov/2018)

Attachments

Attachment	Description	No. of Pages
A	Meeting Agenda	1
B	Summary of Meeting Attendees	1
C	ESRAC Overview	2
D	Slides for ERAC Meeting Overview (by Casey Grant)	7
E	Project Idea Form	3
F	Summary of ESRAC Research Priorities – January 2018	1
G	Summary of ESRAC Research Priorities – June 2016	2

RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

ELECTRICAL SAFETY RESEARCH ADVISORY COMMITTEE

RESEARCH PLANNING MEETING

AGENDA

Last Updated: 24 October 2018
Subject to further updates

Saturday, 27 October 2018

8:00 am – 12:00 pm

Sheraton San Diego Hotel & Marina

1380 Harbor Island Drive, San Diego, CA 92101

(Dress code: business casual)

1.	Welcome, Introductions, Preliminaries & Background	(8:00 – 8:30 am)
2.	Review of Active and Recently Completed Projects	(8:30 – 9:00 am)
3.	Review of Previously Proposed Research Activity	(9:00 – 9:30 am)
	Break	(9:30 – 9:45 am)
4.	Facilitated Discussion to Identify Key Fundamental Principles for PoE	(9:45 – 10:15 am)
5.	Facilitated Discussion to Identify Specific Action on Marinas & Pools	(10:15 – 10:45 am)
6.	Identification and Prioritization of Other NEC Related Research	(10:45 – 11:45 am)
7.	Meeting Summary, and Adjournment	(11:45 – 12:00 pm)

Note: Information on the latest NEC revision & related activity can be found at: www.nfpa.org/70

1 Batterymarch Park, Quincy, MA 02169-7471
Telephone: +1.617.984.7281 Fax: +1.617.984.7010
Email: Foundation@NFPA.org www.NFPA.org/Foundation

Electrical Safety Research Advisory Committee;
Saturday 27 October 2018 (8 am to 12 pm) ----- San Diego, CA

Last Updated: 27 October 2018

Attendees

1	George Bish	Amazon	gjbish@gmail.com
2	Dave Clements	IAEI	dclements@iaei.org
3	Donny Cook	Shelby County AL	dcook@shelbyal.com
4	Amy Cronin	Strategic Code Solutions LLC	acronin@codestrategist.com
5	Vince Dellacroce	Siemens	vincent.dellecroce@seimens.com
6	Randy Dollar	Siemens Industry, Inc.	randy.dollar@siemens.com
7	Thomas Domitrovich	Eaton	thomasadomitrovich@eaton.com
8	Steve Douglas	QPS/CSA	sdouglas@qps.ca
9	Paul Dobrowsky	Innovative Technology Services	pauldobrowsky@aol.com
10	Nehad El-Sherif	IEEE	nehad.e.el-sherif@ieee.org
11	Steve Froemming	IAEI/CMP-13	sfroemming@franklinwi.gov
12	Casey Grant	FPRF	cgrant@nfpa.org
13	Joel Goergen	Cisco Systems Inc.	jgorgen@cisco.com
14	Mark Hilbert	MRHilbert Electrical Inspection	mhilbert@mrhilbert.net
15	David Hittinger	IEC	davidhittinger@gmail.com
16	Randy Ivans	UL ULC	randy.ivans@ul.com
17	Chad Jones	Cisco Systems Inc.	cmjones@cisco.com
18	Kevin Lippert	Eaton	kevinjlippert@eaton.com
19	Keith Lofland	IAEI	klofland@iaei.org
20	Jack Lyons	NEMA	Jack.Lyons@nema.org
21	Tim McClintock	NFPA	tmcclintock@nfpa.org
22	William McCoy	Telco Sales	wjmccoy@verizon.net
23	Chuck Mello	CDCMello Consulting LLC	chuck@cdcmello.com
24	Bill Pancake	IAEI	wpancake@comcast.net
25	Calvin Roberts	BICSI	Calvin.l.roberts@gmail.com
26	Brian Rock	Hubbell Inc.	brian.rock.electrotechnical@gmail.com
27	James Rogers	Bay State Inspection Agency	bsia@vinigand.net
28	Steve Rood	Legrand	steve.rood@legrand.us
29	Joel Sandel	JRS Consulting	js@jrsnyc.com
30	Vince Saporita	Saporita Consulting	v.saporita.pe@ieee.org
31	Jeff Sargent	NFPA	jsargent@nfpa.org
32	Kurt Seeliger	ATT-SBCA	ks803v@att.com
33	Anton Tomasin	IAEI	tonytomasin@yahoo.com
34	Derek Vigstol	NFPA	dvigstol@nfpa.org
35	Joseph Wages, Jr.	IAEI	jwages@iaei.org
36	Keith Waters	Schneider Electric	keith.waters@schneider-electric.com
37	Wendell Whistler	IBEW	wendell@cjatc.org
38	Leo Zieman	EEI	leo.r.zieman@fpl.com

RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

Advisory Committee on Electrical Safety Research

Last Updated: 7 August 2017

Goal

To enhance electrical safety through research and education in support of NFPA Electrical Codes and Standards

Reporting Structure

The Committee is a subdivision of the Fire Protection Research Foundation (the Foundation), which is solely responsible for its administration.

Membership

The Committee is open to all individuals who support its mission; membership will be attained by registration with the administrator of the Foundation. The Executive Director of the Foundation will appoint an initial Chair of the Committee, to serve until a Chair and Vice Chair are elected by membership of the Committee for two year terms, or until their successors are elected and qualified.

The staff liaison of the NEC Code Making Panels, the staff liaison of other NFPA electrical codes and standards, appointed liaisons from these committees and from the Fire Protection Research Foundation Board of Trustees will serve by designation as members of the Committee.

Role of the Foundation in General Committee Activities

The Foundation shall oversee and have general charge of the affairs and activities of the Committee. The Foundation shall designate a non-voting secretary to the Council, the secretary shall provide administrative services to its activities, including meeting arrangements, record keeping, and other activities as determined to be appropriate by the Board of Trustees.

Activities of the Committee

The Committee will meet at least annually; additional meetings may be held at the call of the Chair. An annual report of Committee activities will be provided to all members. Regular electronic communication on current activities will be provided through electronic means.

The Chair of the Committee will recommend designated individuals to carry out various activities in support of the mission including: research planning, representation on Foundation Project Technical Panels, and symposia planning committees, etc, as needed.

The primary activity of the Committee will be to plan, oversee, and communicate research programs in support of its mission as follows:

The Committee will engage in a research planning program to identify priority research projects. The scope and preliminary research plan for these priority projects will be developed with guidance from members of the Committee. If appropriate, the Foundation will seek funding support for the project, and, once undertaken, will appoint a Project Technical Panel including members of the Committee to oversee the project and conduct the research in accordance with its procedures. Regular reports on all research projects will be provided to the Committee membership by the Foundation by email, and through presentations at the appropriate Code Making Panel meetings.

A secondary activity of the Committee is to provide the community with updates on the state of the art in electrical safety. The Committee will provide input into symposia planning at the Foundation; symposia will be administered by the Foundation.

All activities of the Committee are subject to the approval of the Foundation Board of Trustees.

Funding

Committee membership is open to all who support its mission and the Foundation will support the general activities of the Committee at no cost to participants. The Foundation will charge for its role in administration of Foundation research projects.

RESEARCH FOUNDATION
RESEARCH FOR THE NFPA MISSION

Electrical Safety Research Advisory Committee

Research Planning Meeting

27 October 2018 | 8:00 am – 12:00 pm | San Diego, California

AGENDA

ESRAC: Electrical Safety Research Advisory Committee

1) **Welcome, Introductions, Preliminaries & Background**
2) Review of Active and Recently Completed Projects
3) Review of Previously Proposed Research Activity
4) Facilitated Discussion to Identify Key Fundamental Principles for PoE
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7) Meeting Summary, and Adjournment

Understanding the NFPA and FPRF

NFPA – National Fire Protection Association

- Non Profit Membership Association
- Established in 1896; Approximately 65K members
- Headquartered in Quincy, MA, though no geographic boundaries
- Mission: Make the world safer from fire and related hazards
- 300 plus "model Codes & Standards; administered by 8K volunteers

FPRF– Fire Protection Research Foundation

- NFPA's Research Affiliate: Separate non-profit research organization
- Mission: Facilitate research on behalf of the NFPA mission
- Analogy: Hollywood movie producer

www.NFPA.org/Foundation

Foundation Projects… who participates?

- Funding (Sponsors): *Where does it come from?*
  - Manufacturers, trade associations, NFPA, federal agencies, research organizations, nowhere, etc…
- Contractors: *Who Does the Work?*
  - Consultants, research organizations, test labs, universities, NFPA Fire Analysis, volunteers
- Advisory Oversight: *Project Technical Panel*
  - Typically small (6 to 15)
  - Meet at important stages of project (start/end/other)

www.NFPA.org/Foundation

HANDOUT: ESRAC Overview

HANDOUT: Project Idea Form

Project Idea Form available in the "Research Fund" section at: www.nfpa.org/Foundation

Foundation Operating Principles

Available at: www.nfpa.org/Foundation

Foundation Operating Principles (used for project acceptance)

The following principles are used for evaluating the acceptance of Foundation projects.

Note: The Foundation reserves the right to not accept any project.

- Promote the engagement, proliferation and diversity of credible research
- Build broad research capabilities with a large network of contributors and collaborators
- Communicate and support the dissemination of research results, especially with practitioners
- Be consistent with the "Research Foundation Policies for the Conduct of Research Projects"
- Facilitate research projects that have at least one of the following characteristics:
  - Be of focused interest to the broad safety community,
  - Be of focused interest to a SDO (standards developing organization) technical committee or similar constituency group,
  - Be directly related to an out-reach or advocacy issue, or
  - Not involve proprietary product development.

Operating Principles: Clarifies what the FPRF does…

RESEARCH FOUNDATION

Foundation Vetting Criteria

Available at: www.nfpa.org/Foundation

Foundation Vetting Criteria (used for project prioritization)

The following vetting criteria are used for evaluating Foundation project priorities.

- Technical and Scientific Value: The value-added from a technical and scientific standpoint, and the positive benefits from the perceived societal impact.
- Problem Magnitude: The magnitude of the problem as compared to overall mission of NFPA and/or its influence on applicable activities (e.g., the respective standard document).
- Time Criticality: The consideration of timing issues that directly impact the value of the outcomes.
- Feasibility: The likelihood of success for Foundation engagement on the project, considering factors such as the uniqueness of the Foundation's position, availability of funding, etc.
- Strategic Research Agenda: The positioning of the topic in relation to overarching research guidance such as strategic research agendas.

Vetting Criteria: Clarifies how the FPRF prioritizes projects…

RESEARCH FOUNDATION

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RESEARCH FOUNDATION

FOUNDATION REPORTS: www.nfpa.org/foundation

RESEARCH FOUNDATION

Fire Resistance of Concrete for Electrical Conductors

Once completed, report will be available at: www.nfpa.org/Foundation

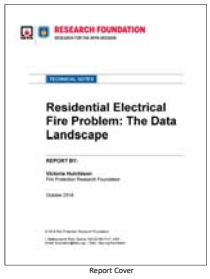
Report Table of Contents

Project Summary

RESEARCH FOUNDATION

Residential Electrical Fire Problem: The Data Landscape

Report available at: www.nfpa.org/Foundation



Report Cover

Project Summary

RESEARCH FOUNDATION

Evaluation of Electrical Feeder and Branch Circuit Loading: Phase 1

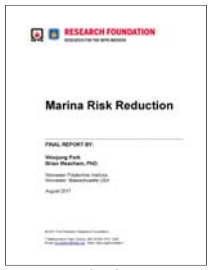
Report available at: www.nfpa.org/Foundation

Report Cover

Project Summary

Marina Risk Reduction

Report available at: www.nfpa.org/Foundation



Report Cover

Project Summary

Power over the Ethernet

Reports available at: www.nfpa.org/Foundation

Proceedings Cover

Proceedings Cover

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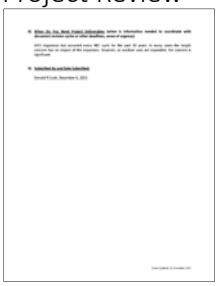
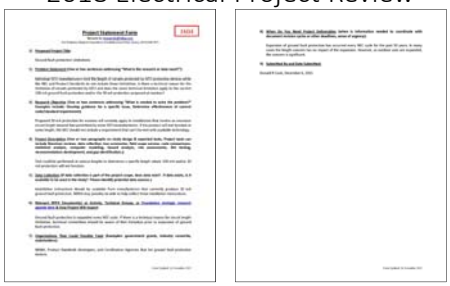
2018 Electrical Project Review

2018 Electrical Project Review



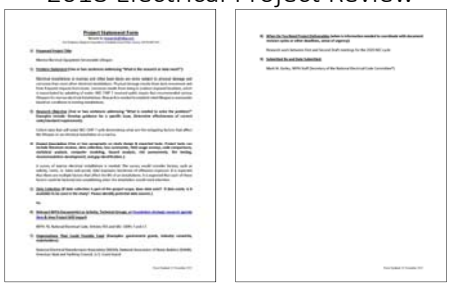
GFCI Limitations

2018 Electrical Project Review



Ground Fault Protection Limitations for Marinas

2018 Electrical Project Review

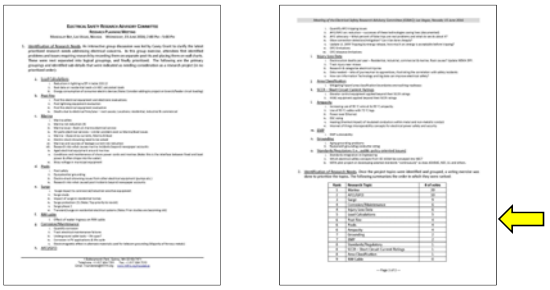


Marina Electrical Equipment Serviceable Lifespan

2018 Electrical Project Review

Pool Corrosion

ESRAC Research Priorities 2016



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Spotlight on PoE Activities: An Update

--- Power over the Ethernet ---

- Within NFPA:
  - Initial Focus: NEC®, NFPA 72®, NFPA 730/731
  - Installation documents, e.g., NEC®, NFPA 3/4, NFPA 72®, NFPA 79, NFPA 730/731, & more…
  - Occupancy documents, e.g., NFPA 75, NFPA 76, NFPA 99, NFPA 101, & more…
  - Process documents, e.g., NFPA 85, NFPA 86, & more…
  - Other NFPA Documents?
- Beyond NFPA with other organizations…

Spotlight on PoE Activities: An Update

--- Research Roadmap for Smart Fire Fighting ---

Project Report available on the NIST and Foundation websites

e.g., www.nfpa.org/SmartFireFighting

Spotlight on PoE Activities: An Update

--- Smart Home Summit ---

www.nfpa.org/Foundation

Smart Home Summit

20-21 October 2015; Palo Alto, California

Spotlight on PoE Activities: An Update

--- Power over the Ethernet ---

- Durham Workshop
  - University of New Hampshire
  - October 2017; Durham NH
  - Goal: facilitate a research planning effort for the consideration of concepts involving Power over the Ethernet (PoE), to identify and prioritizes knowledge gaps and recommend next steps and action items in support of the applicable codes and standards.

Durham Workshop Proceedings at: www.nfpa.org/Foundation

Spotlight on PoE Activities: An Update

--- Power over the Ethernet ---

- Summary Observations (Oct 2017)
  1. Regulatory Coordination
  2. Key Technical Issues
  3. Research and Data
  4. Training, Education and Awareness

Spotlight on PoE Activities: An Update

--- Power over the Ethernet ---

- PoE Summit: Next Steps
  - NFPA C&E
  - June 2018; Las Vegas NV
  - Goal: to leverage information from attendees and from previous meetings to clarify actionable steps to facilitate full consideration of PoE cabling in modern infrastructure while maintaining established levels of safety.

PoE Summit Proceedings at: www.nfpa.org/Foundation

Spotlight on PoE Activities: An Update

--- Power over the Ethernet ---

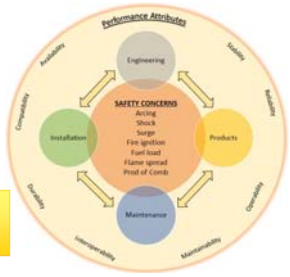
- Summary Observations (Jun 2018)
  1. Vision
  2. Training, Education and Awareness
  3. Regulatory Coordination
  4. Research and Data

Spotlight on PoE Activities: An Update

--- Power over the Ethernet ---

- Need to support/evolve emerging technologies
- But… we need to:
  - Maintain the present safety infrastructure focus, i.e., safety concerns
  - Respect performance attributes for fire alarm communication

In the face of emerging technologies with great promise, is the present "Safety Infrastructure". It is well-established with a deep history, built on painful lessons of the past.



Spotlight on PoE Activities: An Update

--- Key Fundamental Principles ---

Possible Key Fundamental Principles being considered by NFPA 72, National Fire Alarm Code

1) **System goals and objectives**:
   a) Sensing and Detecting a Hazard: Fire, Smoke, Haz Mat Event, Active Shooter, etc.
   b) Notifying and Directing Occupants: Egress, Shelter in Place, etc.
   c) Notifying and Directing Emergency Responders: Hazard, Building Conditions, Occupant Location, etc.
2) **Key safety concerns**:
   a) Electrical: Arcing, Shock, Surge, etc.
   b) Fire: Ignition, Fuel Load, Flame Spread, Products of Combustion, etc.
3) **Key performance attributes**:
   a) Availability: Ability to be obtained.
   b) Compatibility: Ability to co-exist with similar equipment.
   c) Durability: Ability to last.
   d) Interoperability: Ability to function on a common platform with similar equipment.
   e) Maintainability: Ability to be serviced.
   f) Operability: Ability to function.
   g) Stability: Ability to not introduce problems.
   h) Reliability: Ability to perform as expected.

DRAFT

AGENDA

ESRAC: Electrical Safety Research Advisory Committee

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4) Facilitated Discussion to Identify Key Fundamental Principles for PoE
5) **Facilitated Discussion to Identify Specific Action on Marinas & Pools**
6) Identification and Prioritization of Other NEC Related Research
7) Meeting Summary, and Adjournment

Marina Risk Reduction

Report available at: www.nfpa.org/Foundation

Report Cover

Project Summary

AGENDA

ESRAC: Electrical Safety Research Advisory Committee

1) Welcome, Introductions, Preliminaries & Background
2) Review of Active and Recently Completed Projects
3) Review of Previously Proposed Research Activity
4) Facilitated Discussion to Identify Key Fundamental Principles for PoE
5) Facilitated Discussion to Identify Specific Action on Marinas & Pools
6) **Identification and Prioritization of Other NEC Related Research**
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ESRAC Research Priorities 2016

Rank	Research Topic	# of votes
1	Marinas	20
2	AFCI/GFCI	10
3	Surge	9
4	Corrosion/Maintenance	6
4	Injury Stats Data	6
5	Load Calculations	5
6	Pool Fire	4
6	Pools	4
6	Ampacity	4
7	Grounding	2
7	EMP	2
8	Standards/Regulatory	1
8	SCCR - Short Circuit Current Ratings	1
8	Arms Classification	1
9	NM Cable	0

AGENDA

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RESEARCH FOR THE NFPA MISSION

RESEARCH FOUNDATION
RESEARCH FOR THE NFPA MISSION

Thank You

Contact Information:

Casey Grant
Fire Protection Research Foundation

One Batterymarch Park, Quincy, MA USA 02169-7471
Email: cgrant@nfpa.org

www.nfpa.org/Foundation

RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

Project Idea Form

Instructions:

- This form is intended to gather project ideas from our stakeholders. It is not an application for a research grant. The consideration and implementation of all project ideas will be in accordance with FPRF Policies, Operating Principles, and Vetting Criteria.
- By submitting this form to the FPRF, the submitter acknowledges that the Foundation may conduct a research project by issuing an open request for proposals for a project contractor in accordance with the FPRF Policies (unless waived in certain circumstances).
- This project idea form may be considered for the Research Fund selection process. For more information about the Research Fund evaluation process, please visit www.nfpa.org/NFPAresearchfund.
- To submit a research project idea, complete all fields below and send to research@nfpa.org.

1) Proposed Project Type (Select all that apply):

- ☐ Small Project (e.g. Literature Review, Gap Analysis, Code Comparisons, Loss Summaries)
- ☐ Large Project (e.g. Fire Testing, Computer Modelling, Field Surveys, Risk Assessments)
- ☐ Concept from NFPA Technical Committee
- ☐ Research Planning Meeting (e.g. Workshop)
- ☐ Other, please specify:

2) Proposed Project Title (75 characters or less):

3) Problem Statement (One or two sentences addressing "What is the problem?" Examples include: New/Emerging technology, Lack of technical substantiation or guidance) (750 character limit):

4) **<u>Research Objective</u> (One or two sentences addressing "What is needed to solve the problem?" Examples include: Develop guidance for a specific issue, Determine effectiveness of current code/standard requirement) (750 character limit):**

5) **<u>Project Description</u> (One or two paragraphs describing how to achieve the objective, including expected tasks. Project tasks can include literature reviews, data collection, loss summaries, field usage surveys, code comparisons, statistical analysis, computer modeling, hazard analysis, risk assessments, fire testing, recommendation development, and gap identification.) (3000 char. limit):**

6) **Data Collection (If data collection is part of the project scope, does data exist? If data exists, is it available to be used in the study? Please identify potential data sources.) (750 character limit)**

7) **Impact of Project Deliverables on relevant NFPA Document(s) (500 character limit):**

8) **Organizations That Could Possibly Fund (Examples: government grants, industry consortia, stakeholders) (500 character limit):**

9) **When Do You Need Project Deliverables (when is information needed to coordinate with document revision cycles or other deadlines, sense of urgency) (100 characters):**

10) **Submitted By and Date Submitted:**

Point of Contact

Name:

Organization:

Email:

2018 NFPA Research Fund Review - Electrical

Reviewer: Combined List

Rating = 1 to 5 (5 is highest); Rank = 1 to 12

	ID#	Title	Technical Relevance	Magnitude	AVERAGE Sense of Urgency	Success Liklihood	Total		OVERALL RANK	
4	**1604**	GFCIs in Marinas	4.9	5.0	4.8	4.6	19.3	✓	**2.6**	✓
11	**1880**	Marina Elec Equip Harvesting	4.6	4.7	4.7	4.5	18.6	✓	**3.5**	✓
1	**1601**	Modelling Shock in Water	4.8	4.8	4.5	4.1	18.1	✓	**3.8**	✓
8	**1803**	Residential Electrical Fire Data	4.5	4.5	4.3	3.9	17.2	✓	**3.9**	✓
3	**1603**	GFCI Limitations	4.6	4.0	4.0	4.6	17.2	✓	**4.0**	✓
12	**1881**	Pool Corrosion	3.8	3.6	3.2	3.9	14.4	!	**5.9**	!
5	**1623**	Interoperability	3.3	3.3	3.3	3.3	13.2	!	**7.0**	!
2	**1602**	Low Voltage Cable Impedence	2.8	3.3	3.0	3.0	12.2	✗	**8.4**	!
7	**1719**	Fire Resistance Rating of Concrete	3.3	2.5	2.1	3.6	11.4	✗	**8.6**	✗
9	**1813**	Arc Flash Modelling	4.4	4.1	4.1	4.1	16.8	!	**8.7**	✗
6	**1718**	Elec Grounding in O2 Atmosphere	3.0	2.7	2.7	3.3	11.8	✗	**9.5**	✗
10	**1821**	Power Transmission Anti Icing	2.6	2.4	2.3	2.5	9.8	✗	**10.1**	✗
		Additions:								
	1819	Hospital Energy Use					0.0			
		Hospital Lighting					0.0			
		Power Over the Ethernet					0.0			
		Adoption Protocol Summary					0.0			
		Equipment Supports for FF Acccess					0.0			

Comments:

Note: Ranking based on review at ESRAC Meeting on 13/Jan/2018, with 21 forms returned.

1601	(1) Applicable to any body of water covered by the NEC; (2) Too many deaths
1602	(1) Questionable outcome impact
1603	(1) Important to expanded requirements
1604	(1) Assess solutions to urgent problem; (2) Too many deaths
1623	(1) Keep NEC/NFA 72 ahead of curve
1718	(1) Not urgent NEC topic
1719	(1) Issue seems to have had reduced discussion
1803	(1) Important to moving AFCI &GFCI protection; (2) Are AFCI's effective? (3) May require longer time frame;
1803	(4) Set-up data acquisition going forward; Have much more granularity; Include AFCI & GFCI information
1813	(1) Scope creep to IEEE/NFPA project
1821	(1) More utility oriented
1880	(1) Related to #1604; (2) Too many deaths;
1880	(3) Most important issue to address, and no one else will; People are dying
1881	(1) Electricity / water interface

ELECTRICAL SAFETY RESEARCH ADVISORY COMMITTEE

RESEARCH PLANNING MEETING

MANDALAY BAY, LAS VEGAS, NEVADA WEDNESDAY, 15 JUNE 2016; 2:00 PM – 5:00 PM

1. Identification of Research Needs. An interactive group discussion was led by Casey Grant to clarify the latest prioritized research needs addressing electrical concerns. In this group exercise, attendees first identified problems and issues requiring research by recording them on separate post-its and placing them on wall charts. These were next separated into logical groupings, and finally prioritized. The following are the primary groupings and identified sub-details that were indicated as needing consideration as a research project (in no prioritized order):

    a. Load Calculations
        i. Reduction in lighting w/SF in table 220.12
        ii. Real data on residential loads v/s NEC calculated loads
        iii. Energy consumption of consumer electric devices (Note: Consider adding to project on branch/feeder circuit loading)
    b. Post Fire
        i. Post fire electrical equipment and electronic evaluations
        ii. Post lightning equipment evaluation
        iii. Post fire electrical equipment evaluation
        iv. Deaths due to electrical fires/year – root causes; Locations: residential, industrial & commercial
    c. Marina
        i. Marina safety
        ii. Marina risk reduction (4)
        iii. Marina issue – Boat v/s marina electrical service
        iv. RV parks electrical services – similar problem exist as Marina/Boat issues
        v. Marina – Zipse stray currents, Marina & Boat
        vi. Electric shock drowning need to be solved
        vii. Marinas and sources of leakage current risk reduction
        viii. Research into what causes marina incidents beyond newspaper accounts
        ix. Aged electrical equipment around marinas
        x. Conditions and maintenance of shore power cords and marinas (Note: this is the interface between fixed and boat power & often drape into the water)
        xi. Stray voltage in municipal equipment
    d. Pools
        i. Pool safety
        ii. Equipotential grounding
        iii. Electro-shock drowning issues from other electrical equipment (pumps etc.)
        iv. Research into what caused pool incidents beyond newspaper accounts
    e. Surge
        i. Surge impact to commercial/industrial sensitive equipment
        ii. Surge study
        iii. Impact of surge in residential homes
        iv. Surge protection (3) (Note: Top priority to revisit)
        v. Surge phase 2
        vi. Transient/surge on residential electrical systems (Note: Prior studies are becoming old)
    f. NM cable
        i. Effect of water ingress on NM cable
    g. Corrosion/Maintenance
        i. Quantify corrosion
        ii. Track electrical maintenance failures
        iii. Underground cable tasks – life span?
        iv. Corrosion in PV applications & life cycle
        v. Electromagnetic effect in alternate materials used for telecom grounding (Majority of ferrous metals)
    h. AFCI/GFCI

i. Quantify AFCI tripping issues
ii. AFCI/GFCI arc reduction – successes of these technologies saving lives (documented)
iii. AFCI advocacy – What percent of false trips are real problems and what do we do about it?
iv. Glow connection detection/mitigation? Can it be done cheaply?
v. Update UL 1699 Tripping by energy release, how much arc energy is acceptable before tripping?
vi. GFCI limitations
vii. GFCI distance limitations

i. Injury Loss Data
   i. Electrocution deaths per year – Residential, industrial, commercial & marine. Root causes? Update NEMA 5PP.
   ii. Track injury near misses
   iii. Research & categorize electrical injuries
   iv. Data needed – ratio of journeyman to apprentices, illustrating the correlation with safety incidents
   v. How can Information Technology and big data can improve electrical safety?

j. Area Classification
   i. Mitigating hazard area classification boundaries encroaching roadways

k. SCCR – Short Circuit Current Ratings
   i. Elevator control equipment applied beyond their SCCR ratings
   ii. HVAC equipment applied beyond their SCCR ratings

l. Ampacity
   i. Increasing use of 90 °C wire at its 90 °C ampacity.
   ii. Use of 90 °C cables with 75 °C logs
   iii. Power over Ethernet
   iv. EGC sizing
   v. Heating (thermal impact) of insulated conductors within metal and non-metallic conduit
   vi. Internet of things interoperability concepts for electrical power safety and security

m. EMP
   i. EMP vulnerability

n. Grounding
   i. Aging grounding problems
   ii. Equipment grounding conductor sizing

o. Standards/Regulatory (i.e., public policy oriented issues)
   i. Standards Integration in Engineering
   ii. Which electrical safety concepts from IEC 60364 be conveyed into NEC?
   iii. NFPA pilot project on developing selected standards "continuously" as does ASHRAE, NSF, UL and others.

2. Identification of Research Needs. Once the project topics were identified and grouped, a voting exercise was done to prioritize the topics. The following summarizes the order in which they were ranked:

Rank	Research Topic	# of votes
1	Marina	20
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