

**EFCOG Electrical Safety Subgroup
Teleconference Minutes
May 15, 2013**

Attendees:

Chad Replogle	ORNL	Mike Hicks	DOE INL
Max Wright	Pantex	Greg Christensen	INL
Jackie McAlhaney	SRS	David Inskeep	INL
Todd Kujawa	Jefferson Labs	John Whipple	INL
Jerald Kinz	Hanford	Doug Coffland	LLNL
Mazen Al-Wazani	DOE – Richland WA	John Pearson	ORISE
Mark Scott	LBNL	Roger Kulavich	Y12
Heath Garrison	NREL	Bill Lowry	NETL
Marc Williams	SNL	Bobby Gray	K25
Brian Sautter	SRS	Nasser Dehkordi	PNNL
Paul Chapman	Y-12	Ajit Gwal	DNFSB
Doug Stickney	SLAC	Bob Eason	ORNL
William Reed	ICP	Joe Kilar	ANL
Richard Waters	INL	Michael Phillips	ICP
Pat Tran	DOE HS-12	Joyce Arviso-Benally	DOE – SFO
George Powell	NTS	Gary Dreifuerst	LLNL
Bobby Sparks	PNNL	Shane Knox	Pantex
Y.T. Wang	DOE/NNSA	Peter Foster	DNFSB
Stephen Crow	CHPRC/RL	Mike Utes	Fermilab
John Lacenere	PPPL		

Minutes

The meeting was called to order at 9: 00 by Greg Christensen.

1. Fall workshop – Greg/Jackie Greg reviewed actions to date. Noted that an agenda was established. HV distribution working group does not have a leader yet. Speakers for workshop have been identified. James Stallcup will lead the tutorial on the 2014 NEC; Tuesday will be speakers, Wed-Thursday is working groups; tours will be available if there's interest on Friday. There will be no registration cost.
 - a. Proposed working groups - Leaders
 - i. Hazardous energy control –Marc Williams
 - ii. DC systems – Gary Dreifurst
 - iii. Uniform AHJ Policy – Doug Coffland, Joe Kilar
 - iv. High voltage distribution (1910.269) - TBD
 - v. Compensatory Measures for Conditions of Maintenance of OCPDs -Greg Christensen
 - vi. Electrical Severity Tool Standard (ISA) – Mike Hicks
 - b. Registration page - Heath noted that there is a Marriot within walking distance of the site that offers government rates, and anyone planning to attend should make reservations as soon as possible. Lloyd is working on the registration page. Heath needs to have an idea of who is coming to arrange badging.

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2. Recent Events

- a. Arc Hood O₂/CO₂ issue – Greg Christensen – work while wearing an arc flash hood resulted in an oxygen-deficient atmosphere (16%) inside the hood that resulted in dizziness to the worker. The site limited hood wearing to 3-5 minutes. Ajit Gwal noted that 40 cal PPE has been in use for a long time, and wondered why this hasn't been an issue before. Greg noted that there have been some heat stress concerns with the hoods, but no known O₂ deficient concerns. One person asked about the impact of altitude on the effects. Greg did not believe that there were any negative impacts on someone who was acclimated to the altitude. Some manufacturers are aware of the issues, and Salisbury has developed a hood with a vented face shield, which can be flipped up. . Greg noted that only 40 cal hoods were looked at. The INL IH noted that this is first time research of this type was conducted, so the results should be used carefully... The text of the preliminary report is included at the end of these minutes.
 - b. Doug Coffland reviewed a fire at LLNL. A fire occurred in Building 322 at LLNL. Apparently, the fire occurred because a heated cleaning tank was allowed to evaporate to a level where the heater could overheat and the temperature detector failed to shut down the power as designed. An incident analysis team is currently investigating the incident to determine the exact cause and make recommendations for how to prevent it from happening again.
3. NFPA 70E 2015 June meeting – Mark McNellis/Bobby Gray: The 2nd revision meeting is scheduled for June 24, all comments are closed. Bobby noted that there were 213 comments, many around the 50/100 volt issue. Bobby also said that if he has the information on the flash hood concern, he could perhaps get a TIA in at the June 24 meeting. Bobby noted that he received the comments today, and will provide a summary to the group.
 4. ESMT updated to align with 70E 2012 – Mike Hicks: The revision is complete, and Rev 3 is posted at BP 48 on EFCOG website. Work now is to move to an ISA standard format to submit for approval. Greg noted that he was on a conference call with the EFCOG executive committee. He was asked the status of moving the tool to conform to the occurrence reporting criteria. Greg replied that our responsibilities were completed, and that the ORPS committee now has responsibility.
 5. DOE ES HDBK-1092 REVCOM process closed – Pat Tran “The end is in sight”. An approval memo was developed last week to ask for approval of document. Pat Worthington concurred with it and it's on the way to Glenn Podonsky's office. Anticipated completion by June 7, then will go to the technical center manager who will post it.
 6. Mazen Al-Wazani – concern with what is required to be listed or approved. OSHA lists equipment that has to be listed, and some sites believe that because the equipment is not specifically called out in the OSHA regulations, that testing and measurement equipment and power tools are exempt from the listing. Bobby discussed some history of the OSHA standard (subpart S) – original

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requirements were for the 29CFR 1910 301-308, and suggested that one could make an argument that equipment outside distribution equipment may not need to be listed. General consensus was to add this to the working group this fall. See Interpretation of Aug 26 2003. Greg requested that we table the discussion for today, and work out details for the fall conference.

7. Monthly Events - Skip Searfoss Skip is working on a separate issue but was unable to provide information today. Greg discussed our concerns about tracking events and the importance of that to the executive committee. Ajit Gwal asked if Skip identified when he would be available again. Greg noted that EFCOG was not happy about the situation. Mike Hicks said that the reports will be issued, but will be issued late. There is not a timeframe for when he will be working this issue.
8. Other – Nasser Dehkordi (PNNL) stated that his concern is that it virtually impossible to follow the requirements to test GFCI receptacles monthly as required, and 70E should add a risk based approach to testing GFCI where it's not possible to do the test on a monthly basis. Bobby Gray noted that the requirement was based on the UL standard, and any change should be to the UL standard, not to NFPA 70E. Bobby suggested that we should develop a variance request to exempt DOE from testing requirements under certain conditions. Extended discussion occurred around whether or not it should be accomplished, and when, if the hazard was greater to test (on a roof, for example), the GFCI should be tested. General consensus was to add a working group, or add topic into another working group for the fall conference. The executive committee will evaluate the placement.

O₂/CO₂ Issue with Arc Flash Protection Hoods

Issue: While working in Salisbury Pro-Hood 40 cal/cm² Arc Flash Protection Hoods (Model FH40GY), electrical technicians experienced dizziness and increased respiration rates.

An industrial hygiene investigation was initiated and testing indicated breathing zone O₂ concentrations dropping to 18.7% within 20 seconds of donning the hoods without increased activity or level of effort. Testing was then performed to determine oxygen and CO₂ concentrations during increased activity levels in a controlled environment utilizing a treadmill at 2-2.5 mph with a 2-2.5% incline. Four tests were conducted and the results indicated O₂ levels decreasing to approximately 16% after approximately 5 minutes.

Testing was then performed on a treadmill with the same parameters at 2-2.5 mph with a 2-2.5% incline. utilizing blowers (Salisbury Pro air ACAIR2000) inside the arc flash hoods. Testing included two different configurations. One configuration routed the air blowing up over the head inside the hardhat, the other routed the air around the side of the head with the outlets at the temples. Airflow was measured for each configuration. Noise/vibration was barely perceptible. With the single outlet on top of the head inside the hardhat, the corrected volumetric flowrate was 5.6 cfm. With the two outlets at the temples, the corrected total volumetric flowrate was 5.0 cfm.

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In both cases the oxygen levels improved over the previous tests, however, they still dipped below 19.5%. The lowest oxygen level observed over a 10 minute period was 19%. The levels fluctuated but remained between 19% and 20.9%. The delta in the CO₂ change was lower with a 400 ppm increase without the blowers and a 260 ppm increase with the blowers but still well below the TLV-TWA.

Temperatures inside the hood were relatively constant and unaffected inside the hood. The individual with whom the testing was performed felt more comfortable despite a temperature reading of between 80 - 83 degrees inside the hood, which was comparable to the temperature without the blower.

It was concluded, O₂ levels decrease and CO₂ levels increase to unacceptable levels when there is no blower assist over time. With a blower, the O₂ and CO₂ levels are improved and considered to be acceptable. At 19% oxygen, there should be no physiological effects in healthy adults. Limiting conditions include; breathing problems, cardio-pulmonary issues, heat stress, and demanding physical tasks. Work from ladders should be carefully monitored and alternatives such as the use of an aerial lift considered as a risk reduction measure.

Work may be performed with conventional hoods without manufacturer approved air supply system if the work is of short duration (i.e., breaker manipulations and zero energy verification). Wearing a hood for a short duration is defined as requiring the use of an arc flash protective hood for approximately 3 to 5 minutes.

Arc Flash Protection Hoods worn for extended periods (i.e., testing and repair work) should be equipped with a manufacturer approved air supply system designed to provide fresh oxygen to the worker. Examples include the Salisbury Pro-Air ACAIR2000, or an Arc Flash Protection Face Shield, designed to provide fresh airflow while the hood's face shield is in the deployed position, such as the Salisbury AS1200HAT.