

**NPEC Subcommittee SC-3, Operations, Maintenance, Aging, and Testing**

**Meeting S05-02  
Tuesday Aug. 2, 2005  
San Francisco, Ca**

Members Present:	Surin Dureja (Chair)	Brij Bharteey
	George Ballassi (Vice Chair)	Dave Horvath
	Peter Kang	Jim Liming
	Jim Redmon	Ted Riccio (Secretary)
	Glen Schinzel	John Taylor (Past Chair – by phone)
	Hamid Heidarisaafa	
Members Absent:	Bob Lofaro	Jit Vora
	Henry Leung	Burl Williams
	Mansoor Sanwarwalla	
Other Attendees:	Larry Gradin	Jeff Shackelford
	Vishu Visweswaran	

**1.0 Introduction**

• **Opening Remarks**

Surin called the meeting to order on Aug. 2 at 8:05 AM, welcoming all in attendance and guests Larry Gradin, Jeff Shackelford, Vishu Visweswaran.

• **Introductions**

The members and guests introduced themselves.

• **Meeting's Agenda**

A proposal to place Glen's report first and Jim's second was voted on and approved.

**2.0 Secretary's Report**

• **Approval of SC05-1 Meeting Minutes**

The minutes of the Jan, 2005 meeting, in Las Vegas, were approved by affirmative vote noting that there was an error in the alligator fund. The balance should have been \$152.82 rather than \$312.14 as stated in the minutes.

• **Action Item Status**

AI-05-1-4 Check with Henry Leung for membership – Henry would like to stay on SC-3  
Action item AI-05-1-5 remains open as of the close of this meeting.

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Item No.	Description	Status
AI-05-1-1	Arrange S05-2 - Surin/Ted	Closed
AI-05-1-2	Recruit new members –All	Closed
AI-05-1-3	Try to get NRR Electrical representation - Peter K.	Closed
AI-05-1-4	Check with Henry Leung for membership - Surin	Closed
AI-05-1-5	Get clarification for the point at which the PAR runs out - Surin	Open

- **Alligator Fund**

Surin recommended that we thank Dan Brosnan and PG&E for setting up the meeting facilities and food on behalf of SC-3.

- **SC3 Membership**

Discussions were held on absenteeism. Glen noted that 4 members had not attended the last 5 meetings. The subcommittee determined that we would continue membership if we had communication with the members for each meeting. Surin will contact Mansoor and Bob Lofaro to see if they will remain as members. A question was raised on which NRC member would be the “official” liaison for the NRC. Checking with Peter after the meeting, Jit will remain as the NRC liaison for SC 3.0

Name	03-01	03-02	04-01	04-02	05-01	05-02
George A. Ballassi	X	X	X	X	X	X
Brij Bharteey	A	X	A	X	X	X
Surin Dureja	X	X	X	X	X	X
Hamid Heidarisaifa	A	X	A	X	A	X
David A. Horvath	X	X	A	X	X	X
Peter J. Kang (NRC Alt)	N/A	N/A	N/A	Guest	X	X
Henry Leung	A	X	A	A	A	A
James K. Liming	N/A	X	X	X	X	X
Bob Lofaro	X	X	A	A	A	A
Jim Redmon	N/A	X	X	A	X	X
Ted Riccio	X	X	X	X	X	X
Mansoor Sanwarwalla	A	A	A	X	A	A
Glen E. Schinzel	X	X	X	X	X	X
<u>John Taylor</u>	X	X	X	T	T	T
J. (Jit) T. Vora	A	A	A	A	X	A

X means Present A means Absent T means present by Teleconference. [Attachment 1](#) is a copy of the current subcommittee membership and includes the Working Groups.

The current breakdown of SC 3 members by category is as follows:

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<u>Utility</u>	<u>AE/Consultant</u>	<u>Gov't/National Labs</u>	<u>Other</u>	<u>Total</u>
6	4	4	1	15

The updated membership roster is included as [Attachment 1](#) to the minutes. The current SC-3 and working group rosters are also on the IEEE/NPEC website at URL: <http://grouper.ieee.org/groups/npec/private/sc3/sc-3.html>: user name: [REDACTED] password: [REDACTED].

### 3.0 SC-3 Chair's Report

- **NPEC Activities**

#### Meetings:

- a. Meetings Held :  
SC3 held two meetings this year, along with NPEC meetings.
  - i) 05-01 in Las Vegas, NV
  - ii) 05-02 in San Francisco, CA
- b. Future Meetings:  
Next meeting for SC3 is planned to be in conjunction with NPEC meeting in Phoenix, AZ.

#### Activities:

Discussion of Sub-Committee Activities during its meetings.

- a. Activities Started: PAR's submitted to AdCom during 05-02 meeting in San Francisco, CA, for IEEE 692 and IEEE 1205.
- b. Activities Continued: Revision of IEEE 338, Preview presented to NPEC
- c. Activities Completed: Recirculation ballot for IEEE 336, and Reaffirmation of IEEE 692 were completed, and sent to RevCom.

#### Highlights of important activities and future plans:

- i) Presentation by Vishu Visweswaran (GE- Nuclear) on the topic of BWR Owners Group process for STI changes.
- ii) Presentation by Ted Riccio – Assessment of Nuclear standards and guides for safety systems (SC3, STP).
- iii) Will look forward to develop new IEEE standard for EMI/RFI.

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### Standards/Working Group Status:

Please list all standards here. Arrangement in order of due date, with the document closest to the five year action date first, unless there are documents beyond the 5 year period.

Working Group	Chairman	Standard	Revision or Reaffirmation Date	Comments
3.1	George Ballassi	336	2005	Submitted to RevCom
3.1	George Ballassi	338	Expected in 2006	Will request for 1 year PAR extension from 3/2006 to 3/2007
3.2	Dave Horvath	692	PAR for revision initiated and presented in AdCom 8/2/05	Reaffirmation ballot completed and submitted to RevCom
3.4	Dave Horvath	1205	Corrigendum for revision initiated and presented in AdCom 8/2/05	Minor changes could not be incorporated as errata to the standard.

### Status of Documents in Ballot:

#### **Document Number and Title: IEEE 692-1997, Reaffirmation**

Number of Individuals in Ballot Group: 27

Number of Ballots Received: 22

Return Percentage: 81%

Number of Affirmative: 20

Number of Negative: 1

Affirmative Percentage: 95%

Comments: Negative ballot was resolved and, final approval submitted to REVCOM.

Discuss if the ballot successful. YES

#### **Document Number and Title: IEEE 336-1985, Revision, Recirculation ballot**

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Number of Individuals in Ballot Group: 54

Number of Ballots Received: 46

Return Percentage: 85%

Number of Affirmative: 37

Number of Negative: 5

Affirmative Percentage: 88%

Comments: All the negative ballots were considered and reviewed/ resolved. Final approval submitted to REVCOM.

Discuss if the ballot successful. YES

### **Requests for Interpretation:**

None

**Status of any assigned action to the sub-committee:** None

Discussions followed on SC 3.0 taking on additional standards. One proposed is a standard on EMI/RFI. George pointed out that it should be 2 standards, one for specific equipment and one for systems integration. Discussion followed on how to develop and provide guidance in the standards.

See attachment 3 for a copy of the meeting minutes of the Nuclear Risk Management Coordination Committee which met on March 11, 2005.

- **Future Meeting Location and Dates**

The next meeting is scheduled to be held in Phoenix, Az. on January 23-25, 2006 at the Hyatt Regency Phoenix at Civic Plaza, 122 North 2nd Street, Phoenix, AZ 85004. The negotiated rate is \$ 121 (single/double). The rate includes complimentary continental breakfast each day. The negotiated rate will apply two days before and two days after the meeting.

The cut-off date for reservations is January 2, 2006.

Meetings rooms are sponsored by the Arizona Public Service (APS), and will be held at the Pinnacle West Learning Centre.

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To book on-line, depress the Control key and click on the link below. Use g-ieee1 for the Group/Corporate#.

<http://hyattphoenix.com/>

To book by phone, call the hotel at 877-241-5385 or Hyatt reservations at (888) 591 1234. It is recommended that you book as soon as possible as this is the peak visitor season. Cancellation can be done up to 3 PM day before arrival without penalty.

### **4.0 Presentations**

See Attachment 2 for Vishu's presentation of BWR owner's group work on risk based test intervals.

See [Attachment 3](#) for Ted's presentation on Assessment of Nuclear Standards and Guides for Safety Systems.

### **5.0 Working Group 3.1 (Testing) Report**

**WG 3.1 is responsible for maintenance of IEEE Std 336, "Guide for Installation and Testing for Class 1E Power, Instrumentation, and Control Equipment at Nuclear facilities" and IEEE Std. 338, "Standard Criteria for the Surveillance Testing of Nuclear Power Generating Station Safety Systems".**

P336 was submitted to RevCom the week of July 25, 2005

WG 3.1 previewed slides for P338 presentation to NPEC during these meeting sessions.

**Post Meeting Note:** P336 was approved by RevCom in September 2005.

P338 was approved for ballot by NPEC and is being balloted upon. Ballot period is scheduled to terminate by 11/21/05.

### **6.0 Working Group 3.2 (Security) Report**

**WG 3.2 is responsible for maintenance of IEEE Std 692, "IEEE Standard Criteria for Security Systems for Nuclear Power Generating Stations".**

IEEE Std 692-1997 was balloted for reaffirmation in September 2004. Out of 27 eligible balloters, 22 returned their ballots with the result of 20 affirmatives, one negative, and one abstention. The one negative was later resolved to affirmative.

The reaffirmed standard and ballot tally were submitted to IEEE staff on July 26, 2005 for review and approval at the September 21, 2005 RevCom meeting.

Although the reaffirmation process documented the present acceptability of IEEE Std 692 with its current scope, WG-3.2 desires to update the scope of the standard to reflect recent regulatory changes that have occurred as well as to incorporate relevant user feedback and other improvement suggestions. Therefore, WG-3.2 has prepared a PAR for a new revision project

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and recommends that it be submitted to AdCom for review and subsequent approval. The reasons for this revision (as stated on the proposed PAR) are as follows:

a. Resolve comments from the Illuminating Engineering Society of North America related to security lighting approaches and requirements, b. Consider any relevant technological developments in the security area since the previous revision, c. Expand the definitions to include terms descriptive of design features discussed in the standard (for example: seismic magnetic buried lines), d. Improve the consistency of the way in which design basis and its associated documentation are addressed, e. Reevaluate where current prescriptive requirements can possibly be replaced with performance requirements, f. Maintain flexibility and consistency with any current industry and NRC initiatives to revise 10 CFR Part 73 and nuclear generating station security, g. Consider the addition of appropriate quality assurance guidance where relevant, h. Review and incorporate any other user feedback on IEEE Std 692,] i. Address security related assessment requirements.

### **7.0 Working Group 3.4 (Aging) Report**

**WG 3.4 is responsible for maintenance of IEEE Std 1205 “*Guide for Assessing, Monitoring, and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations*”.**

Recently, three errors in IEEE Std 1205-2000 were identified by user feedback.

Specifically, in two locations in the guide, the Boltzmann constant coefficient factor should be 0.8617 instead of 0.817. In one other case, a subscript of one term in one equation should have been "i" instead of "1".

An attempt was made to make these corrections via IEEE's standard errata process but this approach was disapproved by IEEE staff and use of the corrigendum process was recommended. Preparing and approving a corrigendum requires a PAR and use of the ballot process.

Research has found that these three errors occurred as a result of the following:

The incorrect Boltzman constant of  $0.817 \times (10 \text{ exponent negative } 4) \text{ eV/degrees K}$  was a holdover error from the 1993 version of IEEE Std 1205. Further research shows this error arose from use of the Boltzman constant value appearing in an Idaho National Engineering Laboratory (INEL) technical paper (circa 1990). All other sources that I have checked (including the CRC Handbook of Chemistry and Physics) use  $0.8617 \times (10 \text{ exponent negative } 4) \text{ eV/degrees K}$ . Therefore, it can be concluded that the value in the INEL paper was a typographical error that has not been identified until now.

The remaining typographical error involving a subscript change (should be "i" not "1") in the final summation term of Equation 4 of Clause 6.6.3 of IEEE Std 1205 did not exist in the balloted draft version of P1205/D3 nor in the version submitted to the IEEE Standards Board. It

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occurred when the final draft was converted by IEEE staff and was not caught during final proofing).

A draft PAR to prepare the Corrigendum to IEEE Std 1205-2000 has been prepared and WG-3.4 recommends that it be submitted to AdCom for review and subsequent approval. Note a draft two page corrigendum has already been prepared and is attached for information only. It is NOT a part of the PAR.

The working group plans to submit the corrigendum for ballot within one week of receiving notice from NesCom of PAR approval. Upon completion of successful ballot, IEEE Std 1205-2000 with Corrigendum 1 will be submitted reaffirmation ballot by the end of the year.

### **8.0 New Business**

The subject of developing an EMI/RFI standard was considered. At the last meeting NPEC was looking for suggestions on the subject. SC2, SC3 and SC6 all have some sort of jurisdiction. At this point, discussions tended toward SC 3.0 taking on a helping role for the standard and not necessarily being responsible for its development. We also discussed SC 3.0 taking ownership of the reliability standards (352, 933). Discussions also were held on the idea of integrating risk informed technologies into IEEE standards. Surin agreed to present this to ADCOM and/or NPEC.

### **9.0 Liaison Reports**

- **EPRI Liaison Report** – See [Attachment 4](#)
- **ASME Liaison Report** – See [Attachment 5](#)
- **NRC Liaison Report** – No report for SC 3.0. Report was presented in WG 3.1 meeting. See [Attachment 6](#) for a copy.
- **SC2 Liaison Report** – There was no report this meeting from SC 2.0 You may get a report or the minutes by contacting [Patrick Gove](#). [REDACTED]

The meeting adjourned at 12:25 PM on Tuesday.  
Prepared by Ted Riccio SC-3 Secretary.



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ATTACHMENT 1

**IEEE - Nuclear Power Engineering Committee  
Subcommittee SC-3 Membership List  
Operations, Maintenance, Aging, And Testing**

<b>Name/Company</b>	<b>Address</b>	<b>Assignment</b>
<b>BALLASSI, A. (GEORGE)</b> GENERAL DYNAMICS/ ELECTRIC BOAT CORP. [REDACTED]	[REDACTED]	SC-3 (VC) WG 3.1(C) WG-3.4
<b>BHARTEEY, B.M. (BRIJ)</b> SPECTRUM TECHNOLOGIES a division of ATNC. [REDACTED]	[REDACTED]	SC-3 WG-3.1
<b>DUREJA, S.K. (SURIN)</b> CONSTELLATION NUCLEAR [REDACTED]	Calvert Cliffs Nuclear Power Plant [REDACTED]	SC-3 (C) WG-3.1 NPEC
<b>HEIDARISAF, HAMID R.</b> AMERICAN ELECTRIC POWER [REDACTED]	[REDACTED]	SC3 SC3.1
<b>HORVATH, D.A. (DAVE)</b> ADVENT ENGINEERING SERVICES, INC. [REDACTED]	[REDACTED]	SC-3(PC) WG-3.1 WG-3.2(C) WG-3.4(PC) NPEC (S)
<b>PETER J. KANG (NRC Alternate)</b> US NUCLEAR REGULATORY COMMISSION [REDACTED]	Office Of Nuclear Regulatory Research [REDACTED]	SC-3 (Alt) WG-3.1
<b>LEUNG, C.W. (HENRY)</b> CANADIAN NUCLEAR UTILITY SERVICE [REDACTED]	[REDACTED]	SC-3
<b>LIMING, JAMES K.</b> ABS CONSULTING INC. [REDACTED]	[REDACTED]	WG-3.1 SC3
<b>LOFARO, ROBERT (BOB)</b> BROOKHAVEN NATIONAL LAB [REDACTED]	[REDACTED]	SC3 WG -3.1
<b>REDMON, JIM</b> SOUTHERN CALIFORNIA EDISON [REDACTED]	San Onofre Nuclear Generating Station [REDACTED]	SC-3 WG-3.1
<b>RICCIO, TED</b> South Texas Project Electric Generating Station [REDACTED]	[REDACTED]	SC3 (S) WG 3.1 (S)

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<b>Name/Company</b>	<b>Address</b>	<b>Assignment</b>
<b>SANWARWALLA, M.H. (MANSOOR)</b> SARGENT & LUNDY [REDACTED]	[REDACTED]	SC-3
<b>SCHINZEL, G.E. (GLEN)</b> South Texas Project Electric Generating Station [REDACTED]	[REDACTED]	SC3 WG-3.1
<b>TAYLOR, J.H. (JOHN)</b> BROOKHAVEN NATIONAL LAB [REDACTED]	[REDACTED]	SC-3(PC) WG-3.1
<b>VORA, J.P. (JIT)</b> US NUCLEAR REGULATORY COMMISSION [REDACTED]	Office Of Nuclear Regulatory Research [REDACTED]	SC-3
<b>WILLIAMS, B. (BURL)</b> ENERGY OPERATIONS [REDACTED]	Arkansas Nuclear One [REDACTED]	SC-3 Mailing list only
<b>GLEASON, JAMES (JIM)</b> BSC, LLC (Yucca Mountain) [REDACTED]	[REDACTED]	Guest at Las Vegas meeting

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**IEEE - Nuclear Power Engineering Committee  
Working Group WG-3.1 Membership List  
Testing  
Standard IEEE Std 336 and 338**

<b>Name/Company</b>	<b>Address</b>	<b>Assignment</b>
<b>BALLASSI, A. (GEORGE)</b> GENERAL DYNAMICS/ ELECTRIC BOAT CORP. [REDACTED]	[REDACTED]	SC-3(VC) WG-3.1(C) WG-(3.4)
<b>BHARTEEY, B.M. (BRIJ)</b> SPECTRUM TECHNOLOGIES a division of ATNC. [REDACTED]	[REDACTED]	SC-3 WG-3.1
<b>DUREJA, S.K. (SURIN)</b> CONSTELLATION NUCLEAR [REDACTED]	Calvert Cliffs Nuclear Power Plant [REDACTED]	SC-3(C) WG-3.1 NPEC
<b>HEIDARISAFI, HAMID R.</b> AMERICAN ELECTRIC POWER [REDACTED]	[REDACTED]	SC-3 WG-3.1
<b>HORVATH, D.A. (DAVE)</b> ADVENT ENGINEERING SERVICES, INC. [REDACTED]	[REDACTED]	SC-3(PC) WG-3.1 WG-3.2(C) WG-3.4(C) NPEC(S)
<b>PETER J. KANG</b> US NUCLEAR REGULATORY COMMISSION [REDACTED]	Office Of Nuclear Regulatory Research [REDACTED]	SC-3(?) WG-3.1
<b>LEUNG, C. W. (HENRY)</b> CANADIAN NUCLEAR UTILITY SERVICE [REDACTED]	[REDACTED]	SC-3
<b>LIMING, JAMES K.</b> ABSG CONSULTING INC. [REDACTED]	[REDACTED]	SC-3 WG-3.4
<b>LOFARO, ROBERT (BOB)</b> BROOKHAVEN NATIONAL LAB [REDACTED]	[REDACTED]	SC-3 WG-3.1
<b>REDMON, JIM</b> SOUTHERN CALIFORNIA EDISON [REDACTED]	San Onofre Nuclear Generating Station [REDACTED]	SC-3(?) WG-3.1
<b>RICCIO, TED</b> STP Nuclear Operating Co. [REDACTED]	[REDACTED]	SC-3(S) WG-3.1(S)

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<b>Name/Company</b>	<b>Address</b>	<b>Assignment</b>
[REDACTED] <b>SCHINZEL, GLEN</b> STP Nuclear Operating Co [REDACTED]	[REDACTED]	SC-3 WG-3.1
<b>TAYLOR, J.H. (JOHN)</b> BROOKHAVEN NATIONAL LAB [REDACTED]	[REDACTED]	SC-3(PC) WG-3.1(PC) WG-3.4
<b>WILLIAMS, B.E. (Burl)</b> ENTERGY [REDACTED]	Arkansas Nuclear One [REDACTED]	SC-3 WG-3.1 WG-(3.4)Mailing List Only

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**IEEE - Nuclear Power Engineering Committee  
Working Group WG-3.2 Membership List  
Security Systems  
Standard IEEE Std 692**

<b>Name/Company</b>	<b>Address</b>	<b>Assignment</b>
<b>BOTTOM, PhD, N.R. (NORMAN)</b> PRIVATE CONSULTANT [REDACTED]	[REDACTED]	WG-3.2
<b>HORVATH, D. A. (DAVE)</b> ADVENT ENGINEERING [REDACTED]	[REDACTED]	SC-3 (PC) WG-3.1 WG-3.2 (C) WG-3.4 NPEC (S)
<b>PEARSON, EINAR W. (BILL)</b> NIAGARA MOHAWK [REDACTED]	Nine Mile Point Nuclear Station [REDACTED]	WG-3.2
<b>PHELPS, P.A. (PAUL)</b> DOMINION GENERATION [REDACTED]	Surry Power Station [REDACTED]	WG-3.2
<b>WORRELL, T. M. (TOM)</b> DOMINION GENERATION [REDACTED]	Surry Power Station [REDACTED]	WG-3.2 (S)
<b>WILLIAMS, B.E. (BURL)</b> ENTERGY [REDACTED]	Arkansas Nuclear One [REDACTED]	WG-3.1 WG-3.2

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**IEEE - Nuclear Power Engineering Committee  
Working Group WG-3.4 Membership List  
Assessing, Monitoring, And Mitigating Aging Effects On Npqs Equipment  
Standards: IEEE Std 1205**

<b>Name/Company</b>	<b>Address</b>	<b>Assignment</b>
<b>BALLASSI, G. (GEORGE)</b> GENERAL DYNAMICS/ ELECTRIC BOAT CORP. [REDACTED]	[REDACTED]	SC-3 (VC) WG 3.1(C) WG-3.4
<b>COLAIANNI, R. PAUL</b> DUKE ENERGY. [REDACTED]	[REDACTED]	WG-3.4
<b>HORVATH, D.A. (DAVE)</b> ADVENT ENGINEERING SERVICES, INC. [REDACTED]	[REDACTED]	SC-3(C) WG-3.1 WG-3.2(C) WG-3.4(PC) NPEC (S)
<b>TAYLOR, J.H. (JOHN)</b> BROOKHAVEN NATIONAL LAB [REDACTED]	[REDACTED]	SC-3(PC) WG-3.1(PC) WG-(3.4)

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ATTACHMENT 2  
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IEEE Presentation  
Aug 2, 2005-color.pp

ATTACHMENT 3  
Double click below



IEEE Nuclear  
Standards Review.pp

ATTACHMENT 4  
Double click below



NEI\_EPRI Liaison  
Report 0805.doc

ATTACHMENT 5  
Double click below



ASME Liaison Report  
0805.doc

ATTACHMENT 6

**NRC Liaison Report  
By Peter J. Kang and Jit Vora  
Office of Nuclear Regulatory Research, NRC  
August 1-2, 2005**

The following items would be of interest to the members of the IEEE SC-3 and its working groups:

### **Updating of License Renewal Guidance Documents (LRGDs)**

The LRGDs consist of GALL report, SRP-LR, RG 1.188, and NEI 95-10. These guidance documents were developed for the license renewal (LR) review process to be more effective and efficient. They have been in use for LR application since 2001. Based on the experience gained from LR review process, the applicants and the staff have been finding a need for updating the documents to address newly identified components, emerging new technical issues, and revisions to various aging management programs (AMPs). For this effort, the industry has been very responsive by standardizing their LR application format to gain further efficiency and to reduce the time spent on reviewing LR applications. The LRGDs updating process required the public and industry participation on the bases and justification for updating all the changes and documenting the bases. The final LRGDs (revision 1) are expected to be available by September 30, 2005.

### **Generic Letter (GL) on Medium Voltage (4.16 kV) Underground Cable Aging Issues**

NRC staff plans to issue a GL on potential degradation concerns related to the medium voltage underground cables emerged during the reviews of LR applications and operating experience. The staff has reviewed the history of operational data (LERs) on medium voltage underground cables. It was concluded that these cables can fail due to water treeing or a decrease in dielectric strength due to aging, exposed to condensation and wetting in inaccessible locations such as conduits, cable trenches, and duct banks. The staff decided that this issue should be reviewed under 10 CFR Part 50 and not under the license renewal 10 CFR Part 54. On February 5, 2004, the staff issued a letter (ML040370628) titled, "Potential Common Mode Failure of Medium Voltage Underground Cables" to NEI to engage the industry regarding the potential common-mode failure of medium voltage cables. The staff met with NEI on June 2, 2004 to provide clarification on the issues and for discussion of the staff's concerns. NEI agreed that cable water trees could be a problem for those medium voltage underground cables susceptible to degradation, but it occurs only randomly, disagreed with the staff opinion on

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potential common mode failures implication requiring an immediate resolution. NEI is preparing a white paper on the subject.

### **Draft Generic Letter (GL) on “Grid Reliability, and the Impacts on Plant Risk, ,And the Operability of Offsite Power”**

In connection with August 14, 2003 blackout event in Northeastern United States of America and a part of Canada, the draft GL was issued to obtain the grid information concerning the status of compliance with NRC regulation on 10 CFR Part 50 Appendix A, GDC 17, "Electric power systems," 10 CFR 50.63, "Loss of all alternating current power (SBO)," and 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," and plant technical specifications (TS) for offsite power on the Federal Register Notice, dated April 6, 2005 (ML050810504) and required to submit written responses within 60 days. The staff is currently reviewing the industry responses and it is expected that the final GL will be issued on sometimes in this year. In addition, temporary Instruction (TI) 2515/163, “Operational Readiness of Offsite Power,” was issued on May 2, 2005. The purpose of the TI was to confirm the operational readiness of offsite power system for summer 2005 in accordance with NRC requirements prescribed in 10 CFR Part 50, GDC-17, 10 CFR 50.63, and 10 CFR 50.65(a)(4) and plant TS for offsite power systems. This TI is now available on the NRC web site.

### **On Going Research Project, “Effects of Switchgear Aging on Energetic Faults”**

An event at a Taiwan nuclear power plant resulted in a energetic fault and a fire that damaged medium voltage (4.16 kV) switchgears. The damage affected both safety division buses in the plant and the event resulted in a station blackout, because emergency diesels were not available on time. Since the design of switchgear was based on the US specification, such energetic faults could occur in US nuclear plants. The NRC initiated a research project to evaluate the effects of switchgear aging on energetic faults (Task 1) and performed the sensitivity analysis (Task 2). The research identified that aging of Class 1E power system components could contribute and increase frequency and severity of such energetic faults if aging is not properly managed. A system level evaluation of medium voltage electrical distribution systems under Task 3 (completed on December 31, 2004) was conducted to examine the effects of various system transients. This task involved a review of plant electrical distribution system designs for transients. Two nuclear plant distribution systems were modeled using a power system analysis software (ETAP) to evaluate medium voltage system operating and fault transients. Under Task 4 (completed on June 30, 2005), the impact on aging of the system protective equipment (i.e., relays and circuit breakers) was reviewed. A NUREG/CR report is planned for this research project by the end of this year.

### **Ongoing Research Project, “Collaborative Research on Wire System Aging”**

During the last SC-3 meeting in Las Vegas Jit Vora reviewed the principles of Broadband Impedance Spectroscopy (BIS) and discussed its application to nuclear plant cables. He discussed the advantages of the BIS method for detecting and locating anomalies in installed cable systems. He provided examples on detecting and locating localized anomalies on humid and thermal hot spots. Since the last meeting successful tests have been completed which involved cable defects due to cracking of the insulating material and mechanical abrasion. It is expected that a NUREG/CR report summarizing the research results will be published by the end of the calender year. In order to continue this overall research effort, it is suggested that the industry provide opportunities for demonstrating the viability of the BIS method in nuclear



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plant environment. In this regard, it would be useful to implement a collaborative research program among the interested organizations and bring the program to a successful conclusion.

### **A Reliability Physics Model for Aging of Cable Insulation Materials**

In March 2005, the NRC issued a NUREG/CR-6869 report on "A Reliability Physics Model for Aging of Cable Insulation Materials." The report presents a method for predicting the probability that the insulation of an aged cable inside containment will reach a critical level of embrittlement. The critical level of embrittlement can be used to support an assessment of the probability that a cable will fail to perform its intended function if exposed to loss-of-coolant accident (LOCA). Since the cables are considered long-lived passive components and since we do not have a history of failure data, like one would have for active components, reliability physics models characterizing the aging behavior of insulating materials are very useful for the treatment of aging in long-lived passive components and structures. The subject report provides a very useful insight.

### **Public Comments on the report on,"Station Blackout (SBO) Risk Evaluation for Nuclear Power Plants"**

NRC issued a request for public comments on the report titled, "Station Blackout Risk Evaluation for Nuclear Power Plants" The research results indicated an industry average SBO core damage frequency of  $2.9 \times 10^{-6}$  per reactor year. This report was compared with the results from the historical estimates from approximately 1980 through the present. Results showed a downward trend from a high of  $2.0 \times 10^{-5}$  per reactor year to the present value. The report stated that the historical decrease in SBO core damage frequency is probably due to the results of many factors such as: plant modifications in response to the SBO rule, improvements in plant risk modeling, and improved components performance. Most of all, the report found the major contributing factor for this decrease is due to improved emergency diesel generator performance.

### **Proposed Digital I&C System Research Plan**

Many licensees are converting analog I&C systems with digital systems. These digital systems present challenges to NRC staff with: increased complexity, rapid changes in digital technology, and new failure modes. The research plan is to focus on: structured approach to develop better methods, and understanding technologies such as risk-informed, performance based, and objective and repeatable. The proposed digital I&C research plan developed by the Office of Research (RES) is to provide a flexible, adaptable framework for identifying NRR, NMSS, and NSIR research issues. This broad-based program is oriented toward: (1) providing more consistent process for regulating nuclear applications, (2) improving review methods for new applications of existing technologies, advanced technologies and new issues, and (3) developing regulatory requirements. The scope of this research plan also includes evaluations of emerging technology, on-line monitoring, advanced flow meters, and wireless technologies.

### **Regulatory Guide (DG-1137) - Guidelines for Lightning Protection in Nuclear Power Plants**

Review of operating experience indicated that lightning can pose a risk, as it can trip operating reactors and actuate safety systems. To minimize such an impact on plant availability and challenges to plant safety systems, the staff is issuing a Regulatory Guide (RG) on lightning protection. This guide focuses on the fire prevention and personnel protection and also

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provides comprehensive guidance for ensuring adequacy and consistency of lightning protection approaches for new plants. NUREG/CR-6866 documents development of its technical basis and approach, which consist of reviewing operating experience (LERs, NRC Inspection reports, and industry reports), accepted Industry practice (IEEE, NFPA, and UL standards), and additional confirmatory research.

In addition, **Draft Regulatory Guide 1.75**, Rev 3, "Criteria for Independence of Electrical Safety Systems," was issued in February, 2005 and **Draft Regulatory Guide 1.152**, Rev. 1, "Criteria For Use Of Computers in Safety Systems of Nuclear Power Plants," is to be issued shortly.

### **Information Notices Issued during this period**

- **IN 2005-04**, "Single - Failure And Fire Vulnerability Of Redundant Electrical Safety Buses," Issued on February 14, 2005.
- **IN 2005-15**, "Three - Unit Trip and Loss Of Offsite Power At Paloverde Nuclear Generating Plant." Issued on June 1, 2005.
- **IN 2005-21**, "Plant Trip And Loss Of Preferred AC Power From Inadequate Switchyard Maintenance."
- **IN 2005-20**, "Electrical Distribution System Failures Affecting Security Systems," July 19, 2005.

### **Status of Pilot Risk-Informed Technical Specification (TS) changes**

The staff has been reviewing and granting changes to the Improved Standard TS, based partly on probabilistic risk assessment (PRA) insights. Typically, the proposed improvements in the TS involve a relaxation of selected completion times (limiting conditions of operation-LCOs) or surveillance frequencies (surveillance requirements-SRs). The expanded use of PRA methods in overall TS provisions are currently under review for Limerick and South Texas, as they were selected as pilot plants for this effort. The review is expected to be completed by this time next year.