

**IEEE Nuclear Power Engineering Committee  
Subcommittee SC-2, Qualification**

**Minutes of Meeting SC2-06-1  
Held April 18-19, 2006  
San Antonio, Texas**

Members Attending: See Table 2

Members Absent: See Table 2

Guests: Chris Abernathy, Electric Power Research Institute  
Peter Brueckner, AREVA NP GmbH  
Walter Emerson, Shaw Group  
Daryl Harmon, Westinghouse  
Frank Kloer, Triconex  
Thomas Koshy, Nuclear Regulatory Commission  
Jochen Kuhnhenh, Institut Naturwissenschaftlich-Technische Trendanalysen  
Kori Ragan, Rosemount  
Bill Sadowski, Wyle Laboratories  
Robert Sill, AEGIS Technologies  
Joe Weiss, KEMA

**Tuesday, April 18, 2006**

**1.0 Call to Order**

The SC-2 Chairman, Satish Aggarwal, opened the meeting on Tuesday April 18, 2006 at 8:00 am and welcomed everyone in attendance. This meeting was scheduled for 1½ days; concluding Wednesday April 19, 2006. A role call was taken and it was determined that a quorum was available, with 48 of 76 SC-2 members present, or represented by proxy.

**2.0 Introduction of Members and Guests**

Open introduction

**3.0 General Remarks, Review and Approval of Agenda**

The meeting agenda (Attachment 1) was reviewed and no changes were requested. A motion was made by Nissen Burstein to approve the meeting agenda. Jim Gleason seconded the motion and the SC-2 members approved the agenda unanimously.

The Chairman proposed the next meeting (06-2) would be held at the Hyatt Regency in Newport Beach, CA (Telephone: 949-729-6053) on November 7-8, 2006. A rate of \$96/night, single or double, has been negotiated for the meeting. The Working Groups were encouraged to meet at the same location on November 6, 2006. There were no objections or comments noted on the location.

The Chairman introduced and welcomed the new SC-2 leadership (Chairman – Nissen Burstein; Vice Chairman – Jim Parelo; Secretary – Jim Gleason) starting in 2007. He also recognized the Working Group Chairs for their achievement of having all standards updated by the completion of his term.

The Chairman asked the subcommittee to consider moving to one meeting a year rather than two. A spirited discussion of the various pros and cons ensued, which resulted in a committee consensus to continue with current practice of holding two meetings each year. The Chairman also proposed that one of the two meetings be held in conjunction with NPEC meeting in the summer; the proposal did not carry.

#### **4.0 Review and Approval of Meeting Minutes (05-2)**

The minutes of the previous SC-2 meeting 05-2 were opened for comment by the members. Several minor editorial changes were identified and Patrick Gove agreed to make the changes and re-issue the minutes. Nissen Burstein made motion to approve the minutes, which was seconded by Jim Gleason and the minutes were approved unanimously.

#### **5.0 SC-2 Chairman's Report**

The Chairman noted the use of "Working Group" terminology in various reports and reminded the members to use SC-2.X in referring to such activities.

The Chairman opened a discussion of trying to hold a meeting outside the U.S. Following a discussion of the advantages and disadvantages, as well as the feasibility of doing so, the members present voted 21-18 to try to hold a meeting outside the U.S. on a periodic basis

The alligator fund balance prior to meeting 06-1 was \$1947. The total charges billed by the Hyatt Regency Hotel for the 06-01 meeting were \$ 1245.63 (Audio Visual charges for renting the projector was \$ 895 plus taxes per day). Miscellaneous meeting expenses from the 05-2 meeting (Ft. Lauderdale, FL): \$40. Postage, internet charges & phone charges for 2005-06: \$30.

A contribution of \$40 was requested from each of the members for this meeting. Of the 49 members physically present at the meeting, 33 contributed the requested \$40. In addition, 5 member's proxy contributed \$40 for the absent members, and 12 guests contributed \$40. A total of \$2000 was collected bringing the total fund to \$2630. These funds are held by the Chairman, SC-2.

#### **6.0 SC-2 Secretary's Report**

The Secretary reviewed the SC-2 List of Action Items, discussing the following status:

- AI-04-1-1: A booklet of biographical data on SC-2 members was has been prepared for the majority of the SC-2 Members. The Secretary will advise Fred Roy to send all who have not responded the guidance for preparing the data, which will have a 6/1/2006 deadline for responses.
- AI-04-2-3: This item was closed at the last meeting and **Pat Gove will revise the SC 05-2 minutes accordingly.**
- AI-04-2-4: A presentation of the draft revision is on the agenda for this meeting and **this item is closed.**
- AI-04-2-9: Kjell Spång informed the group that distribution of the list of IEC delegates from foreign countries is not allowed and **this item is closed.**
- AI-05-1-1: SC-2.1 is preparing a statement of QA requirements for the next IEEE-323 revision and **this item is closed.**

## **7.0 IEEE Standard 382 - Qualification of Actuators**

Bill Sadowski, Assistant Chairman of SC-2.2, presented a detailed discussion on the proposed changes to IEEE 382. (A copy of this presentation is included as Attachment 2.) In addition to expanding the scope to include all types of actuators, the major changes are:

- Elimination of Part II (Cases);
- Improved consistency with IEEE 323-2003 and IEEE 344-2004;
- Revised test sequence/requirements in Section 6.3.2 and the Tests Section of Part III for consistency with Section 6.3.2; and
- Revised the *Normal thermal aging test*, *Seismic simulation test*, and *Normal pressurization cycle test*, and added new Section *Mechanical Cycles* to Part II Tests, all of which were originally in Part III.

While the SC-2.2 members agreed that the revised standard is more concise, reflects the recent revisions of IEEE 323 and IEEE 344, as well as the current state-of-the-art in EQ, it does recognize that there is still room for improvement, since the standard is still lengthy and not easy to read. Bill Sadowski indicated that the Working Group (WG) wanted to eliminate redundant Annex B. Following a vigorous discussion of the Pros and Cons, a motion by the Assistant Chairman to remove Annex B from the revised standard carried (29 to 19).

The IEEE 323 WG Chair noted that the aging chart in Annex C is inconsistent with IEEE 383 and recommended its removal (any aging discussion should be part of IEEE 323). A majority of the SC-2 members present agreed. A motion for SC-2 to grant permission to the WG to present the draft of IEEE 382 to NPEC carried by a vote of 34 Yes, 3 No and 11 abstentions.

The Assistant Chairman of SC-2.2 agreed to have a revised draft of IEEE 382 incorporating the above changes by 4/24/2006, which the SC-2 Chairman would distribute to the members who would complete their review by 5/15/2006.

## **8.0 Status Report on the Special Working Group on Qualification of Fiber Optic Cables**

Jan Pirrong discussed the activities of the Special Working Group (SWG). The approved PAR 1082 expires in 2009. The group is starting with a blank slate. At a joint meeting with the ICC, 30 individuals expressed an interest in participating in the standard development and 22 attended the first meeting. The SWG has three cable manufacturers represented. One manufacturer of fiber-optic cables is represented, but the SWG would like additional participation.

As the first draft of the standard is anticipated by the end of 2006, Jan inquired about guidance on the format and content for the standard. Jim Gleason agreed to provide Jan Pirrong with the format and content guidance for the standard.

## **9.0 Nano-Indentation Method for Aging Analysis of Cables**

An application of the Nano-indentation method for determining the actual aging state of organic materials used in cable insulations was presented by Marek Tengler of the Czech Republic.

- Also known as depth-sensing indentation technique.
- Micro-indentation testing tip penetrates to the sub-micrometer (nanometer) depth.
- Tip pressed against specimen by electromagnetic force and utilizes Shimadzu DUH-202 tester.
- Two more years of research are needed to complete development.

Comments offered by other members of SC-2 dealt primarily with other similar test results that are already available (EPRI Indenter, Sandia data in DOE-EPRI Cable Polymer Aging Database).

## **10.0 Cyber Security of Industrial Control Systems and Potential Impact on Nuclear Power Plants**

Joe Weiss (KEMA) presented a number of issues related to cyber security of control systems and their impact on nuclear power plants. (A copy of this presentation is included as Attachment 3.) His experience has shown him that the fossil industry does a better job addressing cyber security than their nuclear counterpart.

Specific nuclear plant issues of concern are:

- Many nuclear plant data networks are not isolated
- Vendors are still building vulnerable nuclear plant I&C systems.
- There is a lack of information sharing and expertise from outside nuclear
- Cyber is a new type of threat that may not have been adequately addressed in plant design bases, redundancy and diversity, and the effect of external events on NPPs
- Digital Upgrade Methodologies may not adequately address cyber
- Generic Letter 2006-02 does not address cyber
- Cyber events can impact component and/or plant unavailability
- NPP outages can affect grid stability and vice versa
- Threat considerations and response training to cyber related events protect NPP investment

Several recommendations for immediate actions to address some of the cyber concerns, and work that still needs to be done for the long-term were provided. Joe summarized by stating that many NPPs are vulnerable to cyber attacks, since productivity demand and replacement of obsolete technologies are making control and monitoring systems vulnerable. Appropriate policies, procedures, and software architectures can make NPPs more secure and reliable.

KEMA has scheduled their 6th Cyber Security Conference for August 7-10, 2006 at the Hilton in Portland, Oregon.

## **11.0 Advanced Control Room Design**

Daryl Harmon (Westinghouse) presented background information on the design features of the AP1000 Advanced Control Room, along with a discussion of the Operations and Control Centers, Human-machine Interface (HMI) Features, and Human Factors Engineering (HFE) Program. (A copy of this presentation is included as Attachment 4.)

The AP1000 design was approved by NRC in late 2004. In addition, the HFE Program and HMI design process has been submitted to (and reviewed by) the NRC. The most recent HMI technology has been used in the detailed design for first plant construction

The Operations and Control Centers consist of Main Control Room, containing the main controlling area; shift supervisor and clerk offices; switching and tagging area; and kitchen/restroom facilities. Other Operations and Control Centers are the Remote Shutdown room, Technical Support Center, Operations Support Center, Emergency Operations Facility, and local control stations

The AP1000 compact control room is being implemented with Common Q and Ovation video-based

HMI. A comprehensive HFE Program is being conducted to support combined license applications, and the detailed engineering for the complete HMI is under development.

### **12.0 Condition Monitoring of Motor Operated Valves**

Peter Brueckner (AREVA) discussed Condition Monitoring of Motor Operated Valves (MOV) using Power Measurements at the Motor Control Centers (MCCs). (A copy of this presentation is included as Attachment 5.) Condition-based maintenance (CBM) of MOVs uses new diagnostic methods and tools to extract more information about the “condition” of the MOVs. The technique utilizes remote measurements from MCCs, which are simple, relatively inexpensive and can be performed even during plant operation. The motor serves as a sensor for the mechanical behavior of the MOV and uses periodic tests by electrical measurements from the switch gear (MCC).

Diagnosis equipment in MCCs must have a high accuracy ( $\leq 1\%$  for electrical signals) and be qualified (electrical safety, electromagnetic compatibility [EMC], and seismic) for use in safety related environment. Furthermore, diagnosis equipment must not have any influence on the I&C system and MCCs.

In conclusion, modern monitoring methods with measurements from MCCs can replace traditional in-situ measurements. CBM needs more frequent information about condition of components than other maintenance strategies, but CBM (or maintenance planning) can help to improve plant safety, availability, and reduce costs.

### **13.0 Comparison in Safety Culture: NASA on Challenger and NRC on Davis-Besse**

Jim Gleason provided a comparison/contrast between the “safety culture” exhibited by NASA in response to the Challenger “accident” and the NRC following the Davis Besse “event.” (A copy of this presentation is included as Attachment 6.) The bottom line:

- The Challenger crash caused the death of seven people and the loss of a \$1Billion shuttle, yet no one in the decision chain was fired or fined.
- The Davis-Besse Reactor Head issue resulted in no injuries and the plant is still operating, yet the utility was fined \$5.4Million, and five individuals were banned from working at nuclear facilities for five years and face possible indictments by the US Department of Justice.

Following the Safety Culture presentation, the meeting adjourned for the day. The SC-2 Chairman announced that a courtesy suite would be provided by the following organizations for members and their guests this evening:

ASCO Valve	Rotork
Amatek Solidstate Controls	Spectrum Technologies
Applied Energy Services	Trentec
Black and Veatch	Tyco
Electric Motor & Contracting	Westinghouse Electric
Nuclear Logistics	Wyle Laboratories

**Wednesday, April 19, 2006**

## **1.0 Development of Joint IEEE/IEC Standards**

The Chairman discussed the status of efforts to develop joint standards with the IEC. The agreement reached with the IEC for the development of joint standards only applies to new standards and therefore excludes IEEE 323. The issue has been turned over to the IEEE legal staff and IEEE will get back to the Chairman by 4/28/2006. (It appears that one of the problems is that no international authority can authorize the joint standard.) Kjell Spång said that, with the coalescing of EU, European member countries have a tendency to use IEC standards, rather than those of the IEEE. Furthermore, the European national standards (such as KTA, RCC, etc.) are being supplanted by IEC standards, but the decision is left up to each IEC subcommittee chairperson. This is clearly a political, rather than a technical, issue.

## **2.0 NRC Report**

Tom Koshy has been nominated as the NRC representative to replace Satish Aggarwal and he provided the NRC liaison report. The details of his presentation, which covered a number of topics of interest to the SC-2 members, are included as Attachment 7.

## **3.0 Working Group Reports**

### **3.1 IEEE Standard 323 (SC-2.1 - WG on Environmental Qualification)**

Jim Gleason indicated that the WG is looking into several areas to improve the standard for the next revision, namely: (a) providing clarification of the safety terms used, such as important to safety, safety significant, RISC-3, etc.; (b) adding a QA clause that includes the functional requirements of 10 CFR Part 21 and personal liability; and, (c) including EQ "tribal knowledge" for a number of key areas. The SC-2 Secretary suggested that the reference to IEEE 627 should be reinstated in the standard as it is still used by some international organizations. The Westinghouse representative said that IEEE 627 was cited in the AP-1000 design. The Chairman agreed to seek NPEC guidance on the issue.

### **3.2 IEEE Standard 334 (SC-2.2 - WG on Motors)**

James Dean reported that the SC-2 comments provided at the last meeting have been incorporated and the revision should be in the balloting process within 30 days.

### **3.3 IEEE Standard 382 (SC 2.3 - WG on Valve Operators)**

Refer to Section 7.0 discussion on 4/18/2006 by Bill Sadowski, Assistant Chairman of SC-2.2.

### **3.4 IEEE Standard 383 (SC 2.4 - WG on Cables)**

While there was no activity on this standard, Satish Aggarwal, the SC-2 Chairman, noted that action will be required by 2008 for revision or re-affirmation, and requested that the Mandrel test be re-visited. John White, the WG Chairman, said that there would be no action on this topic, as the WG accepts the provisions as written.

### **3.5 IEEE Standard 344 (SC 2.5 - WG on Seismic Qualification)**

Jim Parelo, the WG Chairman, informed SC-2 that, while there was no activity on this standard, the ASME standard for qualification of mechanical equipment (QME-1) has been revised but not yet published.

### **3.6 IEEE Standard 572 (SC 2.11 - WG on Connectors)**

According to Bill Hadovski, the WG Chairman, the revised standard is with the IEEE editors and should be issued shortly. The revised standard might be approved by the next scheduled SC-2 meeting.

### **3.7 IEEE Standard 650 (SC 2.13 - WG on Battery Chargers)**

Dennis Dellinger, the WG Chairman, reported that the revised standard is at the "Review Committee" and publication is expected by the next SC-2 meeting.

### **3.8 IEEE Standard 649 (SC 2.14 - WG on Motor Control Centers)**

The Chairman of the WG, Robert Francis, said that the standard was issued for SC-2 balloting on 4/14/2006.

## **4.0 Use of Safety Terms in the Standards & Regulations**

John Wheless, who led the SC-2 Subcommittee Safety Terms Group (STG), summarized his findings for the attendees. (A copy of his presentation is included as Attachment 8.)

Based on a review of domestic and international codes and standards, the group was able to establish a hierarchy of safety terms and concluded that Safety Related, Class 1E, Post-Accident Monitoring, and Safety Significant are all subsets of Equipment Important to Safety. Several options were identified offered that led to a spirited discussion of which terms to use. Based on the options identified and the input received from the SC-2 discussion, the STG will make a specific recommendation to SC-2.1 that will be presented at the next SC-2 meeting.

## **5.0 European Standards (Reconciliation to American Standards)**

Gary Chapman raised the issue of whether SC-2 should have a role in trying to "harmonize" various international standards (KTA, RCC, etc.) with the IEEE standards of SC-2. Satish said that SC-2 should have a more active role in international standards integration. Kjell Spång pointed out a specific issue in the need for standardization of condition monitoring methods, which led into the presentation appearing in Section 6.0, below.

## **6.0 Needs for Standardization of Condition Monitoring Methods**

Kjell Spång said that the IAEA is working on standardization of condition monitoring methods. (A copy of his presentation is included as Attachment 9 and explains how to obtain a copy of IAEA TECDOC 1188 from the website [www.iaea.org](http://www.iaea.org).) Kjell explained the wide scatter of data for identical unaged and aged samples provided to a number of testing labs around the world (this data is also available in the DOE-EPRI Cable Polymer Aging Database). When Kjell suggested the development of a Condition Monitoring standard, there was concern expressed that such a standard might undermine current aging

management programs at utilities, even though IEC is addressing the issue in a standard.

## 7.0 Action Item Status

Action items from previous SC-2 meetings were reviewed at this meeting. Table 1 provides a listing and the status of action items from past meetings, along with new action items identified at this meeting.

**Table 1 - List of Action Items**

<b>Item No.</b>	<b>Description</b>	<b>Responsible</b>	<b>Status</b>
<b><i>Action Items from Meeting 04-1</i></b>			
AI-04-1-1	Provide biographical data for SC-2 member's book. (All who have not responded will be identified, guidance provided and input collected by 6/1/2006.)	All delinquent SC-2 members	OPEN
<b><i>Action Items from Meeting 04-2</i></b>			
AI-04-2-9	Provide a list of IEC delegates from foreign countries.	Kjell Spang	CLOSED Distribution not allowed
<b><i>Action Items from Meeting 05-1</i></b>			
AI-05-1-1	WG 2.1 to address the use of 10CFR50 Appendix B and alternative quality standards in the next revision to IEEE 323	Jim Gleason	OPEN
<b><i>Action Items from Meeting 06-1</i></b>			
AI-06-1-1	The Assistant Chairman of SC-2.2 will issue a revised draft of IEEE 382 incorporating the changes approved by SC-2 by 4/24/2006, which the SC-2 Chairman would distribute to the members who would complete their review by 5/15/2006.	Bill Sadowski	OPEN
AI-06-1-2	The SC-2 Chairman agreed to seek NPEC guidance on the revision or re-affirmation of IEEE-627	Satish Aggarwal	OPEN

## 8.0 Adjournment

At approximately noon on Wednesday April 19, 2006 a motion was made to adjourn and meeting SC2-06-01 was adjourned.

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Minutes Prepared by:  
Tom Hency  
Secretary, IEEE/SC-2



List of Attachments:

1. SC-2 Meeting 06-01 Agenda
2. IEEE Standard 382 - Draft Status Report: April 2006
3. Cyber Security of Industrial Control Systems and Potential Impacts on Nuclear Power Plants
4. AP1000 Advanced Control Room
5. Moving Towards Condition Based Maintenance of Valves and Actuators
6. Comparison in Safety Culture: NASA on Challenger and NRC on Davis-Besse
7. NRC Report dated April 14, 2006
8. SC-2 Subcommittee Safety Terms Group Report
9. Needs for Standardization of Condition Monitoring Methods

**Table 2 Attendees of SC-2 Meeting 06-1 April 18-19 in San Antonio, Texas**

Name/Company	Address	Dates Attended	
		4/18	4/19
<b>Aggarwal, S. K. (Satish) – Chairman SC-2</b> U.S. Nuclear Regulatory Commission Tel. (301) 415-6005 Fax (301) 415-5074	Washington, DC 20555	X	X
<b>Bartonicek, B. (Bohumil)</b> Nuclear Research Institute Rez plc Tel. +420-266-173579 Fax +420-266-173580	250 68 Husinec Rez 130 Czech Republic	P	P
<b>Baughman, P. D. (Paul)</b> ABS Consulting/EQE Tel. (603) 778-1144 Fax (603) 778-7495	118 Portsmouth Avenue Suite B302 Stratham, VA 03885		
<b>Bharteey, Brij</b> Tel. (518) 382-0056 Fax (518) 382-0283	112 Erie Blvd. Suite 3 Schnectady, NY 12305	X	X
<b>Behera, A. K. (Anup)</b> Kiran Consultants, Inc. Tel. (630) 515-2650, ext. 17 Fax. (630) 515-2654	1401 Branding Lane Suite 255 Downers Grove, IL 60515	P	P
<b>Brewington, T. (Tom)</b> Wyle Laboratories Tel. (256) 837-4411, ext. 512 Fax (256) 837-3363 (Proxy: Robert Francis)	7800 Highway 20 West Huntsville, AL 35806	P	P
<b>Burstein, N. M. (Nissen) – Vice Chairman SC-2</b> AREVA Tel. (434) 832-2501 Fax (434) 832-2683	3315 Old Forest Rd. M/C OF54 Lynchburg, VA 24506-0935	X	X
<b>Butcher, C. (Craig)</b> Tennessee Valley Authority Tel. (423) 751-8250 Fax (423) 751-8247	1101 Market Street LP 4H Chattanooga, TN 37402-2801		

Table 3 Attendees of SC-2 Meeting 06-1 April 18-19 in San Antonio, Texas (continued)

Name/Company	Address	Dates Attended	
		4/18	4/19
<b>Casadevall, S. (Steve)</b> ASCO Valve Inc. Tel. (973) 966-2512 Fax (973) 966-2624	50 Hanour Road Florham Park, NJ 07932	X	X
<b>Chapman, G. V. (Garry)</b> Trentec, Inc. Tel. (513) 528-7900 Fax (513) 528-9292	4600 East Tech Drive Cincinnati, OH 45245	X	X
<b>Channarasappa, S. (Suresh)</b> Westinghouse Electric Co. Tel. (724)-733-6587	1760 Golden Mile Hwy. Monroeville, PA 15746	X	X
<b>Chicote, Javier Alonso</b> Tel. +34-91-659-8696 Fax +34-91-659-8677	Avda. Montes de Oca 28709 San Sebastián de los Reyes Madrid, Spain	P	P
<b>Chipkin M. (Marty)</b> Nine Mile Point Nuclear Station Tel. (315) 349-2825 Fax (315) 349-1579	P.O. Box 63 Lycoming, NY 13093		
<b>Chivers, J. (Jeff)</b> Rosemount Nuclear Tel. (952) 949-5377 Fax (952) 949-5147	8200 Market Blvd. Chanhassen, MN 55317	P	P
<b>Choi, S. Y. (Sun Yeong)</b> Korea Atomic Energy Research Institute Tel. +82-(42) 868-8372 Fax +82-(42) 868-8256	Box 105, Yuseong Daejeon, 305-600 Korea		
<b>Chung, Choon-Hoon</b> <b>KOPEC</b>			
<b>Dean, J. M. (James)</b> Applied Energy Services, Inc. Tel. (203) 730-0587 Fax (203) 744-5192	14 Eagle Rock Hill Rd. Bethel, CT 06801	X	X

Table 3 Attendees of SC-2 Meeting 06-1 April 18-19 in San Antonio, Texas (continued)

Name/Company	Address	Dates Attended	
		4/18	4/19
<b>Delcea, L. N. (Liviu Nicolae)</b> CNE Prod Tel. +40-241-80-1658 Fax +40-723-111-627	Medgidiei St. No. 1 C.P. 42, Cernavoda 08625 Constanta, Romania	X	X
<b>Dellinger, D. E. (Dennis)</b> Solidstate Controls, Inc. Tel. (614) 846-7500 Fax (614) 885-3990	875 Dearborn Drive Columbus, OH 43085	X	X
<b>Di Benedetto, P. (Philip)</b> Tel. (978) 686-3561 Cell (978) 660-7662	123 French Farm Road North Andover, MA 01845		
<b>Duong, Q. H. (Quang)</b> DTE Energy Tel. (734) 586-1813 Fax (734) 586-4911	6400 N. Dixie Hwy 125 EF2-TAC Newport, MI 48166		
<b>Drumm, F. (Frank)</b> Tyco Electronics Tel. +49-89-6089-567 Fax +49-89-6089-445	Raychem GmbH Finsinger Feld 1 85 Ottobrunn, Germany	P	P
<b>Eguchi, Yasutaka</b>		P	P
<b>Fargo, W. D. (Wells)</b> Southern California Edison Co. Tel. (949) 368-2525 Fax (949) 368-2122	3214 Legendario San Clemente, CA 92673-3811		
<b>Faya, A. J. (Artur)</b> Canadian Nuclear Safety Commission Tel. (613) 996-0023 Fax (613) 943-1292	280 Slater Road Ottawa, Ontario K1C 5S9 Canada	X	X
<b>Francis, R. L. (Robert)</b> Wyle Laboratories Tel. (256) 837-4411 ext. 315 Fax (256) 837-3363	7800 Highway 20 West Huntsville, AL 35807	X	X

Table 3 Attendees of SC-2 Meeting 06-1 April 18-19 in San Antonio, Texas (continued)

Name/Company	Address	Dates Attended	
		4/18	4/19
<b>Gleason, J. (Jim)</b> Bechtel Scientific Co. Tel. (702) 295-4561	1180 Town Center Drive Las Vegas, NV 89149	X	X
<b>Gove, P. (Patrick) – Assistant Secretary SC-2</b> Black & Veatch Tel. (913) 458-7834 Fax. (913) 458-2491	11401 Lamar Overland Park, KS 66213	X	X
<b>Hadovski, W. L. (William)</b> Westinghouse Electric Co. Tel. (860) 731-6258 Fax (860) 731-6256	2000 Day Hill Road Windsor, CT 06095	X	X
<b>Harada, Hideo</b>		P	P
<b>Helander, P. (Peter)</b> Tel. +46-18-51-1836 Fax +46-18-51-1894	Dag Hammarskjolds vag 13 752 37 Uppsala, Sweden		
<b>Hencey III, T. (Tom)</b> Scientech, Inc. Tel. (727) 669-3047 Fax (727) 669-3100	1393 Indian Trail N. Palm Harbor, FL 34683	X	X
<b>Henley, J. C. (Jerrell)</b> Tel. (256) 379-2920 Fax. (256) 379-2920	1359 Old Winchester Road New Market, AL 35761		
<b>Hopp, Dirk C.</b>			
<b>Horvath, D. (Dave)</b> Advent Engineering Tel. (734) 930-7500 Fax (734) 327-7501	P.O. Box 555 24 Frank Lloyd Wright Blvd., Lobby C Ann Arbor, MI 48106	X	X
<b>Hsu, Yoa-Tung</b>			
<b>Hwang, In-Koo</b>			

Table 3 Attendees of SC-2 Meeting 06-1 April 18-19 in San Antonio, Texas (continued)

Name/Company	Address	Dates Attended	
		4/18	4/19
<b>Irish, C. S. (Craig)</b> Nuclear Logistics, Inc. Tel. (978) 250-1684 Fax (978) 250-0245	27 Linwood Street Chelmsford, MA 01824	P	P
<b>Jagtiani-Krause, S. A. (Serena)</b> Trentec Inc. Tel. (513) 528-7900 ext. 121 Fax (513) 528-9292 (Proxy: Garry Chapman)	4600 East Tech Dr. Cincinnati, OH 45245	P	P
<b>Kapur, S. (Sushant)</b> Bechtel Power Corp. Tel. (301) 228-6057 Fax (301) 631-0841	5275 Westview Drive Frederick, MD 21703-8306		
<b>Khan, M. R. (Mohsin)</b> ARES Corp. Tel. (510) 645-5960 Fax (510) 656-5961	2101 Webster St. Suite 1650 Oakland, CA 94612		
<b>Leung, H. (Henry)</b> Tel. (905) 567-3332	4556 Credit Pointe Dr. Mississauga, Ontario Canada L5M 3L9		
<b>Lofaro, R. J. (Bob) – Secretary SC-2</b> Brookhaven National Laboratory Tel. (631) 344-7191 Fax (631) 344-5569	P.O. Box 5000 Building 130 Upton, NY 11973-5000		
<b>Lory, B. M. (Bruce)</b> Engineering & Management Specialists, Inc. Tel. (312) 327-0920, ext. 119 Fax (312) 327-0925	123 West Madison Street, Suite 1300 Chicago, IL 60602	X	
<b>Martin, D. R. (Darin)</b> Southern Testing Services, Inc. Tel. (865) 966-5330 Fax.(865) 675-5399	10627 Lexington Drive Knoxville, TN 37932		

Table 3 Attendees of SC-2 Meeting 06-1 April 18-19 in San Antonio, Texas (continued)

Name/Company	Address	Dates Attended	
		4/18	4/19
<b>McQuillan, P. (Pat)</b> Limitorque Tel. (434) 845-9714 Fax (434) 845-9736	5114 Woodall Road Lynchburg, VA 24502		
<b>Mikow, D (Daniel)</b> Framatome, ANP Tel. (724) 779-9800 ext. 1314 Fax (724) 779-9844 (Proxy: Nissen Burstein)	200 West Kensinger Drive Suite 600 Cranberry Township, PA 16066	P	P
<b>Mitton, T. (Todd)</b> RCM Technologies Tel. (905) 821-1616 Fax (905) 821-1613	6620 Kitimat Road, Unit 4 Mississauga, Ontario L5N 2B8 Canada	X	X
<b>Mohiuddin, A. (Asif)</b> Sargent & Lundy Tel. (312) 269-2752 Fax (312) 269-7041	55E. Monroe 23C41 Chicago, IL 60603	X	X
<b>Mohtashemi, E. (Edward)</b> GE Nuclear Energy Tel. (408) 925-1844 Fax (408) 925-6261	175 Curter Avenue M/C 788 San Jose, CA 95125	X	X
<b>Monchy-Leroy, C. (Carole)</b> EDF Research and Development Tel. +33-1-60-73-6773 Fax +33-1-60-73-7407 (Proxy: Marc Kuntz)	Electrical Equipment Lab Les Renardières 77818 Moret sur Loing Cedex-France		
<b>Newell, W. (Bill)</b> Schulz Electric Company Tel. (203) 562-5811 Fax (203) 562-1082	30 Gando Drive New Haven, CT 06513	P	P

Table 3 Attendees of SC-2 Meeting 06-1 April 18-19 in San Antonio, Texas (continued)

Name/Company	Address	Dates Attended	
		4/18	4/19
<b>Parello, J. (James)</b> Westinghouse Electric Co., LLC Tel. (724) 722-5545 Fax (724) 722-5497	1000 Westinghouse Drive New Stanton, PA 15672-9606	X	X
<b>Pavsek, J. (Janez)</b> Milan Vidmar Electroinstitute Tel. +386-31-809-322 Fax +386-1-252-1359 (Proxy: Marek Tengler)	SI-1000 Ljubljana Hajdrihova 2, Slovenia		
<b>Pirrong, Jan S.</b> Cablelan		X	X
<b>Pomerening, D. J. (Daniel)</b> Southwest Research Institute Tel. (210) 522-2318 Fax (210) 522-4506	6220 Culebra Road San Antonio, TX 78238-5166	X	X
<b>Robert Queenan</b> Scientech Tel. (208) 524-9311 Fax (208) 524-9238	220 South Woodruff Ave. Idaho Falls, ID 83401	X	X
<b>Quinn, Edward (Ted) L.</b>		P	P
<b>Richards, J. M. (John)</b> Duke Energy Co. Tel. (704) 382-3916 Fax (704) 382-3993	Mail Stop EC09H P.O. Box 1006 Charlotte, NC 28201-1006	X	X
<b>Roy, F. (Fred)</b> Scientech Tel. (256) 722-8500 Fax (256)722-8533	125 West Part Loop Huntsville, AL	P	P
<b>Sandberg, S. (Steve)</b> Rockbestos-Surprenant W&C Tel. (860) 653-8360 Fax (860) 653-8412	20 Bradley Park Road East Granby, CT 06026	X	X



Table 3 Attendees of SC-2 Meeting 06-1 April 18-19 in San Antonio, Texas (continued)

Name/Company	Address	Dates Attended	
		4/18	4/19
<b>Schinzel, G. E. (Glen)</b> South Texas Project Tel. (361) 972-7854 Fax (361)972-7073	P.O. Box289 Wadsworth TX 77483	X	X
<b>Simms, R. (Roderick)</b> Tel. (269) 465-5901 ext. 3583 Fax (269) 466-3454	One Cook Place Bridgman, MI 49106		
<b>Späng, K. (Kjell)</b> Tel. +46-31-298573 Fax +46-31-694594	KS Miltek Strandskarsvagen 9 SE-42658 Vastra Frolunda, Sweden	X	X
<b>Starck, R. (Richard)</b> MPR Associates Tel. (703) 519-0511 Fax (703) 519-0224	320 King Street Alexandria, VA 22314		
<b>Suzuki, Hirotsugu</b>			
<b>Tengler, M. (Marek)</b> Tel.+42-0377-386961 Fax +42-0377-386961	Labhova 8/34 Pilsen 31806	X	X
<b>Van Uffelen, M. (Marco)</b> Tel. +32 14-33-2638 Fax +32-14-31-1993	Boertang 200 Dept. Instrumentation Building BR3 B-2400, Mol, Belgium	X	X
<b>Varga, L. (Laszlo)</b> VEIKI-VNL, Ltd. Tel. +36-1-417-3157 Fax +36-1-417-3163	Vasgolyo u. 2-4. H-1158 Budapest, Hungary		
<b>Weber, C. E. (Carl)</b> Pacific Gas & Electric Co. Tel. (805) 545-4084 Fax (805) 545-6928	Diablo Canyon Power Plant P.O. Box 56 Avila Beach, CA 93424	P	P

Table 3 Attendees of SC-2 Meeting 06-1 April 18-19 in San Antonio, Texas (**continued**)

Name/Company	Address	Dates Attended	
		4/18	4/19
<b>Wheless, J. (John)</b> Southern Nuclear Operating Company Tel. (205) 992-6898 Fax (205) 992-0391	40 Inverness Center Pkwy. Bin BO57 Birmingham, AL 35242	X	X
<b>White, J. (John)</b> TXU CPSES Tel. (254) 897-6674 Fax (254) 897-0530	P.O. Box 1002 Glen Rose, TX 76043	X	X
<b>Toni Wittamore</b> Rotork Controls, Inc Tel. (585)-328-1550, ext. 252 Fax (585) 328-5848	575 Mile Crossing Blvd. Rochester, NY 14624	X	X
<b>Wood, R. T. (Richard)</b> Oak Ridge National Laboratory Tel. (865) 574-5578 Fax (865) 576-8380	Bethel Valley Road P.O. Box 2008 Bldg. 3500, MS 6010 Oak Ridge, TN 37831-6010	X	X
<b>Yamamoto, T. (Toshio)</b> JAPEIC Tel. +81-47-380-8554 Fax +81-47-380-8556	Business Court Shin- Urayasu Bldg. 9-2 Mihama 1-Chome Urayasu-shi, Chiba 279-0011 Japan		

X = Attended  
 P = Attended by Proxy