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TABLE OF CONTENTS
MINUTES OF THE **541st** ACRS MEETING

April 5-7, 2007

- I. Opening Remarks by the ACRS Chairman (Open)
- II. Human Reliability Analysis Models (Open)
- III. Proposed Revisions to Standard Review Plan (SRP) Section 4.2, Reactor Fuels (Open)
- IV. Risk-Management Technical Specification Initiative 4b - Flexible Completion Times (Open)
- V. ACRS Report on the NRC Safety Research Program (Open)
- VI. Subcommittee Report on Plant License Renewal(Open)
- VII. Meeting with Commissioner Jaczko (Open)
- VIII. Executive Session (Open)
 - A. Reconciliation of ACRS Comments and Recommendations
 - B. Report on the Meeting of the Planning and Procedures Subcommittee Held on April 4, 2007.
 - C. Future Meeting Agenda

REPORTS:

The following reports to Dale E. Klein, Chairman, NRC, from William J. Shack, Chairman, ACRS:

1. Human Reliability Analysis Models, **dated April 23, 2007**
2. Technology -Neutral Framework for Future Plant Licensing, **dated April 20, 2007**

LETTERS:

The following letters to Luis A. Reyes, Executive Director for Operations, NRC, from William J. Shack, Chairman, ACRS:

1. Revision to Standard Review Plan Section 4.2, "Fuel System Design," **dated April 23, 2007**
2. Risk-Informed Technical Specifications Initiative 4b, Risk-managed Technical Specifications (RMTS) Guidelines, **dated April 23, 2007**

MEMORANDA:

The following memoranda to Luis A. Reyes, Executive Director for Operations, NRC, from, Frank P. Gillespie, Executive Director, ACRS:

1. Proposed Rule to Amend 10 CFR 50.61, "Alternate Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events," **dated April 10, 2007**

APPENDICES

- I. *Federal Register Notice*
- II. Meeting Schedule and Outline
- III. Attendees
- IV. Future Agenda and Subcommittee Activities
- V. List of Documents Provided to the Committee

MINUTES OF THE 541st MEETING OF THE
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
April 5 - 7, 2007
ROCKVILLE, MARYLAND

The **541st** meeting of the Advisory Committee on Reactor Safeguards (ACRS) was held in Conference Room T2-B3, Two White Flint North Building, Rockville, Maryland, on **April 5-7, 2007**. Notice of this meeting was published in the *Federal Register* on **March 21, 2007** (72 FR **13312**) (Appendix I). The purpose of this meeting was to discuss and take appropriate action on the items listed in the meeting schedule and outline (Appendix II). The meeting was open to public attendance.

A transcript of selected portions of the meeting is available in the NRC's Public Document Room at One White Flint North, Room 1F-19, 11555 Rockville Pike, Rockville, Maryland. Copies of the transcript are available for purchase from Neal R. Gross and Co., Inc., 1323 Rhode Island Avenue, NW, Washington, DC 20005. Transcripts are also available at no cost to download from, or review on, the Internet at <http://www.nrc.gov/ACRS/ACNW>.

ATTENDEES

ACRS Members: Dr. William J. Shack (Chairman), Dr. Mario V. Bonaca (Member-at-large), Dr. Said Abdel-Khalik, Dr. George E. Apostolakis, Dr. Sanjoy Banerjee, Dr. Michael Corradini, Dr. Thomas S. Kress, Mr. Otto L. Maynard, and Dr. Dana A. Powers. For a list of other attendees, see Appendix III.

I. Chairman's Report (Open)

[Note: Mr. Frank P. Gillespie was the Designated Federal Official for this portion of the meeting.]

Dr. William J. Shack, Committee Chairman, convened the meeting at 8:30 A.M. He announced in his opening remarks that the meeting was being conducted in accordance with the provisions of the Federal Advisory Committee Act. In addition, he reviewed the agenda for the meeting and noted that no written comments or requests for time to make oral statements from members of the public had been received. Dr. Shack also noted that a transcript of the open portions of the meeting was being kept and speakers were requested to identify themselves and speak with clarity and volume. He discussed the items of current interest and administrative details for consideration by the full Committee.

II. Human Reliability Analysis Models (Open)

[Note: Mr. Hossein P. Nourbakhsh was the Designated Federal Official for this portion of the meeting.]

In a November 8, 2006 Staff Requirements Memorandum, resulting from the October 20, 2006 meeting with the Advisory Committee on Reactor Safeguards (ACRS), the Commission requested the Committee to "work with the staff and external stakeholders to evaluate the different Human Reliability models in an effort to propose either a single model for the agency to

use or guidance on which model(s) should be used in specific circumstances.” During the April 2007 meeting, the Committee discussed proposed plans by the NRC staff and the Electric Power Research Institute (EPRI) to evaluate several human reliability analysis (HRA) models used by staff and industry. The members commented that the objective should be to develop a common understanding of the relative importance of factors affecting human performance and ways in which they could be integrated into analysis. Achieving this objective will allow the staff to establish guidance on which model(s) should be used for specific regulatory applications. The staff presented its current plan for organizing an HRA Empirical Study using simulator data at the Halden Reactor Project in order to assess the strengths and weaknesses of HRA models. The Committee stated that it views this Empirical Study as part of the broader effort to collect evidence regarding the validity of HRA models. The Committee further stated that additional evidence should be collected from operating experience, especially the Augmented Inspection Team reports on past incidents.

III. Proposed Revisions to Standard Review Plan (SRP) Section 4.2, Reactor Fuels (Open)

[Note: Ms. Zena Abdullahi was the Designated Federal Official for this portion of the meeting.]

The Committee met with representatives of the NRC staff, EPRI, and the reactor fuel vendors to discuss Revision 3 to Standard Review Plan (SRP) Section 4.2, “Fuel System Design.” This revision addresses several new issues identified by the staff from operating experience, research, and reviews of advanced fuel designs and cladding materials. The staff presented new interim acceptance criteria for reactivity-initiated accidents (RIAs), which will be applicable to new reactors. As new RIA test data become available over the next 18 months, the interim criteria will be reevaluated, and the staff will establish the final criteria that will be applied to operating plants, as well as the schedule for their implementation. Representatives of the nuclear industry expressed concern about the use of experimental data from test reactors and the need to adjust that data to account for the different phenomena and fuel cladding behavior between test reactor and operating reactor conditions. The Committee noted that the revised SRP Section includes two new criteria that are not currently applied to fuel in operating plants, and methods to demonstrate compliance with these new criteria will need to be developed.

IV. Risk-Management Technical Specification Initiative 4b - Flexible Completion Times
(Open)

[Note: Ms. Maitri Banerjee was the Designated Federal Official for this portion of the meeting.]

The Committee met with representatives of the NRC staff, EPRI, and the South Texas Project (STP) Nuclear Operating Company to discuss the industry guidance document NEI 06-09, “Risk-Informed Technical Specifications Initiative 4b, Risk-Managed Technical Specifications (RMTS) Guidelines,” the associated staff’s draft safety evaluation, as well as the pilot plant implementation of RMTS at STP. The staff presented the major aspects of the program requirements of NEI 06-09 and stated that it is consistent with the Commission’s policy statement on the use of probabilistic risk assessment (PRA) and the maintenance rule. The program manages risk specific to the associated plant configuration by determining technical specification completion times and requiring compensatory measures based on risk thresholds. The staff stated that the program requirement on cumulative risk limits and the requirement to

enter into the plant corrective action program would address potential abuse of the program. The staff also discussed the benefits of the program, requirements for licensees' PRA programs, and the results of its audit at STP. Representatives from STP described the scope of their RMTS program, modeling of uncertainties, and training requirements. A database of about 20,000 maintenance states are available in the risk-informed completion time calculator to assist the plant operators and the maintenance planners in decisionmaking. An example of this computer based tool was presented.

V. ACRS Report on the NRC Safety Research Program (Open)

[Note: Mr. Hossein P. Nourbakhsh was the Designated Federal Official for this portion of the meeting.]

The ACRS provides the Commission a biennial report, presenting the Committee's observations and recommendations concerning the overall NRC Safety Research Program. During the April 2007 meeting, the Committee discussed proposed format, content, and assignments for its 2008 report to the Commission on the NRC Safety Research Program.

VI. Subcommittee Report on Plant License Renewal (Open)

[Note: Ms. Maitri Banerjee was the Designated Federal Official for this portion of the meeting.]

The Chairman of the Plant License Renewal Subcommittee provided a report to the Committee summarizing the results of the April 4, 2007 meeting with the NRC staff and representatives of Entergy Nuclear Operations, Inc. (Entergy) to review the Safety Evaluation Report (SER) with open items related to the license renewal application for the Pilgrim Nuclear Power Station. The current operating license for Pilgrim expires on June 8, 2012. During the meeting, Entergy described the plant, its operating history, and the license renewal application. The major discussion topics were the potential corrosion of the primary containment carbon steel liner, water intrusion into the floor of the torus building, and the lack of benchmarking for neutron fluence calculations. The applicant described multiple and diverse measures available for detection of water leakage that could result in corrosion of the containment liner, inservice inspection of the liner, hydrological and structural analyses regarding water intrusion into the torus room, and plans to resolve the open item regarding fluence. The staff's draft SER was issued in March 2007 and contains four open items, three proposed license conditions, and 45 commitments from the applicant.

VII. Meeting with Commissioner Jaczko (Open)

[Note: Mr. Frank P. Gillespie was the Designated Federal Official for this portion of the meeting.]

The Committee met with Commissioner Jaczko to discuss items of mutual interest. Commissioner Jaczko described his views regarding some of the issues associated with risk-informed and performance-based regulations for fire protection, emergency planning, and emergency core cooling (10 CFR 50.46a). He also discussed the agency's preparation for new reactor licensing and the importance of validating and verifying models that contribute to

regulatory decisions. Commissioner Jaczko concluded by stating that given the complex phenomena associated with nuclear power plant operations there are still a number of important technical issues to be addressed. The discussion with the ACRS members covered the consequences of accidents in terms of health effects and land contamination, the quantitative health objectives, the challenges with communicating risk analyses to the public, and the ACRS report on the safety research program.

VIII. Executive Session (Open)

[Note: Mr. Frank P. Gillespie was the Designated Federal Official for this portion of the meeting.]

A. RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS/EDO COMMITMENTS

The Committee discussed the response from the NRC Executive Director of Operations (EDO) to ACRS comments and recommendations included in recent ACRS reports.

The Committee considered the EDO's response of March 8, 2007, to comments and recommendations included in the February 8, 2007 ACRS report on the safety aspects of the license renewal application for the Oyster Creek Generating Station. The Committee decided that it was satisfied with the EDO's response.

OTHER RELATED ACTIVITIES OF THE COMMITTEE

During the period from March 10, 2007 through April 4, 2007, the following Subcommittee meetings were held:

- Reliability and Probabilistic Risk Assessment — March 22, 2007

The Subcommittee reviewed the staff's plans for evaluating the agency's human reliability analysis models.

- Reliability and Probabilistic Risk Assessment — March 23, 2007

The Subcommittee reviewed Risk-informed Technical Specifications Initiative 4b, Risk-managed Technical Specifications Guidelines.

- Materials, Metallurgy, and Reactor Fuels — April 3, 2007

The Subcommittee reviewed Revision 3 to Standard Review Plan Section 4.2, "Fuel System Design."

- Plant License Renewal — April 4, 2007

The Subcommittee reviewed the license renewal application for the Pilgrim Nuclear Power Station and the associated SER with Open items prepared by the NRC staff.

- Planning and Procedures — April 4, 2007

The Subcommittee discussed proposed ACRS activities, practices, and procedures for conducting Committee business and organizational and personnel matters relating to ACRS and its staff.

LIST OF MATTERS FOR THE ATTENTION OF THE EDO

- The Committee plans to review the draft final version of 10 CFR 50.61, “Alternate Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events,” after reconciliation of public comments.
- The Committee plans to continue to work with the staff to resolve certain issues associated with the technology-neutral framework for future plant licensing.
- The Committee plans to work with the staff in formulating the details of its plan to evaluate different human reliability analysis models.
- The Committee plans to discuss a draft report on the NRC safety research program during its September 2007 meeting.
- The Committee plans to review the final SER associated with the license renewal application for the Pilgrim Nuclear Power Station during its September 2007 meeting.

PROPOSED SCHEDULE FOR THE 542nd ACRS MEETING

The Committee agreed to consider the following topics during the 542nd ACRS meeting, to be held on May 3-5, 2007:

- Digital Instrumentation and Control Systems Matters
- Commission Paper on Staff’s Recommendation to Make a Risk-informed and Performance-based Revision to 10 CFR Part 50
- Status of the Development of an Integrated Long-Term Regulatory Research Plan
- ACRS Members’ Issues Associated with the Technology-Neutral Framework for Future Plant Licensing
- Discussion of Topics for Meeting with the NRC Commissioners
- Proposed Report on Revision to 10 CFR 50.46 LOCA Criteria for Fuel Cladding Materials

B. Report on the Meeting of the Planning and Procedures Subcommittee Held on April 4, 2007

The ACRS Subcommittee on Planning and Procedures held a meeting on April 4, 2007, in Room T-2B1, Two White Flint North Building, Rockville, Maryland. The purpose of the meeting was to discuss matters related to the conduct of ACRS business. The meeting was convened at 8:30 am and adjourned at 9:30 am.

1) Review of the Member Assignments and Priorities for ACRS Reports and Letters for the April ACRS meeting

Member assignments and priorities for ACRS reports and letters for the April ACRS meeting are attached. Reports and letters that would benefit from additional consideration at a future ACRS meeting were discussed.

2) Anticipated Workload for ACRS Members

The anticipated workload for ACRS members through June 2007 is attached. The objectives are to:

- Review the reasons for the scheduling of each activity and the expected work product and to make changes, as appropriate
- Manage the members' workload for these meetings
- Plan and schedule items for ACRS discussion of topical and emerging issues

During this session, the Subcommittee also discussed and developed recommendations on items requiring Committee action.

3) Interview of Candidates for ACRS Membership

In April, the ACRS Member Candidate Screening Panel and the members interviewed three more candidates for membership on the ACRS.

4) Assessment of the Quality of Selected NRC Research Projects

During its December 2006 and February 2007 meetings, the Committee selected the following three projects for quality assessment in FY2007:

- Associated Circuit Fire Testing (CAROLFIRE) - [Banerjee (Chair), Corradini, Sieber]
- Fatigue Crack Flaw Tolerance in Nuclear Plant Piping [Shack (Chair), Armijo, Abdel-Khalik]
- Technical Review of Online Monitoring Techniques for Performance Assessment [Maynard, (Chair), Apostolakis, Bonaca]

Since Mr. Sieber is not expected to be back on the Committee in the near future, the Committee should consider assigning another member to serve on the Panel, which is assigned to assess the quality of the research project on Associated Circuit Fire Testing (CAROLFIRE).

5) Proposed Topics for Meeting with the NRC Commissioners

The ACRS is scheduled to meet with the NRC Commissioners between 1:30 and 3:30 p.m. on Thursday, June 7, 2007. The following topics have been approved by the Commission. The Commission has added the topic on 10 CFR 50.46 to the list of topics proposed by the Committee.

1. Overview (WJS/SD)
 - Future Plant Design Activities
 - Dissimilar Metal Weld Issues
 - Ongoing/Future ACRS Activities
2. Framework for Future Plant Licensing (TSK/DCF)
3. Digital I&C Activities (GEA/CGH)
4. License Renewal/Extended Power Uprates (MVB/MAJ/RC)
5. Human Reliability Analysis Models (GEA/HPN)
6. Staff Report on the Status of the 10 CFR 50.46 Rulemaking (WJS/CGH)

6) ACRS Report on the Technology-Neutral Framework Document

During the March ACRS meeting, the Committee completed a report on the Technology-Neutral Licensing Framework Document. Subsequently, recognizing some parts of the report needed clarification, the members have agreed to defer that report to the April ACRS meeting. The report approved by the Committee did not include several issues in the initial report. The Committee needs to discuss these issues as well as those raised by Dr. Wallis to determine which issues are supported by the majority of the members. This will help having a focused discussion at the Subcommittee meeting. A Subcommittee meeting should be held to discuss the technical aspects of the Framework Document, intended use of this Document, as well as the differences between the staff and members. Subsequently, the Subcommittee Chairman should prepared a proposed report for consideration by the Full Committee.

7) Visit to San Onofre Nuclear Plant and Meeting With Region IV Administrator

During the March ACRS meeting, the members have agreed to visit San Onofre Nuclear Plant and meet with the Regional Administrator during the week of August 13, 2007.

Members who plan to attend the plant visit and meeting with the Region IV Administrator are as follows:

Apostolakis	Corradini
Armijo	Maynard
Banerjee	Shack
Bonaca	Sieber
Abdel-Khalik	Wallis

Details of the travel arrangements will be provided during the May/June meeting.

A proposed list of questions for meeting with the Regional Administrator and licensee is attached. Members should provide feedback on these questions.

8) Visit to the Susquehanna Nuclear Plant

During the March meeting, several members have agreed to visit the Susquehanna Nuclear Plant during the week of August 20 to observe the simulation of the plant response to transients or certain events and gather information for use in the ACRS review of the Susquehanna application for an extended power uprate. Members who plan to attend this plant visit are:

Banerjee	Bonaca
Abdel-Khalik	Shack
Armijo	Wallis

9) Annual Ethics Training

The annual Ethics Training for the members are scheduled for Friday, April 6, 2007. Mr. John Szabo from the NRC Office of General Counsel will provide the training and answer any questions the members may have regarding Conflict-of-Interest matters, owning stocks, etc.

10) Self-Assessment of ACRS Performance

A Commission Paper, documenting the results of the self-assessment of the ACRS performance is due to the Commission on July 6, 2007. This year's Self-assessment will involve seeking feedback from internal and external stakeholders. To achieve this, a list of questions will be sent to the stakeholders. These questions were sent to the members on March 29, 2007 for comments.

11) Quadripartite Working Group Meeting (FPG/MA)

Germany's Reaktor-Sicherheitskommission (RSK) will host the first Quadripartite Working Group (WG) meeting on the topic of "Sump Screen Blockage" on October 17-18, 2007 in Erlangen, Germany. Erlangen is selected so that the attendees may visit the test facilities for sump screen blockage (laboratories of AREVA NP). Erlangen is located near Nürnberg (airport).

If travel time within Germany is a limiting factor, RSK is asking for proposals for alternative locations within Germany as RSK can also host the meeting in Berlin, Frankfurt, München or Köln (without a tour of a test facility).

12) Proposed Revisions to the Generic Issues Program

In response to an August 31, 2005 SRM, the staff is revising the Generic Issues Program (GIP). SECY-07-0022 provides a status report on these proposed revisions. The objective of the proposed revisions is to have the GIP address only those issues that have significant generic implications related to risk or security that cannot be more effectively handled by other regulatory processes. The revisions will also:

- Provide centralized leadership for GIP management and strengthen the involvement of regulatory offices
- Ensure consistent implementation of the GI assessment process across the offices
- Enhance the screening process such that the same criteria are consistently applied to identify issues that are appropriate for the GIP; revise various stages of the GIP; and employ enhanced risk-informed techniques to focus on timely assessment of GIs
- Enhance the staff's ability to resolve issues by using all existing regulatory tools, programs, and processes, with early involvement of key.

In July 2007, the staff plans to issue proposed revisions to Management Directive 6.4, "Generic Issues Program," for comment. The staff will provide the draft final version of the MD 6.4 in September 2007, requesting an ACRS review during the October 2007 meeting.

C. Future Meeting Agenda

Appendix IV summarizes the proposed items endorsed by the Committee for the **542nd** ACRS Meeting, **May 3-5, 2007**.

The **541st** ACRS meeting was adjourned at **1:00 PM, April 7, 2007**.