

2010 PCIC Annual Conference Safety Subcommittee Meeting Agenda

Tuesday, September 21, 2010
Marriott Conf. Rooms 3 & 4
3:30 pm – 5:00 pm

Agenda

- Welcome
- Safety Subcommittee Officers
- PCIC Safety Excellence Award
- Membership Update
- 2009 Subcommittee Meeting Minutes
- IEEE Email Alias
- Outstanding Technical Contribution Award
- IEEE IAS Electrical Safety Workshop
- IAS/PCIC Conferences and Workshops
- Electrical Safety Websites

Agenda Continued

- ESFI
- National Electrical Code
- Standards and Regulation Activity
- 2010 Safety SC Paper Presentations
- 2011 Safety SC Paper Proposals
- Case Study: Electrical Emergency Response Drill
- Adjourn
- Reference Websites

Safety Subcommittee Officers

■ Chair	Kevin Lippert	Eaton
■ Vice-Chair	Paul Sullivan	DuPont
■ Secretary	Ed Larsen	Square D/ Schneider Electric

- The officers positions will change after the 2010 Conference.
- Kevin Lippert will finish his term. Paul Sullivan will become the Chair, and Ed Larsen will become the Vice-Chair.
- Ilan Balasubramanian will assume the incoming Secretary position.

PCIC Safety Excellence Award

- The PCIC Safety Excellence Award is used to recognize individuals for

"outstanding dedication and contributions made to advance and accelerate the dispersion of information and knowledge impacting electrical safety through activities within and outside the Petroleum and Chemical Industry Committee".

PCIC Safety Excellence Award

- The past award recipients are
 - 1999 H Landis Floyd II
 - 2000 L. Bruce McClung
 - 2001 Ray A. Jones
 - 2002 Satish Chaparala
 - 2003 Mary Capelli-Schellpfeffer
 - 2004 Danny Liggett
 - 2005 Bill Jordan
 - 2006 David Pace
 - 2008 Tom Neal
 - 2009 Shahid Jamil

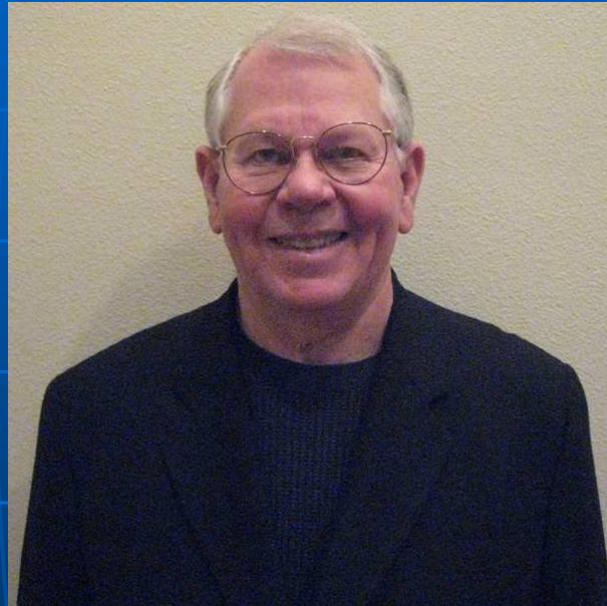
PCIC Safety Excellence Award

The recipient for 2010 has been:

- Chair of the IEEE PCIC Safety Subcommittee
- Chair of the 2004 IEEE IAS Electrical Safety Workshop
- Vice-chair of the working group for the 2007 revisions to IEEE 463 "Standard for Electrical Safety Practices in Electrolytic Cell Line Working Zones".
- Member of NFPA 70E Technical Committee "Standard for Electrical Safety in the Workplace."
- Member of the IEEE 1584 committee for the "Guide for Performing Arc Flash Calculations."
- Author and presenter of numerous IEEE papers and tutorials on electrical safety at PCIC, Pulp & Paper Conference and the Electrical Safety Workshops
- In industry for over 40 years
- Mentor, resource and friend to many here today!

PCIC Safety Excellence Award

- The recipient for 2010 is:



**Daryld Ray Crow
Congratulations!**

PCIC Safety Excellence Award

- We are now accepting nominations for the 2011 Safety Excellence award.
- An email will be sent to all PCIC Safety Subcommittee members with the nomination information.
- A link to the form will be posted in the Safety Subcommittee section of the PCIC website.
- Nominations are due by October 31, 2010.

Reference Websites

- There are several websites that are available to provide you good electrical resource information or other useful information.
- Those websites are at the end of this presentation.
- This presentation will be available at the PCIC Safety Subcommittee website after the conference.
<http://www.ieee-pcic.org/subcommittees/safety.html>

Membership Update

- A copy of the Safety Subcommittee roster is being circulated.
- Please initial by your name, and check the block for willingness to do paper reviews.
- If you are not a member of the Safety Subcommittee, we invite you to become one. Please provide your name at the end of the rosters. All other info comes from the PCIC member database.
- If any changes during the year, update your information at the Update Member Information link on the PCIC website.

<http://www.ieee-pcic.org/subcommittees/membership/memberupdate.html>

2009 Safety Subcommittee Meeting Minutes

- The 2009 Safety Subcommittee meeting minutes were distributed by email to Safety Subcommittee members and posted on the Safety Sub-Committee page of the PCIC Website.

<http://www.ieee-pcic.org/subcommittees/safety.html>

- Any additions/corrections?
- Motion to approve?

IEEE Email Alias

- Get an IEEE email alias for FREE
- Emails automatically virus scanned
- IEEE “one-stop shopping” for updating Email address
- Get your email alias at the following website

<http://eleccomm.ieee.org>

PCIC Outstanding Technical Contribution (OTC) Award

- PCIC is accepting nominations for the 2011 OTC award and requests the Safety SC submit a nomination.
- An email will be sent to all PCIC Safety Subcommittee members with the nomination information.
- The form will be posted in the Safety Subcommittee section of the PCIC website.
- Nominations are due back to one of the Safety SC officers by October 31, 2010.

Electrical Safety Workshop

Subcommittee Meeting



San Antonio PCIC - 2010

- **Subcommittee Officers**
 - Danny Liggett - chair
 - David pace - Vice-Chair
- **Current Roster - 47**

Electrical Safety Workshop Subcommittee Meeting



San Antonio PCIC - 2010

Mission of the Subcommittee

- To support and provide long-term planning for the IEEE IAS Electrical Safety Workshop that facilitates advancements in electrical safety.

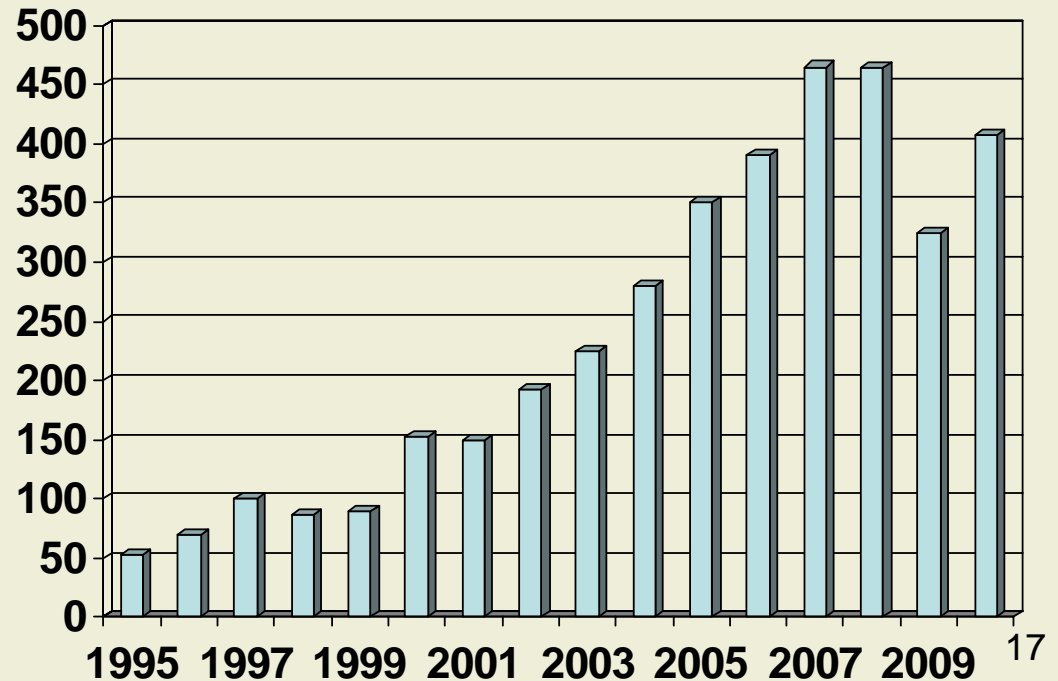
Electrical Safety Workshop

Subcommittee Meeting



San Antonio PCIC - 2010

- **History of the Workshop**
 - Attendance



Electrical Safety Workshop

Subcommittee Meeting



San Antonio PCIC - 2010

- **ESW 2010 - Memphis - Joe Rachford (Chair)**
 - February 1-5, 2010
 - 407 in Attendance
 - Keynote Presentations
 - Jeff Espenship - Target Leadership
 - Dr Mary Capelli-Schellpfeffer
 - 23 Papers
 - 4 Tutorials

Electrical Safety Workshop

Subcommittee Meeting



San Antonio PCIC - 2010

- **ESW 2011 - Toronto - Eva Clark (Chair)**
 - January 24-28, 2011
 - Sheraton Centre
 - Keynote Speakers:
 - Darryl Hill, PhD, CSP
 - VP Safety & Health, ABB
 - President-American Society of Safety Engineers
 - Dr. Joel Fish, MD, MSc, FRCS(c)
 - Chief Medical Officer, St. John's Rehab Hospital

Electrical Safety Workshop

Subcommittee Meeting



San Antonio PCIC - 2010

- **ESW 2012 - Dennis Neitzel**
 - Destination Unknown
 - Somewhere South & Warm
 - Contract being Negotiated

Electrical Safety Workshop

Subcommittee Meeting



San Antonio PCIC - 2010

- **Future Workshops**
 - 2013 ESW - PCIC Chicago
 - 20th Anniversary
 - 2014 ESW - PCIC San Francisco
 - 2015 ESW - PCIC Houston

IAS/PCIC

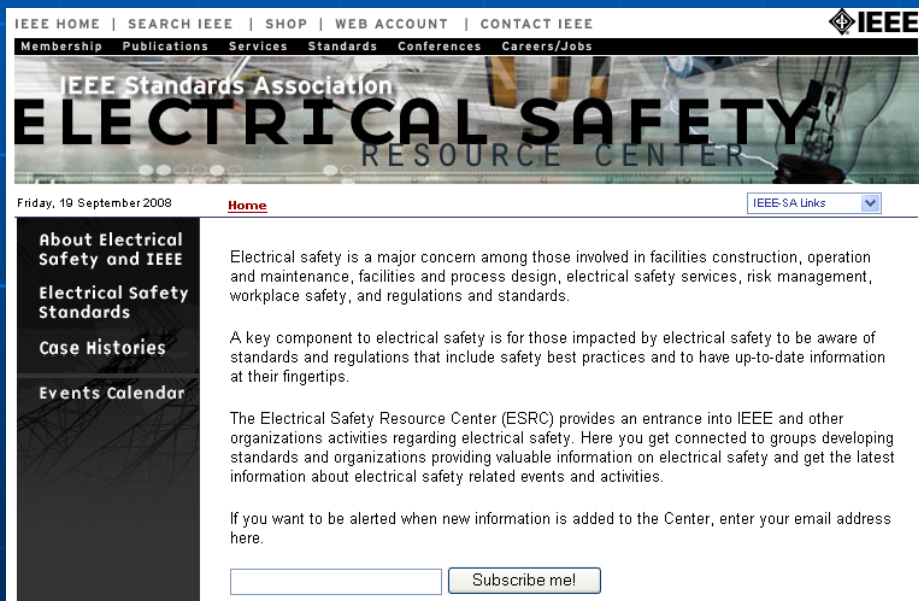
Conferences and Workshops

- **Other Conferences and Safety Workshops**
 - **2010 Electrical Safety, Technical, and Mega Projects Workshop – Mar 29-31, Calgary**
<http://ewh.ieee.org/soc/ias/tmp/>
 - **2010 PCIC Europe, June 15-17 Oslo, Norway**
http://www.pcic-europe.eu/g3.cms/s_page/61830/s_name/pcic2010welcometooslo
 - **2010 IAS Meeting, October 3-7, Houston**
<http://www.ewh.ieee.org/soc/ias/2010/>

Electrical Safety Websites

■ Electrical Safety Resource Center

<http://standards.ieee.org/esrc>



IEEE HOME | SEARCH IEEE | SHOP | WEB ACCOUNT | CONTACT IEEE

Membership Publications Services Standards Conferences Careers/Jobs

IEEE Standards Association

ELECTRICAL SAFETY

RESOURCE CENTER

Friday, 19 September 2008 [Home](#) IEEE-SA Links

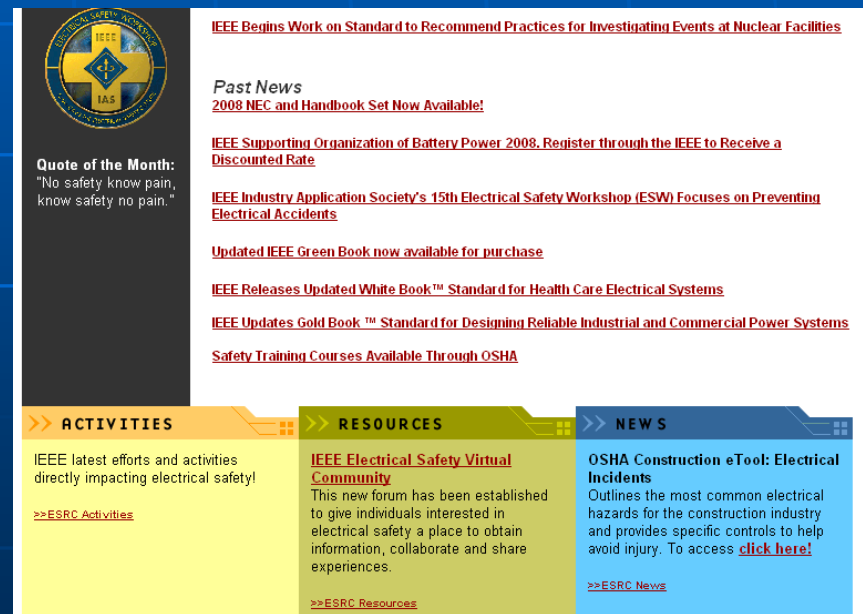
- About Electrical Safety and IEEE
- Electrical Safety Standards
- Case Histories
- Events Calendar

Electrical safety is a major concern among those involved in facilities construction, operation and maintenance, facilities and process design, electrical safety services, risk management, workplace safety, and regulations and standards.

A key component to electrical safety is for those impacted by electrical safety to be aware of standards and regulations that include safety best practices and to have up-to-date information at their fingertips.

The Electrical Safety Resource Center (ESRC) provides an entrance into IEEE and other organizations activities regarding electrical safety. Here you get connected to groups developing standards and organizations providing valuable information on electrical safety and get the latest information about electrical safety related events and activities.

If you want to be alerted when new information is added to the Center, enter your email address here.



IEEE Begins Work on Standard to Recommend Practices for Investigating Events at Nuclear Facilities

Past News
2008 NEC and Handbook Set Now Available!

IEEE Supporting Organization of Battery Power 2008. Register through the IEEE to Receive a Discounted Rate

IEEE Industry Application Society's 15th Electrical Safety Workshop (ESW) Focuses on Preventing Electrical Accidents

Updated IEEE Green Book now available for purchase

IEEE Releases Updated White Book™ Standard for Health Care Electrical Systems

IEEE Updates Gold Book™ Standard for Designing Reliable Industrial and Commercial Power Systems

Safety Training Courses Available Through OSHA

Quote of the Month:
"No safety know pain,
know safety no pain."

ACTIVITIES

IEEE latest efforts and activities directly impacting electrical safety!

[>>ESRC Activities](#)

RESOURCES

IEEE Electrical Safety Virtual Community
This new forum has been established to give individuals interested in electrical safety a place to obtain information, collaborate and share experiences.

[>>ESRC Resources](#)

NEWS

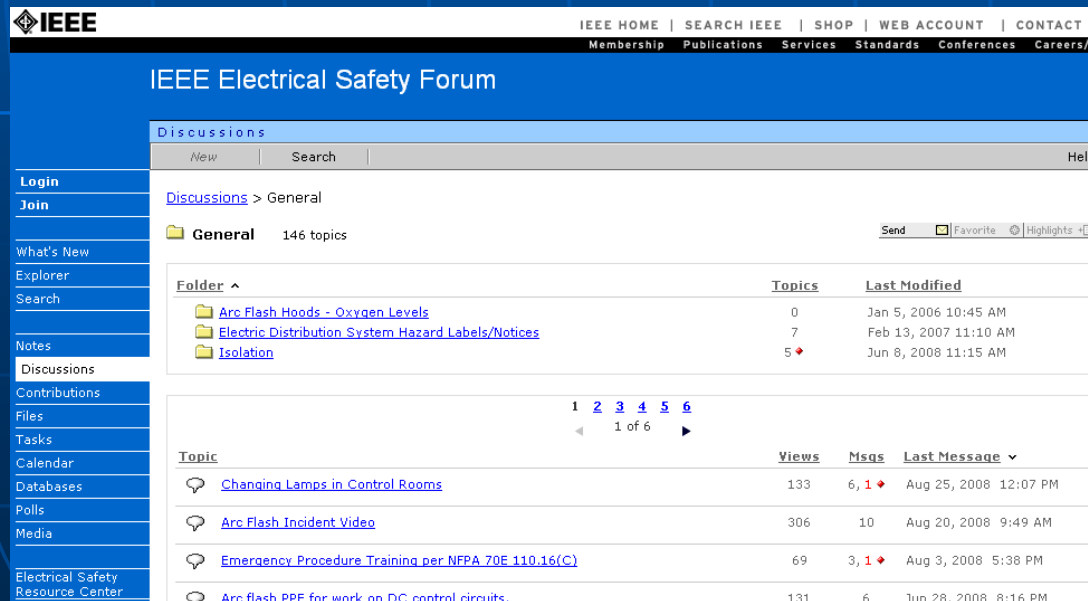
OSHA Construction eTool: Electrical Incidents
Outlines the most common electrical hazards for the construction industry and provides specific controls to help avoid injury. To access [click here!](#)

[>>ESRC News](#)

Electrical Safety Websites

- IEEE SA Electrical Safety Forum
 - Virtual Communities
 - Online 24/7 Electrical Safety Community

http://ieeecommunities.org/ieee.esafety?invitation_key=410-F78D0DB86C



The screenshot displays the IEEE Electrical Safety Forum interface. At the top, there is a navigation bar with links for IEEE HOME, SEARCH IEEE, SHOP, WEB ACCOUNT, and CONTACT IE. Below this, the forum title 'IEEE Electrical Safety Forum' is shown. The main content area is titled 'Discussions' and includes a search bar and a 'Help' link. The current view is for the 'General' folder, which contains 146 topics. A table lists the folders and their respective topic counts and last modified dates:

Folder	Topics	Last Modified
Arc Flash Hoods - Oxygen Levels	0	Jan 5, 2006 10:45 AM
Electric Distribution System Hazard Labels/Notices	7	Feb 13, 2007 11:10 AM
Isolation	5	Jun 8, 2008 11:15 AM

Below the folder list, there is a pagination control showing '1 of 6' pages. The main forum listing table shows the following topics:

Topic	Views	Msgs	Last Message
Changing Lamps in Control Rooms	133	6, 1	Aug 25, 2008 12:07 PM
Arc Flash Incident Video	306	10	Aug 20, 2008 9:49 AM
Emergency Procedure Training per NFPA 70E 110.16(C)	69	3, 1	Aug 3, 2008 5:38 PM
Arc flash PPE for work on DC control circuits.	131	6	Jun 28, 2008 8:16 PM

ESFi - Electrical Safety Foundation International

- Mission: To reduce electrical injuries and deaths through education
- Information on Home, School and Workplace electrical safety
- Several items available as FREE downloads
- Promoter of Electrical Safety Month in May of each year

<http://www.esfi.org>

National Electrical Code

- The 2011 edition of the NEC is scheduled to be available in September 2010.
- The deadline for proposals for the 2014 edition is November 4, 2011.

Standards and Regulations Activity

- NFPA 70E
- IEEE 1584
- IEEE/NFPA Arc Flash Research Project
- IEEE 463, Electrical Safety Practices in Electrolytic Cell Line Work Zones
- IEEE P1716, Managing Natural Disaster Impact
- IEEE P1814, Electrical System Design to Improve Electrical Safety
- IEEE P1683, Standard for Motor Control Centers Rated up to 1000 volts with Requirements Intended to Reduce Injuries
- Incident Data Collection, Fax Anonymous Registry (FAR) Project

<http://www.capschell.com/FARProject1999.htm>

2010 Safety Subcommittee Technical Session Presentations

- Session # 1 (Held earlier today)
- Tuesday, September 21
- 8:30am to 11:30am
- Salon K

2010 Safety Subcommittee Technical Session 1 Presentations

- Testing PPE for Arc Hazard Protection - IEC 61482-1 Test Rig Evaluation Including Proposed Changes
 - David Sweeting , Sweeting Consulting
- A Step Closer Towards Maintenance Free Gear
 - David Loucks – Eaton Corporation

2010 Safety Subcommittee Technical Session 1 Presentations

- Focused Evolution of an Electrical Safety Culture
 - James Mitchem, TIC Industrial
 - Mark Cross, TIC Southeast
 - Daryld Ray Crow, DRC Consulting, Ltd.

2010 Safety Subcommittee Technical Session Presentations

- Session # 2
- Wednesday, September 22
- 8:30am to 11:30am
- Salon M

2010 Safety Subcommittee Technical Session 2 Presentations

- **Arc Flash Hazards with Electric Fire Pump Installations**
 - Richard Holub , DuPont Engineering
 - Dan Doan , DuPont Engineering
 - Robert Anderson, DuPont Engineering
- **Mitigating Electrical Shock and Arc Flash Energy - A Total System Approach for Personnel and Equipment Protection**
 - Daleep Mohla – DCM Electrical Consulting Services, Inc
 - Tim Driscoll – OBIEC Consulting Ltd.
 - Paul Hamer – Chevron Energy Technology Co.
 - Sergio Panetta – I-Gard Corp.

2010 Safety Subcommittee Technical Session 2 Presentations

- Measuring Performance of Your Electrical Safety Program by Audit
 - Terry Becker, ESPS Electrical Safety Program Solutions
 - Robert Neish, Shell Canada Energy

- Attend these presentations to learn something and show support for these authors.

2011 Safety Subcommittee Technical Session Proposals

- The following are the proposed Safety Subcommittee papers for 2011.

Arc Flash Calculations using a physics based circuit model		Ballot #: 12 66F7B62475
<u>Author(s)</u>	<u>Company</u>	
Thomas F. Papallo	GE Plainville, CT, USA	

Arc Flash calculations in the IEEE 1584™, "IEEE Guide for Performing Arc Flash Calculations" calculate the Arcing Current and the Incident Energy using logarithmic curve fit equations. These equations are the results of a regression analysis of multiple arc flash tests and describe the Arcing Current and Incident Energy over the full range of Bolted Fault Currents. But these equations are a multiple variable fit to the test data. Multiple papers have been presented with many circuit models to represent the arc in the electrical circuit. This paper will present a circuit model of the arc then derive the Arcing Currents and Incident Energy as a function of the physical circuit parameter, the Arc Voltage. The model presented also fits the non-linear behavior of the Arc Voltage and Arcing Current over the entire range of bolted fault currents. The arc voltage model is then related to the single parameter, the gap the arc is between. Having an accurate arcing model has a second advantage. It allows the electrical energy during an event to be calculated specifically for the energy associated with the arc. This solution then allows calculation of the energy based on the event let through characteristics. The implication of this result is very powerful. This model implies that the IEEE Arcing Currents are in fact based on a physical circuit model dependent only on the real parameters. These real parameters are independent of current and are functions only of the gap.

Safety Toronto 2011 PCIC Proposal

2010 Paper Carry-over

- Arc-Flash Protection for Low- and Medium-Voltage Panels
 - Geraldo Rocha - Schweitzer Engineering Labs
 - Eduardo Zanirato - Schweitzer Engineering Labs
 - Fernando Ayello - Schweitzer Engineering Labs
 - Roberto Taninaga - Schweitzer Engineering Labs

Case Study – Electrical Emergency Response Drill

Paul B. Sullivan
DuPont

Safety Subcommittee Meeting

2010 Petroleum and Chemical Industry Committee Technical Conference

San Antonio, TX - September 20-22, 2010



Purpose

- **The purpose of this case study is to:**
 - **share an experience of an electrical emergency response drill performed at a medium-sized manufacturing facility**
 - **provide some key learnings that you can use at your facility**

Background

- **Site was a medium-sized facility that included:**
 - **Powerhouse**
 - **Compressed air, heat transfer fluid heating systems, steam generation, electricity generation**
 - **Manufacturing**
 - **Spinning machines, extrusion equipment, chemical processes**
 - **Support Areas**
 - **Offices, water and waste treatment, maintenance facilities**

Background

- **Site had program in place to perform quarterly emergency response drills**
- **Drills focused on processes and systems other than electrical**
 - **Steam, heat transfer fluids**
- **Management felt drills effectively tested the emergency preparedness of site personnel**

Background

- **Site had own emergency response teams**
 - **First responders**
 - 24 hour coverage
 - **Medical**
 - Doctor, nurse (weekday only)
- **Site fire station, fire trucks, ambulance**
- **Designated Incident Command Center**
 - Primary – Site Fire Station
 - Secondary – Conference room



Corporate Requirement

- **Corporate Electrical Safety Management standard published**
- **Include mandatory requirement to perform mock electrical injury emergency drills**
 - **New requirement**

Site Drill Implementation

- **Site Electrical Safety Team worked with site Safety personnel to develop electrical emergency scenario**
- **Chose to create scenario to test several aspects of the site emergency response system**
 - **Not just electrical response**
- **Scenario kept secret except for 4 personnel**
 - **Better evaluation of actual response**

Scenario

- **Fault in indoor 15kV metal-clad switchgear while racking a circuit breaker**
 - Located in Powerhouse
 - 1950's equipment
- **Fault shutdown power to one unit substation**
- **Two individuals involved in incident**
 - Electrician #1 – Performing racking task
 - Electrician #2 – Stand by person

Scenario

- Personnel were wearing full arc flash personal protective equipment



- Electrician #1 to be unconscious on floor
 - Sign stating unconscious and electrical burns
- Electrician #2 uninjured and calling for help

Scenario

- **Unit substation outage caused the following**
 - **Lights in substation equipment room turned off**
 - **Fire Station lost power**
 - **Shutdown and locked out power to Fire Station before scenario started**
- **Electrician #1 to be replaced by “dummy” once rescue is complete**
 - **Allows fire responders to practice CPR**

Results

- **Emergency responders took 20 minutes to enter electrical equipment room**
 - **Unsure who to ask for permission to enter room**
 - **General uncertainty of what to do and how to respond**
 - **Lights were off in room**
 - **Lots of standing around**



Results

- **Emergency responders performed well once they reached Electrician #1**
 - **Good response techniques**
 - **Standard training prepared them for response to patient**



Results

- **Primary Incident Command Center was not available**
 - **Fire Station without power**
 - **Could not initially open Fire Station garage doors**
 - **Emergency lighting**
 - **Did not last 90 minutes**
 - **Did not function**
 - **Not installed in needed locations**
 - **Personnel not prepared**

Results

- **Secondary Incident Command Center**
 - **Uncertainty as to location of secondary Incident Command Center**

 - **Could not operate communications equipment in room**
 - **Elaborate system of controls on wall**
 - **No instructions**
 - **No practice**

- **Site changed emergency response procedures to address inadequacies identified in drill**

Key Learnings

- **Schedule an emergency response drill for your facility**
 - Choose realistic scenario
 - Keep scenario details knowledge to few people
- **Objectively evaluate results of the drill**
 - Look for improvement opportunities
 - Speed is important, but must have safe scene
- **Implement changes to address opportunities**

For more information...

- **NFPA 70E – *Standard for Electrical Safety in the Workplace***
 - **Section 110.6(C) – Training Requirements – Emergency Procedures**
 - **Annex I – Job Briefing and Planning Checklist**
- ***Emergency Response, Emergency Drills, and Electrical Safety* – John D. Aeiker – 2008 IEEE ESW**
- ***A Primer on Emergency Response for Electrical Safety Professionals* – John D. Aeiker – 2009 IEEE ESW**

Questions?



Final Slide

- Any other business for now or 2011?
- Adjourn

Thanks for coming!

Reference Websites

- **PCIC Safety Subcommittee**
<http://www.ieee-pcic.org/subcommittees/safety.html>
- **IEEE Membership Updates**
<http://www.ieee-pcic.org/subcommittees/membership/memberupdate.html>
- **IEEE Email Alias**
<http://elecomm.ieee.org/>
- **IEEE Electrical Safety Workshop**
<http://www.ewh.ieee.org/cmte/ias-esw/>
- **IEEE Electrical Safety Resource Center**
<http://standards.ieee.org/esrc>
- **IEEE Electrical Safety Forum**
http://www.ieeecommunities.org/ieee.esafety?invitation_key=410-F78D0DB86C

Reference Websites

- ESFi – Electrical Safety Foundation International
<http://www.esfi.org>
- NIOSH – National Institute for Occupational Safety & Health
<http://www.cdc.gov/niosh/>
- OSHA – Occupational Safety & Health – Overhead Power Lines Website
<http://www.osha.gov/Region7/overheadpowerlines/index.html>
- Electrical Contractors Industry Standards
<http://www.osha.gov/SLTC/electricalcontractors/standards.html>