

**NPEC Subcommittee SC-3, Operations, Surveillance, and Testing
Meeting S00-1
Tuesday, February 2, 2000
San Antonio, TX**

Attendance

Members Present:	Brij Bhartery Lamis Fleischer Dave Horvath Henry Leung	John Taylor Jit Vora Paul Colaianni
Members Absent:	Millard Allen George Bellassi Jerry Edson Wayne Johnson	Sonny Kasturi Steve Parsons Doug Thomas Carl Weary
Other Attendees:	Paul Shemanski	Craig Bertolett Wally Colvin

1. Introduction and Opening Remarks

All in attendance introduced themselves and their affiliation. Secretary John Taylor opened the meeting and announced that Sonny Kasturi had stepped down as SC-3 Chair and that Dave Horvath had agreed to be the new Chair.

John Taylor reviewed the agenda (see Attachment 1) and then turned the meeting over to the new Chair, Dave. The agenda was reviewed and approved.

It was noted by the Chair and Secretary that we did not hold a subcommittee meeting in 1999; the reasons being budgetary constraints and a lull in standards activity. However, standards activity is picking up, as is general industry activity in areas related to SC-3's scope, i.e., license renewal and maintenance rule related activities.

Jit Vora expanded on these points by stating that industry efforts have shifted from designing and building nuclear power plants to operating, maintaining, and testing them and as a result, SC-3 should recognize its importance and potential value to the industry and play a more active role.

2. Secretary's Report

A. S98-2

The most recent prior meeting for the entire subcommittee was held on October 14, 1998 in San Antonio. The minutes from this meeting (S98-2) were adopted by acclamation. Although no formal subcommittee meetings were held in 1999, John Taylor noted that a teleconference was

held among the Chair (Sonny Kasturi), Secretary, and Working Group Chairs in March 1999 in lieu of a formal meeting. The notes from this conference call are included as Attachment 2.

B. Action Item Status

There were no open action items from the previous meeting. The new action items that were added are:

Item No.	Description	Status
AI00-1-1	J. Taylor to contact non-active SC-3 members.	Open
AI00-1-2	D. Horvath to notify NPEC's Chair (Brit Grim), Secretary (Neil Smith), and Liaison to IEEE Standards Board (Mark Zar) of this change in WG numbers.	Open
AI00-1-3	P. Colaianni to develop an action plan to satisfy NPEC goal: Develop and Improve Standards to Support Life Extension and License Renewal.	Open
AI00-1-4	D. Horvath to send out NPEC list of responsible IEEE Standards and status for revision, affirmation, or withdrawal	Open
AI00-1-5	Paul Shemanski (WG-3.4) to confirm acceptability of the SC-3 meeting S00-2 location and date and to provide information on potential meeting locations to the SC-3 Secretary John Taylor.	Complete
AI00-1-6	D. Horvath to contact IEEE regarding adding all eligible SC-3 members to the ballot pool for revision of IEEE 323.	Complete: See end of Section 6.

C. Alligator Fund

The Alligator Fund is made up of voluntary contributions from SC-3 members to defray the cost of meeting rooms, refreshments, etc. The balance after S00-1 is \$130.

D. Membership Table

A discussion was held on membership. It was noted that a few members had not shown for two years; they will be dropped from the SC-3 membership pending their response to a communiqué. Action Item AI00-1-1 was assigned for John Taylor to contact these non-active members. It was also noted that there were many new members in the subcommittee, which is refreshing. Henry Leung was unanimously voted in as a member. It was further recommended that the working groups continue to meet in conjunction with the subcommittee, to allow more working group members to attend the subcommittee meeting.

A combined SC-3 and working group roster is included as Attachment 3.

3. Chair's Report

Dave Horvath reiterated guidelines for SC-3 membership:

- All subcommittee members must be contributing at the Working Group level, or be a subcommittee officer.
- Unless approved by the subcommittee as an exception, missing two meetings in a row will be sufficient grounds for being dropped from SC-3 membership.
- Attendance and participation at a minimum of two Work Group meetings will be required prior to consideration for SC-3 membership.

A. NPEC Activities (see Attachment 4)

NPEC is planning to restructure in 2000:

- SC-8, Quality Maintenance and Improvement, will merge into SC-3, Maintenance, Surveillance, and Testing.
- SC-7, Human Factors and Control Facilities, will merge into SC-5, Reliability.

In the spirit of restructuring, Dave noted that SC-3 had a confusing, non-sequential numbering of working groups because of dropped standards. After some discussion, it was moved and approved that the existing working groups are to be renumbered as follows:

- WG-3.0, Periodic Testing, will become WG-3.1.
- WG-3.7, Security, will become WG-3.2.
- WG-3.3 will be left for the new possible quality assurance contingent.
- WG-3.4, Aging Assessments, will remain unchanged.

AI00-1-2 was assigned to Dave Horvath to notify NPEC's Chair (Brit Grim), Secretary (Neal Smith), and Liaison (Mark Zar) to IEEE Standards Board of this change in WG numbers.

In response to a self-assessment, NPEC identified six improvement goals. Goal No. 6, "Develop and Improve Standards to Support Life Extension/License Renewal," was assigned to SC-3. Action to achieve this goal was appropriately assigned to WG-3.4 and Paul Colianni was assigned AI00-1-3 to develop an action plan for WG-3.4 to use to satisfy the NPEC goal.

Jit Vora requested that NPEC's list of responsible standards and their status for revision, withdrawal, or affirmation be sent out to SC-3 members to keep them informed. D. Horvath accepted this action AI00-1-4.

B. Future Meeting Locations

It was decided that the next SC-3 and working group meetings would be held tentatively October 16-18, 2000 in Annapolis, MD. The subcommittee will meet October 17; WG-3.2 and WG-3.4 will meet October 16 and WG-3.1 will meet October 18. Further details will be determined upon confirmation of the acceptability of the meeting location and date.

Paul Shemanski (WG-3.4) has AI00-1-5 to confirm acceptability of the meeting location and date and to provide information on potential meeting locations to the SC-3 Secretary John Taylor.

4. Working Group Reports

Note: WG numbers are per new designation.

A. WG-3.1 Periodic Testing

The working group met on February 3, 2000. The balloting process for reaffirmation of IEEE Standard 338-1987 had one negative vote regarding a review of changes to referenced standards and their impact on IEEE Standard 338. The working group developed a plan to address this comment. For the future revision of IEEE 338, NPEC has asked that the working group consider risk significance in the criteria for determining test frequency.

B. WG-3.2 Security

The working group met on February 2, 2000. Two new members were added and others are sought. One of the new members (Craig Bertolett) is a member of and will act as liaison to the Illuminating Engineering Society, International (IESI). Several unresolved IESI comments from the previous revision of IEEE 692 will be addressed as part of the upcoming revision. These unresolved comments were in the area of nuclear station security lighting requirements (e.g., what the lighting levels should be and how they should be measured). Potential conflicts with 10 CFR 73 could occur and for this reason, NRC representation on this working group is being requested.

C. WG-3.4 Aging Assessments

The revision to IEEE Standard 1205 has been successfully balloted by NPEC; it will be sent to RevCom in two months and will likely be published this year. The balloting statistics were 37 total, 29 returned, 28 affirmative, 1 negative (resolved). During the previous day's WG meeting, an approach was agreed to with the negative balloter such that he is changing his ballot to affirmative. Jit Vora commended WG-3.4 for doing an excellent job on this revision. Jit also noted that IEEE Standard 1205 has been added as a reference in the NRC Generic Aging Lessons Learned (GALL) tables.

5. NRC Liaison Report

Jit Vora presented the NRC Liaison Report, which is included as Attachment 5. The important points are highlighted below:

- 5KV power cable failure at Davis Besse
- Generic Aging Lessons Learned (GALL) tables. These tables evaluate existing documents regarding their support of aging management.
- Failure of low voltage I&C cable in the NRC EQ Research Program activities at Brookhaven National Laboratory.

6. SC-3 Role in the Process for Standard Review and Ballot

Some SC-3 members had requested that SC-3 role be clarified. In order to explain SC-3's role, Dave Horvath first explained the IEEE hierarchy and its matrix organization. IEEE is composed of 36 technical societies, each with its own governing board and president. The three largest technical societies are Computer, Power Engineering, and Communications and these three cover the vast majority of IEEE's over 300,000 members. Also at approximately the same level as a technical society is the IEEE Standards Association (SA).

The Power Engineering Society (PES) has 18 standards committees, which report both to the PES Vice President of Technical activities and to the SA Standards Board. One of these 18 committees is the Nuclear Power Engineering Committee (NPEC), which has technical responsibility for all nuclear power plant electrical standards (currently almost 50 standards).

NPEC has eight (soon to be six) subcommittees to cover 1. administration and the seven technical topics of 2. qualification; 3. operations, surveillance, and testing; 4. auxiliary power; 5. reliability; 6. safety systems; 7. human factors and control facilities; and 8. quality maintenance and improvement. And Subcommittee 3 (SC-3) is responsible for three working groups as described earlier in the minutes.

The IEEE-SA Standards Board has several committees -- the two most relevant to SC-3 being the New Standards Committee (NesCom) and Standards Review Committee (RevCom).

NesCom is responsible for approving (*in advance* of any work) all projects to create a new standard or revise one.

RevCom is responsible for final approval of new or revised standards (*after* they are completed and balloted) as well as to give final approval of reaffirmation or withdrawal of any standards.

For more information on PES and SA, see <http://www.ieee.org/organizations/society/power/> and <http://standards.ieee.org/board/index.html>, respectively.

Given this above hierarchy and matrix of reporting relationships, the process to revise a standard can be summarized from SC-3's perspective as follows:

- The responsible working group and its chair prepare a project authorization request (PAR). The PAR is the method by which IEEE approves the commitment of volunteer resources to the task or project of revising a standard or developing a new one. Examples of information on the PAR include name of the working group and its chair (also called official reporter), the purpose and scope of work, schedule, and which entities have coordination review responsibilities. This form is available electronically at http://standards.ieee.org/resources/glance_at_forms.html. Note there are two "purposes" and "scopes": the first is for the standard in general and the second is specifically for the revision project.
- SC-3 chair reviews the PAR and attempts to catch and correct common errors prior to review by NPEC. Although not required, the SC-3 chair may choose to involve the entire SC-3 in

the review of the PAR (e.g., for training purposes or to address a proposed controversial revision scope)

- NPEC's AdCom (SC-1) reviews and provides comments or approves the PAR and submits to NesCom
- NesCom reviews and approves the PAR or provides comments.
- Upon approval of the PAR, the working group prepares a draft revision and receives concurrence within the group on the content. Typically Draft 1 (and maybe 1a, 1b, 1c, etc) is at the WG level. Guidance for writing standards are found in the Style Manual (<http://standards.ieee.org/guides/style/index.html>) and the Standards Companion (comes with the starter kit provided after the PAR is approved). Also a lot of guidance is now at <http://standards.ieee.org/faqs/>
- Next the working group previews Draft 2 to SC-3 and requests feedback. The draft version it is SC-3's responsibility to assure that the draft and presentation are of acceptable quality that the subsequent preview to NPEC goes smoothly. Incorporation of any feedback from SC-3 will typically result in Draft 3.
- WG Chair previews to NPEC but must submit draft version electronically to committee members at least a month in advance of the meeting. At this meeting, a formal motion is made to allow ballot of the draft standard revision.
- With NPEC's approval to ballot, the WG Chair is permitted to submit a hard copy (it may be Draft 3 or 4 at this point depending on levels of comments received during the preview) with transmittal letter (summarizing the changes in the revision) to the ballot group. The draft version to be balloted and letter are sent to IEEE standards staff who make the copies and do ballot distribution. The ballot group consists of NPEC members and any other interested parties who are both IEEE and SA members and have expressed an interest
- For the ballot to be successful it is necessary for at least 75% of the ballot group to return their ballots and 75% of the returned ballots must have voted affirmative.
- The working group must next resolve comments. If any significant changes to the draft result from comment resolution or if any unresolved negatives remain, a recirc ballot is necessary to assure no others wish to change their ballot vote.
- Finally, the successfully balloted draft is submitted to RevCom with a completed *Form for Submittal of Proposed Standards*. Guidance for completing this form and an electronic version are available at <http://standards.ieee.org/guides/revguide.html>.

Attention was also called to a private area on the IEEE website reserved for NPEC and its various subcommittee and working group's use. The location is password protected. At this location can be found NPEC's Organization and Procedure Manual as well as various meeting announcements and minutes. It is hoped that at some point in the near future SC-3 and its various working group meeting minutes can also be posted. The following instruction apply:

- Point browser to <http://grouper.ieee.org/groups/npec/index.html>
- Click on *NPEC Subcommittee and Working Group Area* at the bottom of the page
- Enter User Name: [REDACTED]
- Enter Password: [REDACTED] (This may eventually change to [REDACTED])

As a result of this discussion, the SC-3 members in attendance requested that SC-3 (because of mutual interests) be allowed to ballot the next revision of IEEE Standard 323. Dave Horvath was assigned AI-00-1-6 to pass this request to IEEE.

[AI-00-6 Resolution after the SC-3 meeting: Any IEEE and SA member can request consideration for addition to the NPEC ballot group by completing the form at <http://standards.ieee.org/db/balloting/ballotform.html> It may be advantageous to add a comment at the bottom of the form that the request is for IEEE 323 only if appropriate. One can then confirm the success of this approach (if so inclined) by contacting IEEE staff: Michael Binder @ 732-562-5540 or Carol Buonfiglio 732-562-3834.]

7. New Business

Power cable issues were covered in Item 5. No other new business was raised.

The meeting was adjourned.

Prepared by

John Taylor

List of Attachments

1. Agenda
2. SC-3 March 1999 Teleconference Call
3. SC-3 Member Roster
4. Chair's NPEC Report
5. NRC Liaison Report by Jit Vora

Attachment 1

IEEE SUBCOMMITTEE 3 MEETING S00-1 2/2/2000, SAN ANTONIO, TEXAS AGENDA

1. Introduction
 - New Chair- J. Taylor
 - Opening Remarks- D. Horvath
 - Meeting Agenda - D. Horvath
2. Secretary's Report- J. Taylor
 - S98-2 Minutes
 - Action Item Status
 - Alligator Fund
 - SC-3 Membership
3. Chair's Report- D. Horvath
 - NPEC Activities
 - Future Meeting Locations
4. Working Group Reports
 - WG-3.1 (was 3.0) Report (Std 338 affirmation and future revision) - D. Horvath
 - WG-3.4 Report (1205 significant ballot comments and status) - P. Colaianni
 - WG-3.2 (was 3.7) Report (Plans for Std 692 revision) - D. Horvath
5. Liason Reports
 - NRC- J. Vora
6. SC-3 Role for Standard Review and Ballot - D. Horvath
7. New Business
 - Power Cable Issues- J. Vora
 - What Else?

Attachment 2

IEEE SC-3 Teleconference March 17, 1999

Members: Sonny Kasturi, John Taylor, Dave Horvath, and Brij Bhartey

Summary

STD 1205: Draft 1 sent to WG 2.0, Draft 2 sent to NPEC, SC-3, and WG 3.4. NPEC preview/permission to ballot at NPEC member WG 3.4 meeting set for 4/14-15/99 in San Antonio.

STD 338

Reaffirmation process started, form filled out and submitted to Naeem Ahmed, at IEEE headquarters in New Jersey. Brig Bhartey will send follow-up e-mail to check status.

Next Meeting

Postpone decision on summer meeting until after NPEC preview by Dave Harvath. S99-2 is tentatively targeted for the July-August time frame. Suggestions for locations and accommodations are appreciated.

Attachment 3

IEEE - NUCLEAR POWER ENGINEERING COMMITTEE SUBCOMMITTEE SC-3 MEMBERSHIP LIST OPERATIONS, SURVEILLANCE, AND TESTING

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Attachment 3

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Attachment 3

IEEE - NUCLEAR POWER ENGINEERING COMMITTEE WORKING GROUP 3.1 MEMBERSHIP LIST PERIODIC TESTING OF SAFETY SYSTEMS STANDARD IEEE STD 338

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Attachment 3

IEEE - NUCLEAR POWER ENGINEERING COMMITTEE WORKING GROUP SC-3.2 MEMBERSHIP LIST SECURITY SYSTEMS STANDARD IEEE-692

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Attachment 3

**IEEE - NUCLEAR POWER ENGINEERING COMMITTEE
WORKING GROUP 3.4 MEMBERSHIP LIST
ASSESSING, MONITORING, AND MITIGATING AGING EFFECTS
ON NPGS EQUIPMENT
STANDARDS: IEEE - 1205**

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Attachment 3

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Attachment 4

Report on Recent NPEC Activities to SC-3 Meeting 00-1 Wednesday, February 2, 2000

NPEC Meeting 99-2 was in Seattle on October 25-26, 1999. Highlights are below:

1. NPEC will restructure in 2000:
 - SC-8 (*Quality Maintenance & Improvement*) will fold into SC-3 (*Maintenance & Testing*)
 - SC-7 (Human Factors and Control Facilities) will fold into SC-5 (Reliability)

2. There is a strong desire to reduce the time it takes to revise a standard from 5 - 6 years to 2 - 3 years similar to what is being achieved by the Standards Coordinating Committees (SCCs).

3. Activities are continuing in response to a self-assessment review conducted in Denver at the 99-1 meeting. This assessment resulted in 35 ideas for improvement and out of these 35, 6 were prioritized into Goals for action. Goal Number 6 was assigned to SC-3. It is:

Develop/improve standards to support life extension/license renewal (action to be completed by the NPEC Meeting 00-1 is to look at how to make this goal measurable and develop schedule).

4. NPEC Ad Hoc Committee is being formed to address the issue of developing a standard practice for third party dedication of I&C equipment and the associated software. The EPRI document is considered impractical and a great amount of variability exists between utilities as to what is acceptable. RFI/EMI is part of the issue.. First meeting will be at the MPR offices in DC on Tuesday February 8, 2000 and it is being coordinated by Jim Thomas (MPR).

5. Next NPEC Meeting (00-1) will be in Key Largo, FL March 7-8, 2000 and NPEC Meeting 00-2 will be in Washington, DC Nov. 14-15, 2000.

Prepared by:

David A. Horvath
SC-3 Chair

Attachment 5

IEEE SC-3, Operations, Surveillance and Testing

LIAISON REPORT

J. P. VORA

Office of Nuclear Regulatory Research

The following topics and activities would be of interest:

- Failure of Class 1 E Buried Cables

On December 3, 1999, NRC issued a Priority Attention Request Morning Report on "Failure of 5KV Cable in Underground Conduit." (See the attachment). A key element of the event or issue is, "how to monitor/evaluate the current condition and performance integrity of inaccessible or buried cable systems and detect degradation, if any, prior to failure?"

- Development of Generic Aging Lessons Learned (GALL) Report in Support for License Renewal
The intent of the GALL report is to evaluate existing programs generically to document the basis for determining when existing programs are adequate without change and when existing programs should be augmented for license renewal. The GALL report would be referenced in the Standard Review Plan (SRP) as a basis for determining the adequacy of existing programs. GALL report builds on a previous report, NUREG/CR-6490, "Nuclear Power Plant Generic Aging Lessons Learned (GALL)," which is systematic compilation of plant aging information. Significant information was derived from Nuclear Plant Aging Research (NPAR) program. The Chapter VI of the GALL report is dedicated to Electrical Components within the scope of license renewal. The components listed are: A. Electrical Cables B. Electrical Connectors. C. Electrical Penetration Assemblies D. Electrical Buses E. Electrical Insulators F. Transmission Conductors G. Ground Conductors. For each component information is developed for giving credits to Existing Aging Management Programs. Details are provided on Materials, Environment, Aging Effect and Aging Mechanisms. Further, references to relevant IEEE Standards including Std. 1205 are provided.

- Failure of Low-Voltage I&C Cables With Bonded Jacket During Loss-of-Coolant Accident (LOCA) Tests

In support for the resolution of GSI-168, "Environmental Qualification (EQ) of Electric Equipment" RES is conducting a series of LOCA tests on low-voltage I&C cables at Wyle Laboratories. The tests involve new, artificially aged and naturally aged samples of cables. Artificially aged cables are aged to simulate 20, 40 and 60 years of service. Cable types selected are representative of approximately 70% of the cables in-service today. They are both single conductor and multi-conductor configuration and involve bonded and unbonded jacket types of cables.

During the week of January 10, 2000, the fifth of the six planned LOCA tests was completed. During the initial portion of steam exposure, no anomalies were observed. At the 15 hour point, when chemical spray was initiated, leakage current were noted for the three Okonite specimens aged to 40 years of equivalent service. Subsequently, these cables failed during the voltage withstand tests per IEEE Std. 383. Degradation of the jacket materials was noted after the artificial aging of the cables.

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Similar failures were observed in 1992 LOCA tests performed at Sandia National Laboratories. At that time all 10 of the Okonite-Okolon cables had failed. An Information Notice (IN 92-81) was issued to alert licensees on potential deficiencies of electric cables with bonded jacket. The Sandia results led the staff to initiate a Task Action Plan to review EQ in detail and to the prioritization of GSI-168. Staff efforts to resolve this GSI are ongoing and will be completed by December 2000.

Attachment 5

PRIORITY ATTENTION REQUIRED

MORNING REPORT HEADQUARTERS date

Licensee/Facility:

FirstEnergy
Davis-Besse 1
Oak Harbor, Ohio
Docket: 50-346
PW R/B&W-R-LP

Notification:

MR Number: H-99-xxxx
Date: 12/xx/99

Subject: FAILURE OF 5KV CABLE IN UNDERGROUND CONDUIT

On October 2, 1999, the #2 component cooling water (CCW) pump tripped at the Davis-Besse Nuclear Generating Station. The supply breaker tripped as a result of a phase-to-ground fault on a 3-phase power cable. The safety-related Okonite cable consists of three twisted 2/0 single conductors with a bare #4 copper ground. The insulation on each 2/0 cable consists of ethylene-propylene-rubber (EPR) insulation, a wrapped semiconductor tape, a tinned copper tape shield, and a neoprene jacket (which is painted to identify the phases as black, red, and white). The cable was installed in a 4-inch pvc conduit that runs partially underground from the switchgear room in the turbine building to the CCW pump room, and had been in service for about 23 years.

The licensee removed the cable and sent it to the corporate laboratory for a root cause analysis. Part of the laboratory evaluation was observed by a vendor representative from Okonite and NRC staff. The appearance of the cable showed severe corrosion of the bare copper ground conductor and cracking of the neoprene outer jacket, particularly in the areas where the cable laid in the low point of the conduit run and would be most susceptible to standing ground water. Although a conclusive root cause has not been determined, it appears that the most likely degradation mechanism is intrusion of ground water into the cable over a period of time. Although this cable is water resistant, it is not water proof, and over time water can permeate through the EPR insulation by the process of osmosis.

The licensee plans on performing as-found Doble power factor testing and partial, discharge testing of the CCW Pump 1 and CCW Pump 3 cables in January, 2000, before replacing them. Those cables will then be inspected to determine if similar degradation has taken place. If similar degradation has occurred on those cables, the licensee may inspect and test other safety-related cables that are installed in underground conduits.

The NRC is interested in this cable failure because there are potential generic implications for cable failures caused by aging at other nuclear power plants. Three 5-kV cables and two 15-kV cables in underground conduits experienced failures at Diablo Canyon between 1989 and 1993 (see LER 50/275 93-005-01). The 15-kV cable failures were attributed to chemical attack but no positive root cause for the 4-kV cable failures could be determined. On January 16, 1996, Palisades experienced a phase-to-phase fault on a 2400-V safeguards bus feeder cable in an underground conduit (see LER 50/255 96-002-01). The cause was attributed to water intrusion and contaminant treeing (microscopic voids in cable insulation that resemble tree branches) in the EPR insulation.

The staff will review the results of the Davis-Besse testing and inspection that will be performed in January and determine whether further action may be warranted to address the potential for

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cable failure caused by intrusion of water vapor into cable insulation over a long period of time.

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