



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

March 22, 2012

MEMORANDUM TO:           ACRS Members

FROM:                    Sherry Meador                    **/RA/**  
                              Technical Secretary, ACRS

SUBJECT:                 CERTIFICATION OF THE MEETING MINUTES FROM  
                              THE ADVISORY COMMITTEE ON REACTOR  
                              SAFEGUARDS 591<sup>st</sup> FULL COMMITTEE MEETING  
                              HELD ON FEBRUARY 9-11, 2012 IN ROCKVILLE, MARYLAND

The minutes of the subject meeting were certified on February 24, 2012 as the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment:  
As stated



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

February 24, 2012

MEMORANDUM TO: Sherry Meador, Technical Secretary  
Advisory Committee on Reactor Safeguards

FROM: J. Sam Armijo */RA/*  
ACRS Chairman

SUBJECT: MINUTES OF THE 591<sup>st</sup> MEETING OF THE ADVISORY  
COMMITTEE ON REACTOR SAFEGUARDS (ACRS),  
FEBRUARY 9-11, 2012

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting are an accurate record of the proceedings for that meeting.

<b>OFFICE</b>	ACRS	ACRS:RSB/Sunsi
<b>NAME</b>	SMeador	CSantos/sam
<b>DATE</b>	02/24/12	02/24/12

**OFFICIAL RECORD COPY**

MINUTES OF THE 591<sup>st</sup> MEETING OF THE  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

ROCKVILLE, MARYLAND

The 591st meeting of the Advisory Committee on Reactor Safeguards (ACRS) was held in Conference Room T2B1, Two White Flint North Building, 11545 Rockville Pike, Rockville, Maryland, on February 9-11, 2012. A copy of the meeting agenda is attached.

The summary report from the ACRS Chairman to the NRC Chairman contains the following information for this meeting: (1) an accurate description of each matter discussed and (2) a list of all the documents issued or approved by the Committee. A copy of the summary report is attached. The documents received by the Committee are listed in the references of each committee letter associated with this meeting.

A transcript of selected portions of the meeting is available in the NRC's public document room ([pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov) or 1-800-397-4209), or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS), or at <http://www.nrc.gov/reading-rm/doc-collections/acrs/agenda/>. The presentation slides and handouts used during the meeting are attached to these transcripts.

ATTENDEES

ACRS Members

Dr. J. Sam Armijo (Chairman), Mr. John Stetkar (Vice-Chairman), Mr. Harold Ray (Member-at-Large) Dr. Said Abdel-Khalik, Dr. Sanjoy Banerjee, Dr. Dennis Bley, Mr. Charles Brown, Dr. Michael Corradini, Dr. Dana A. Powers, Mrs. Joy Rempe, Dr. Michael Ryan, Dr. Stephen Schultz, Mr. Gordon Skillman, Dr. William Shack, and Mr. John Sieber.

ACRS Staff

E. Hackett  
C. Santos  
A. Dias  
C. Antonescu  
H. Nourbakhsh

A list of other attendees is attached.



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 – 0001**

**AGENDA  
591<sup>st</sup> ACRS MEETING  
February 9-11, 2012**

**THURSDAY, FEBRUARY 9, 2012, CONFERENCE ROOM T-2B1, 11545 ROCKVILLE PIKE,  
ROCKVILLE, MD**

- 1) 8:30 AM - 8:35 AM      Opening Remarks by the ACRS Chairman (Open) (JSA/EMH)
- 1.1) Opening Statement
  - 1.2) Items of Current Interest
- 2) 8:35 AM - 12:00 PM      Status Update on Implementation of the Near-Term Task Force (NTTF) Recommendations (Open) (SAK/AFD)
- 2.1) Remarks by the Subcommittee Chairman
  - 2.2) Briefing by and discussions with representatives of the NRC staff and the Nuclear Energy Institute (NEI) regarding the current status on the implementation of the NTTF recommendations in response to the Fukushima event
- 12:00 PM - 1:00 PM      \*\*\* LUNCH \*\*\***
- 3) 1:00 PM - 3:00 PM      Draft Final Regulatory Guide 1.93, "Availability of Electric Power Sources" (Open) (CEA/JDS)
- 3.1) Remarks by the Subcommittee Chairman
  - 3.2) Briefing by and discussions with representatives of the NRC staff regarding Draft Final Regulatory Guide 1.93, "Availability of Electric Power Sources"
- 3:00 PM - 3:15 PM      \*\*\* BREAK \*\*\***
- 4) 3:15 PM - 4:15 PM      Draft Final Report on the Biennial ACRS Review of the NRC Safety Research Program (Open) (MLC/HPN)
- 4.1) Remarks by the Subcommittee Chairman
  - 4.2) Discussion on the proposed draft final report on the biennial ACRS review of the NRC Safety Research Program

- 5) 4:15 PM - 7:00 PM      Preparation of ACRS Reports (Open)
- 5.1) Status Update on Implementation of the Near-Term Task Force (NTTF) Recommendations (SAK/AFD)
  - 5.2) Draft Final Regulatory Guide 1.93, "Availability of Electric Power Sources" (CEA/JDS)
  - 5.3) Draft Final Report on the Biennial ACRS Review of the NRC Safety Research Program (MLC/HPN)

**FRIDAY, FEBRUARY 10, 2012, CONFERENCE ROOM T-2B1, 11545 ROCKVILLE PIKE, ROCKVILLE, MD**

- 6) 8:30 AM - 8:35 AM      Opening Remarks by the ACRS Chairman (Open) (JSA/EMH)

- 7) 8:35 AM - 10:30 AM      Licensing Approach for Reviewing Instrumentation and Control (I&C) for the mPower and Other Advanced Reactors (Open) (CEA/CHB)
- 7.1) Remarks by the Subcommittee Chairman
  - 7.2) Briefing by and discussions with representatives of the NRC staff regarding the proposed licensing approach for reviewing I&C for the mPower and other advanced reactors

**10:30 AM - 10:45 AM      \*\*\* BREAK \*\*\***

- 8) 10:45 AM - 12:15 PM      Future ACRS Activities/Report of the Planning and Procedures Subcommittee (Open/Closed) (JSA/EMH)
- 8.1) Discussion of the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the Full Committee during future ACRS meetings
  - 8.2) Report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business, including anticipated workload and member assignments

**[NOTE: A portion of this meeting may be closed pursuant to 5 U.S.C. 552b (c) (2) and (6) to discuss organizational and personnel matters that relate solely to internal personnel rules and practices of ACRS, and information the release of which would constitute a clearly unwarranted invasion of personal privacy.]**

9) 12:15 PM - 12:30 PM      Reconciliation of ACRS Comments and Recommendations  
(Open) (JSA/EMH/CS)  
Discussion of the responses from the NRC Executive Director for Operations to comments and recommendations included in recent ACRS reports and letters.

**12:30 PM - 1:30 PM      \*\*\* LUNCH \*\*\***

10) 1:30 PM - 7:00 PM      Preparation of ACRS Reports (Open)  
Continue discussion of the proposed ACRS reports listed under Item 5. There may be a 15 break at some point during this activity.

**SATURDAY, FEBRUARY 11, 2012, CONFERENCE ROOM T-2B1, 11545 ROCKVILLE PIKE, ROCKVILLE, MARYLAND**

11) 8:30 AM - 1:00 PM      Preparation of ACRS Reports (Open)  
Continue discussion of the proposed ACRS reports listed under Item 5. There may be a 15 break at some point during this activity.

12) 1:00 PM - 1:30 PM      Miscellaneous (Open) (JSA/EMH)  
Discussion of matters related to the conduct of Committee activities and specific issues that were not completed during previous meetings, as time and availability of information permit.

**NOTES:**

- When appropriate, members of the public and representatives of the nuclear industry may provide their views during the briefings.
- During the meeting, phone number 301-415-7360 should be used in order to contact anyone in the ACRS Office.
- Presentation time should not exceed 50 percent of the total time allocated for a given item. The remaining 50 percent of the time is reserved for discussion.

- Thirty five (35) hard copies and one (1) electronic copy of the presentation materials should be provided to the ACRS in advance of the briefing.
- One (1) electronic copy of each presentation should be emailed to the Designated Federal Official 1 day before the meeting. If an electronic copy cannot be provided within this timeframe, presenters should provide the Designated Federal Official with a CD containing each presentation at least 30 minutes before the meeting.
- One (1) electronic copy of each presentation should be emailed to the Designated Federal Official 1 day before the meeting. If an electronic copy cannot be provided within this timeframe, presenters should provide the Designated Federal Official with a CD containing each presentation at least 30 minutes before the meeting.



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

February 29, 2012

The Honorable Gregory B. Jaczko  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

**SUBJECT: SUMMARY REPORT – 591<sup>st</sup> MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, FEBRUARY 9-11, 2012**

Dear Chairman Jaczko:

During its 591<sup>st</sup> meeting, February 9-11, 2012, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following letters and memoranda:

**LETTERS**

Letters to R. W. Borchardt, Executive Director for Operations, NRC, from J. Sam Armijo, Chairman, ACRS:

- Draft 10 CFR 50.54(f) Letter on Implementation of the Near-Term Task Force Recommendations from the Fukushima Daiichi Event, dated February 15, 2012
- Draft Final Revision 1 to Regulatory Guide 1.93, "Availability of Electric Power Sources," dated February 16, 2012

**MEMORANDA**

Memoranda to R. W. Borchardt, Executive Director for Operations, NRC, from Edwin M. Hackett, Executive Director, ACRS:

- Draft Final Regulatory Guides 1.160 and 4.11, dated February 13, 2012
- International Isotopes Fluorine Extraction and Depleted Uranium De-Conversion Plant Safety Evaluation, dated February 13, 2012



## HIGHLIGHTS OF KEY ISSUES

### 1. Status Update on Implementation of the Near-Term Task Force (NTTF) Recommendations

The Committee met with representatives of NRC Senior Management, Nuclear Energy Institute (NEI), Greenpeace, and Union of Concerned Scientists (UCS) to discuss the NRC staff's current efforts to implement the Near-Term Task Force recommendations. Following directions received from the SRM to SECY-0137, "Prioritization of Recommended Actions to be taken in Response to Fukushima Lessons Learned," dated December 15, 2011, the NRC staff held several public meetings to develop a proposed 50.54(f) letter addressing Recommendations 2.1, 2.3, and 9.3. The NRC staff is also working on the Orders and rulemaking efforts identified in SECY-0137. The NRC staff also described their process for resolving and prioritizing ACRS recommendations stemming from their October 13, 2011, and the November 8, 2011, letters.

Representatives from NEI provided an overall view of the industry objectives, with their prime focus on the continued safe operation of the operating fleet. In its June 2011 report, NEI described how roles are to be shared among the Institute for Nuclear Power Operations (INPO), the Electric Power Research Institute (EPRI), NEI, and the Owners Groups. The recently proposed FLEX program should provide diverse and flexible coping capability by providing an additional layer of safety for beyond design bases external events.

A representative from Greenpeace raised objections to current spent fuel storage practices and power uprates of operating reactors. A representative from UCS indicated having FLEX equipment already being procured raises a concern that NEI's actions may not be consistent with future NRC requirements. The UCS representative also stated that detailed procedures should be part of the upcoming Orders.

### Committee Action

The Committee issued a letter to the Executive Director for Operations on this matter, dated February 15, 2012, in order to bring an item for staff consideration prior to issuance of the final 50.54(f) letter. The Committee recognized that the Orders and the 50.54(f) letter were still being revised prior to their submittal to the Commission on February 17, 2012. However, during their review of the draft 50.54(f) letter, the ACRS found that the guidance provided by the staff for the licensees to perform a Seismic Margin Analysis (SMA) was not consistent with "current applicable Commission requirements and guidance," as required in the Consolidated Appropriations Act, Public Law 112-74, Section 402 in that it did not have the correct reference to the American Society of Mechanical Engineers/American Nuclear Society (ASME/ANS) Standard.

### 2. Draft Final Revision 1 to Regulatory Guide 1.93, "Availability of Electric Power Sources"

The Committee met with representatives of the NRC staff to discuss the draft final Revision 1 to Regulatory Guide 1.93, "Availability of Electric Power Sources." The regulatory guide was revised to include lessons learned from the Northeast Blackout of 2003, to incorporate impacts

of deregulation on offsite power, and to clarify its applicability to evolutionary and passive reactors. The regulatory guide discusses various levels of degradation of the electric power system; and for each of the levels of degradation, it discusses risk considerations and recommended actions. The plant technical specifications specify the Limiting Conditions for Operation (LCO), required actions, and the required action completion times for each degraded level. In the revision, a level was added to the six existing levels to describe the case when the number of available inverters is one less than the LCO requirement. The staff presented the background, discussions, and clarifications added to the regulatory guide, and how the staff incorporated the feedback provided by the ACRS members during a prior subcommittee meeting.

#### Committee Action

The Committee issued a letter to the Executive Director for Operations on this matter, dated February 16, 2012, recommending that draft final Revision 1 to Regulatory Guide 1.93 be issued as final.

#### 3. Licensing Approach for Reviewing Instrumentation and Control for the mPower and Other Advanced Reactors

The Committee met with representatives of the NRC staff to discuss the development of a framework for the licensing review of the instrumentation and controls (I&C) for advanced reactors. The staff is developing a customized design specific review standard (DSRS) for the I&C of B&W's mPower small modular reactor. The staff discussed the need for this action with the goals of improving review efficiency and the safety focus. Timely application of lessons learned and challenges involved in the review of future and advanced reactor I&C were also addressed. Some key areas of interest to the Committee were covered. These involved developing an approach for use of proven third-party certification for high-quality software development, developing clear guidance on what licensing basis information is necessary for safety findings at the licensing stage vs. implementation/inspection stage, and developing an integrated hazard analysis approach. Also, the staff's new licensing framework for I&C will try to demonstrate that the reactor protection and safeguards systems are redundant, independent, deterministic, simple, diverse, and contain defense in depth. The staff is also addressing the needed process changes and how the I&C architecture needs to be fully described as part of the licensing process.

#### Committee Action

This was an information briefing for the Committee. No Committee action was necessary.

#### 4. Draft Final Report on the Biennial ACRS Review of the NRC Safety Research Program

The Committee discussed the draft 2012 ACRS biennial report to the Commission on its review and evaluation of the NRC safety research program. A member of the public provided comments regarding an international collaborative experimental severe accident research

program on spent fuel cladding fires at Sandia National Laboratories. NRC is participating in this Organization for Economic Cooperation and Development (OECD) Nuclear Energy Agency (NEA) sponsored project.

#### Committee Action

The Committee will continue its discussion of the draft final report during its March 8-10, 2012, meeting.

#### 5. Draft Final Regulatory Guides

The Committee considered draft final revisions to the following regulatory guides and decided not to review them. The Committee has no objection to the staff's proposal to issue these Regulatory Guides as final.

- Draft Final Revision 3 to Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"
- Draft Final Revision 2 to Regulatory Guide 4.11, "Terrestrial Environmental Studies for Nuclear Power Stations"

#### 6. International Isotopes Fluorine Extraction and Depleted Uranium De-Conversion Plant Safety Evaluation

The Committee considered the staff's draft final Safety Evaluation Report (SER) for the International Isotopes Fluorine Products, Inc. Fluorine Extraction Process and Depleted Uranium Deconversion Plant. The Committee decided not to review the SER and has no objection to the staff's proposal to issue the SER as final.

#### RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

- The Committee considered the EDO's response of January 16, 2012, to comments and recommendations included in the December 8, 2011, ACRS letter regarding proposed requirements for inspections, test, analyses, and acceptance criteria (ITAAC) maintenance and draft final Revision 1 to Regulatory Guide 1.215, "Guidance for ITAAC Closure under 10 CFR Part 52." The Committee decided that it was satisfied with the EDO's response.
- The Committee considered the EDO's response of January 16, 2012, to comments and recommendations included in the December 12, 2011, ACRS letter regarding ACRS recommendations on Topical Report NEDC-33173P, Supplement 2, Parts 1, 2, and 3, "Analysis of Gamma Scan Data and Removal of Safety Limit Minimum Critical Power Ratio (SLMCPR) Margin." The Committee decided that it was satisfied with the EDO's response.

SCHEDULED TOPICS FOR THE 592<sup>nd</sup> ACRS MEETING

The following topics are scheduled for the 592<sup>nd</sup> ACRS meeting, to be held on March 8-10, 2012:

- Selected Chapters of the Safety Evaluation Report (SER) with Open Items Associated with the US Evolutionary Power Reactor (EPR) Design Certification Application
- Development of Source Terms for Small Modular Reactors
- Development of a Computer Model for Extremely Low Probability of Rupture due to Various Degradation Mechanisms
- Turkey Point Units 3 and 4 Extended Power Uprate Application
- Draft Final Report on the Biennial ACRS Review of the NRC Safety Research Program

Sincerely,

*/RA/*

J. Sam Armijo  
Chairman

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
591<sup>st</sup> FULL COMMITTEE MEETING  
February 9-11, 2012

PLEASE PRINT

TODAY'S DATE: February 9<sup>th</sup>, 2012

	<u>NAME</u>	<u>NRC ORGANIZATION</u>
1	David Brown	NRR/JLD
2	Matthew Mitchell	NRR/JLD
3	Jana Bergman	scientech AWFC
4	Tom Nicholas	RES/DRA
5	Steven Bloom	NRR/JLD
6	Jack Foster	NRR/JLD
7	EARL LEBBY	NRO/DARR
8	ERIK BOWMAN	NRR/NRR/DPR
9	GREG CASO	NRR/DSS
10	DON DUBE	NRO/DSNA
11	John Kang	NRR/DE
12	Rachel Vander	NRR/DE/CEB
13	ROBERT FRETZ	NRR/JLD/PMB
14	John Banning	NRR
15	Nanette Gilles	NRC/OCN/CEA
16	Kevin Witt	NRC/JLD
17	Tania Martinez Navedo	NRO/DE/CEB
18	Marcus Riley	NRO/DE/ICE
19	Brod Harvey	NRO/DSEA/RHMB
20	Jessica Kratchman	NRC/NRR/JLD
21	Jack Zhao	NRC/NRO/DE
22	PATRICK CASTLEMAN	OCM/K&J
23	Terry Jackson	NRC/NRO/DE
24	Fileen McKeena	NRC/NRR
25	Jim Riccio	OCM/OCN
26	Steven Jones	NRR/DSS/SRPR
27	Kevin Williams	NRR/DPR
28	Russell Sydney	RES/DE/DICS



ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
591<sup>st</sup> FULL COMMITTEE MEETING

February 9-11, 2012

PLEASE PRINT

TODAY'S DATE: February 9<sup>th</sup>, 2012

	<u>NAME</u>	<u>AFFILIATION</u>
1	Grainy McKey	Strong Air
2	Takashi YAMAGUCHI	MES
3	PAUL GUNTER	BEYOND NUCLEAR
4	Kimberly Keithline	NEI
5	Scott Bauer	NEI
6	Chris Grafton	NRC/JLD
7	William Ordway	NRC/DCM WDM
8	Jim Riley	NEI
9	Maurice Conley	Platts
10	Jenise Thompson	NRC/NRO
11	Victor R. Baker	U.S. Army
12	PETER ALTER	NRC/NSIR
13	Kenichi Watanabe	NRC / NRR / DIR
14	Sunwoo Park	NRC
15	Martha Shields	Dept of Energy
16	DAN M. GARVEY	MARIT
17	Gordon CLETON	NEI
18	Peter King	NRA / DE
19	VIJAY GOV	NRA / DE
20	Mike Cane	NR
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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
591<sup>st</sup> FULL COMMITTEE MEETING  
February 9-11, 2012

PLEASE PRINT

TODAY'S DATE: February 10<sup>th</sup>, 2012

	<u>NAME</u>	<u>NRC ORGANIZATION</u>
1	STU MAGRUDER	NRO/DARR
2	H. Li	NRO/DE/ICB
3	SUSHIL BIRLA	RES/DE
4	Norbert Corte	NRR/DE/ETCB
5	Jan Jung	NRO/DE/ <del>DE</del> ICB
6	Joe Ashcraft	NRO/DE/ICB
7	Luis Betancourt	RES/DE/DICB
8	<del>PAUL KILMAR</del>	
9	ERICK M. MARTINEZ	NRO/DE/ICB
10	Ross Moore	NRO/DARR
11	B Stahel	NRR/ETCB
12	JERRY WILSON	NRO/DARR
13	Dinesh Taneja	NRO/DE/ICB
14	Mauricio Gutierrez	<del>#</del> RES/DE/DICB
15	Susan Vrahoretis	OGC NRP
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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
591<sup>st</sup> FULL COMMITTEE MEETING

February 9-11, 2012

PLEASE PRINT

TODAY'S DATE: February 10<sup>th</sup>, 2012

	<u>NAME</u>	<u>AFFILIATION</u>
1	DAN STIFFLER	WESTINGHOUSE ELEC CO
2	PAUL KUMAR	B & W
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