

CMEED-2-7

CERTIFIED  
G. Apostolakis, ACRS Chmn  
May 11, 2001

G:PlanPro:ppmins.482  
May 11, 2001

SUMMARY/MINUTES OF THE  
PLANNING AND PROCEDURES SUBCOMMITTEE MEETING  
WEDNESDAY, MAY 9, 2001

The ACRS Subcommittee on Planning and Procedures held a meeting on May 9, 2001, in Room 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 2:50 p.m. and adjourned at 5:00 p.m.

ATTENDEES

- G. Apostolakis, Chairman
- M. Bonaca
- T. Kress

ACRS STAFF

- J.T. Larkins
- J. Lyons
- R. P. Savio
- S. Duraiswamy
- S. Meador
- C. Harris
- J. Gallo

NRC STAFF

- J. Schoenfeld

DISCUSSION

- 1) Review of the Member Assignments and Priorities for ACRS Reports and Letters for the May ACRS Meeting

Member assignments and priorities for ACRS reports and letters for the May ACRS meeting are attached (pp. 32-34). Reports and letters that would benefit from additional consideration at a future ACRS meeting were discussed.

RECOMMENDATION

The Subcommittee recommends that the assignments and priorities for the May 2001 ACRS meeting be as shown in the attachment (pp. 35-37).

S/n

2) Anticipated Workload for ACRS Members

The anticipated workload of the ACRS members through July 2001 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 discussed and developed recommendations on the items that require Committee decision, which are included in Section II of the Future Activities list.

RECOMMENDATION

The Subcommittee recommends that the members provide comments on the anticipated workload. Changes will be made, as appropriate. The Committee needs to consider the Subcommittee's recommendations on items listed in Section II of the Future Activities.

3) Potential Margin Reductions Associated With Significant Power Upgrades

During its December 2000 meeting, the Committee met with representatives of the NRC staff to discuss issues associated with core power upgrades, including potential synergistic effects that may impact plant margin. During that meeting, the staff stated that since prior upgrade reviews provided a template to guide future reviews, it did not plan to develop a Standard Review Plan for use in future upgrade reviews. The staff also stated that it did not have evidence that potential synergisms arising from such actions as power upgrades posed a safety issue. The ACRS expressed concern that prior review process for small power upgrades may not adequately address the full scope of safety issues associated with significant power upgrades (15-20%). Subsequent to discussing this matter at the ACRS retreat on January 22-24, 2001, the Committee tasked ACRS Senior Fellow, Dr. Cronenberg, to evaluate this issue and develop a report. Dr. Cronenberg would like to brief the Committee on the status of his activities associated with this matter.

RECOMMENDATION

The Subcommittee recommends that Dr. Cronenberg provide a briefing to the Committee at the June ACRS meeting, addressing the adequacy of the staff's upgrade review process and potential safety margin reductions associated with power upgrades. He should also provide suggestions as to issues that the ACRS needs to address in its review of future power upgrade requests.

4) Low-Power and Shutdown Operations Risk

The Committee issued several reports to the Commission since 1997 regarding low-power and shutdown operations risk. Subsequent to issuing its April 18, 1997 report, "Establishing a Benchmark on Risk During Low-Power and Shutdown Operations," the Committee discussed its concerns on this issue with the Commission. In its March 13, 2000 report, SECY-00-0007, "Proposed Staff Plan for Low Power and Shutdown Risk Analysis Research to Support Risk-Informed Regulatory Decision Making," the Committee recommended that the staff evaluate the adequacy of its analytical tools for independently assessing the risk-significance of plant configurations during low-power and shutdown operations, especially during plant transitions. If the staff's analytical tools are found to be inadequate or lacking in certain areas, the staff should develop a course of action to address these inadequacies.

In the March 31, 2000 Staff Requirements Memorandum (p. 1), the Commission stated that, "The Commission has disapproved the development of improved guidance for considering LPSD risk, the development of improved methods and tools for assessing human reliability analysis and level 2 risk, and evaluation of areas identified by the ACRS and other stakeholders as potentially important to risk." The NRC staff was directed to support the ANS development of a standard on probabilistic risk assessment for LPSD risk. The attached Commission paper (SECY-01-0067) dated April 20, 2001 (pp. 2-7) contains the staff's status report. The final standard is to be published in June 2003.

Subsequently, the Committee tasked Dr. Savio to gather information on significant low-power and shutdown operational events for use by the Committee in preparing a report to the Commission in the future. Dr. Savio is in the process of gathering such information.

In the recent report to the Commission on the NRC Safety Research Program, the Committee stated that the ACRS continues to believe that the agency should undertake an effort to develop capabilities to quantitatively assess risk during low-power and shutdown modes of operation. The ACRS recommends that the Commission authorize the staff to undertake such an effort.

In view of the above information, it is obvious that the Committee has been constantly bringing its concerns regarding LPSD risk to the attention of the Commission.

RECOMMENDATION:

The Subcommittee recommends that the Committee decide on the following:

- Should the ACRS write another report to the Commission in the very near future reiterating its previous recommendations on LPSD risk?
- Should the Committee wait until Dr. Savio gathers adequate information on LPSD events and use that information as a basis for writing the next report to the Commission?

5) Safety Culture

In SECY-98-059, "Proposed Options for Assessing the Performance and Competency of Licensee Management," the staff proposed five options for ensuring that licensees maintain competent management at their nuclear plants. In the June 29, 1998 SRM (p. 8) related to SECY-98-059, the Commission approved the current staff practice of inferring licensee management performance from performance-based inspections, routine assessments, and event follow up. Also, the Commission approved the elimination of any FY 1998 resource expenditures specifically directed at developing a systematic method of inferring management performance. The Commission also disapproved any use of FY 1999 and FY 2000 resources for these purposes.

Mr. Sorensen, ACRS Senior Fellow, was tasked with developing a report on safety culture. On November 19, 1999, Mr. Sorensen briefed the Human Factors Subcommittee regarding this matter. He also discussed his draft report with the members during the January 2000 ACRS retreat. In addition, the Human Factors Subcommittee discussed with M. Sorensen his report during its March 15, 2000 meeting. Subsequently, Dr. Apostolakis, Human Factors Subcommittee Chairman, recommended that Mr. Sorensen complete his report and that the Committee prepare a report to the Commission on this matter at the July 2000 ACRS meeting.

At the July 2000 meeting, the Committee decided not to write a report on safety culture, instead it suggested that Mr. Sorensen prepare a short version of his report to be presented at the International Conference on Probabilistic Safety Assessment and Management, November 27-December 1, 2000, Osaka, Japan. The paper jointly prepared by Mr. Sorensen, Dr. Apostolakis, and Dr. Powers is attached (pp. 9-15). The long report prepared by Mr. Sorensen is yet to be issued.

In its recent report to the Commission on the NRC Safety Research Program, the Committee recommended expansion of PRA capabilities in the areas of plant aging, safety culture, and latent human errors. The Committee also stated that there are some indications that it may be possible to quantify the effects of safety culture on human performance. Even of more interest is the evidence that there could be an optimal level of regulatory involvement to encourage safety cultures.

RECOMMENDATION:

The Subcommittee recommends that the Committee decide on the following:

- Should the ACRS write a report to the Commission expanding the comments and recommendations in the recent research report and also using the information in Mr. Sorensen's report, or should it wait for Commission reaction prior to proceeding further?
- Should the ACRS finalize and send the report prepared by Mr. Sorensen with a transmittal letter to the Commission?

6) Quadripartite Meeting Update

During the April meeting, the Committee was informed that in a recent letter from Lothar Hahn, Chairman of the RSK, he noted that preparations are continuing for Germany to host the next Quadripartite meeting, possibly later this year. The French GPR have confirmed their participation and the RSK is currently working to confirm the participation of the Japanese NSC.

Subsequent to the April meeting, Mrs. Waldorf from GRS in Germany said that the RSK plans to meet on May 3, 2001 to discuss among other topics the next Quadripartite meeting. Mr. Lathar Hahn, Chairman of the RSK, will be attending this meeting. According to Mrs. Waldorf, consideration is being given to hold the next Quadripartite meeting in November 2001.

RECOMMENDATION:

The Subcommittee recommends that the members propose dates as well as topics for this meeting.

7) Advanced Reactors Subcommittee Workshop Regulatory Challenges for Future Reactors

Input on the workshop agenda was obtained during the April ACRS meeting and the agenda has been finalized and distributed to the workshop speakers and panelists. We plan on issuing a NUREG report summarizing the workshop discussions and the workshop speakers have been asked to provide their viewgraphs and summaries of their presentation before the workshop. The agenda has been posted on the ACRS web site and has been published in the FRN. NEI has published a notice of the workshop in Nuclear Energy Overview (NEI's weekly newsletter to its members) and the NRC Office of Public Affairs published a press release and posted this press release on the "News and Information" page of the NRC's home page on May 8, 2001. A notice for the workshop has been published on the NRC's list of public NRC meetings. The ANS, Nuclear News, and Inside NRC have been notified.

The workshop will be held in the NRC auditorium for the first day and morning of the second day. We will have to move to the Commissioners' Conference Room for the afternoon of the second day to allow for preparations for the June 6, 2001 NRC Awards Ceremony.

8) Differing Professional Opinion on Steam Generator Tube Integrity Issues

In March 2001, the ACRS issued NUREG-1740, "Voltage-Based Alternative Repair Criteria," which was prepared by the ACRS Ad Hoc Subcommittee on Differing Professional Opinion (DPO). This report documents the conclusions and recommendations of the Subcommittee, which were endorsed by the full Committee, on the technical issues raised by Dr. Hopenfeld in his DPO. Please note that Dr. Hopenfeld has retired from NRC at the end of April 2001.

On April 24, 2001, Dr. Hopenfeld sent a memorandum (pp. 16-19) to the Commission, expressing his concerns about the actions taken by the EDO to close the DPO without resolving the concerns raised by the ACRS in NUREG-1740. He requested that the Commission take appropriate actions and instruct PWR plants to plug all tubes that exceeded 2 volts at the beginning of the last fuel cycle. He states that these plants are in violation of 10 CFR Part 100 and present an unacceptable safety risk. Further regulatory relief under Generic Letter 95-05 should be suspended until all the ACRS safety concerns are addressed.

NRC Chairman Meserve, in a recent conversation with Dr. Apostolakis, informed him that Dr. Meserve would like the ACRS to inform the Commission at the May 11 ACRS meeting with the Commission as to whether there are any urgent safety concerns that should be dealt with by the agency immediately. On May 4, 2001, the Chairman sent a memorandum to the EDO (p. 20) regarding this matter. In addition, on May 7, 2001, the Chairman sent a memorandum (p. 21) to Dr. Apostolakis requesting ACRS views on whether immediate actions, other than those already being taken by the staff, are needed.

#### RECOMMENDATION

The Subcommittee recommends that the Committee discuss the concerns raised by Dr. Hopenfeld in his April 24, 2001 memorandum to the Commission as well as Chairman Meserve's request to the ACRS and prepare a report to the Commission addressing the following issues:

- Whether there are urgent safety issues associated with steam generator tube integrity that the agency should be dealt with immediately.
- Whether Dr. Hopenfeld has characterized accurately the Ad Hoc Subcommittee's comments and recommendations included in NUREG-1740.

#### 9) David Lochbaum, Union of Concerned Scientists Testimony

David Lochbaum, Union of Concerned Scientists, testified on the Hill (pp. 22-29) and made reference to various issues, including the DPO, license renewal, and other things that impact ACRS activities. His testimony is critical of the agency's handling of the DPO, utility aging management programs, NRC's assessment of their effectiveness, and the implementation of risk-informed regulations.

#### RECOMMENDATION

The Subcommittee recommends that Dr. Savio contact a staff member of the Clean Air, Wetlands, Private Property, and Nuclear Safety Subcommittee of the U.S. Senate Committee on Environment and Public Works to find out whether members of the Subcommittee would like to have ACRS views on the testimony provided by Mr. Lochbaum. If asked, Dr. Savio will state that ACRS members are concerned that ACRS positions may have been misstated.

10) RSK Workshop on Risk Informed Decisionmaking in Nuclear Safety

Dr. Lothar Hahn transmitted an email to ACRS Executive Director, Dr. John Larkins (pp. 24-33), on May 8 noting that a workshop has been organized in Bonn, Germany, for June 11-12, 2001, to develop a common paper on risk informed decisionmaking in nuclear safety, which would describe the merits and limitations of using risk-information as compared to traditional deterministic regulatory safety analysis. The meeting includes participation from NRC staff and an NRC Commissioner, along with a representative from the Union of Concerned Scientists and NEI. It does not specifically request ACRS participation, however, a slot is available on the agenda for the ACRS, and we assume an invitation would be made if the Committee decided to participate.

RECOMMENDATION

The Subcommittee recommends that the ACRS Executive Director find out whether any NRC staff and Commissioner Diaz plan to attend the RSK workshop. The ACRS Executive Director should inform Dr. Lothar Hahn that even though the ACRS has an interest on this matter, due to the lateness of the invitation it would be difficult for the ACRS members to attend this workshop.

11) Member Issues

Travel Request

Dr. Kress has requested to travel to Milwaukee, Wisconsin, June 18-20, 2001, to attend the ANS Annual Meeting.

RECOMMENDATION

The Subcommittee recommends that the Committee approve Dr. Kress' travel request.

12) Miscellaneous

The Subcommittee recommends that a letter of appreciation be sent Dr. Zuber, who recently resigned as a consultant to the ACRS (pp. 30-31), for his significant contributions to the Thermal-Hydraulic Phenomena Subcommittee.

March 31, 2000

MEMORANDUM TO William D Travers  
Executive Director for Operations

FROM Annette Vietti-Cook, Secretary /s/

SUBJECT STAFF REQUIREMENTS - SECY-00-0007 - PROPOSED STAFF PLAN FOR LOW POWER AND SHUTDOWN RISK ANALYSIS RESEARCH TO SUPPORT RISK-INFORMED REGULATORY DECISION MAKING

The Commission has approved the staff's proposal to actively participate in the American Nuclear Society's work to develop low power and shutdown (LPSD) probabilistic risk assessment standards (part 1 of the 4 part proposal). In support of the standard development, the staff should 1) identify those plant operating states which need to be included in the scope of the standard for consistency in the treatment of shutdown risk and associated configuration risk management decision-making, 2) identify specific shutdown events which are important to risk and need to be considered to provide focus for the standard. Funding for these two tasks (not included in Part 1 of the staff's proposal) should be provided by reprogramming the proposed Tasks 2,3 and 4 to cover one year's work. The staff should report to the Commission its progress and propose additional work if needed.

(EDO)

(SECY Suspense: 3/2001)

The Commission has disapproved the development of improved guidance for considering LPSD risks (part 2), the development of improved methods and tools for assessing human reliability analysis and level 2 risk (part 3), and evaluation of areas identified by the ACRS and other stakeholders as potentially important to risk (part 4).

cc Chairman Meserve  
Commissioner Dicus  
Commissioner Diaz  
Commissioner McGaffigan  
Commissioner Merrifield  
OGC  
CIO  
CFO  
OCA  
OIG  
OPA  
Office Directors, Regions, ACRS, ACNW, ASLBP (via E-Mail)  
PDR  
DCS

/



## **POLICY ISSUE** **(Notation Vote)**

April 20, 2001

SECY-01-0067

**FOR:** The Commissioners

**FROM:** William D. Travers  
Executive Director for Operations

**SUBJECT:** REPORT ON SUPPORT TO THE AMERICAN NUCLEAR SOCIETY FOR  
THE DEVELOPMENT OF STANDARD ON PROBABILISTIC RISK  
ASSESSMENT FOR LOW POWER AND SHUTDOWN

**PURPOSE:**

To report the status of the staff's activities in support of the American Nuclear Society (ANS) efforts to develop a probabilistic risk assessment (PRA) standard for low power and shutdown (LPSD) operations and request Commission approval on additional work needed to support this effort

**BACKGROUND**

In SECY-00-0007 (January 12, 2000), the staff proposed a plan for work on LPSD risk to support risk-informed regulatory decision-making. The purpose of this work was to support the development by ANS of a standard on LPSD PRA quality and to assess in a more realistic fashion the risk associated with LPSD operations. The Commission, in its staff requirements memorandum (SRM) of March 31, 2000, approved the staff's plan to support ANS in developing standards for a LPSD PRA. Specifically, the Commission directed the staff to (1) identify those plant operating states (POSS) which need to be included in the scope of the standard for consistency in the treatment of shutdown risk and associated risk management decision-making and (2) identify specific shutdown events which are important to risk and need to be considered in the standard. The Commission also directed the staff to report its progress and propose additional work if needed.

**CONTACT:**  
Erasmia Lois, RES  
415-6560

DISCUSSION:

Since the Commission's SRM of March 31, 2000, work has proceeded in the following areas:

- ANS activities regarding development of a LPSD PRA
- Staff activities regarding identification of POSs and initiating events important to LPSD risk.

A summary of the work in each of these areas follows.

***ANS Activities:***

ANS is developing a LPSD PRA standard. This standard fits with the PRA standard being developed by the American Society of Mechanical Engineers (ASME). That is, ASME is developing a standard for a Level 1 and Level 2 PRA for internal events (excluding fire) at full power operation. ANS is developing a complementary standard for internal events (excluding fire) at LPSD conditions and is building upon the ASME effort.

In developing the LPSD PRA standard, ANS has divided the standard into three major areas:

1. Criteria for identifying and screening the POSs not important to risk.
2. Criteria for identifying and screening plant configurations not important to risk.
3. Criteria for estimating the core damage frequency (CDF) and large early release frequency (LERF) for the risk important POSs and associated configurations.

POS Identification and Screening:

A plant transitions through different states as it shuts down from full power or as it restarts to full power. The risk associated with some POSs does not contribute substantially to the total plant risk. For these POSs, development of a quantitative model is not necessarily warranted. The ANS standard will provide a set of criteria for identifying the potentially risk important operating states while screening the unimportant. ANS plans to base these criteria on available analyses (information) indicating what POSs have been found to be risk significant along with any unique or specific characteristics. A major input will be the work currently being pursued by the staff (discussed later in this paper).

Plant Configuration Identification and Screening:

As with the POS, not every plant configuration is risk significant. Consequently, the ANS standard will also contain criteria for identifying the significant configurations and screening the unimportant configurations. ANS plans to build upon industry's Configuration Management program that would compare configurations against a "benchmark" to determine if it is risk significant relative to full power. The Electric Power Research Institute (EPRI) is funding the necessary research to develop this benchmark. It is ANS's intention to use the results of

EPRI's effort to develop the necessary criteria to identify the risk significant configurations associated with the risk significant POSs.

Quantification of CDF and LERF for LPSD:

ANS is developing criteria to estimate CDF and LERF for the risk significant POSs and associated configurations for LPSD conditions. The techniques used in the major tasks of a PRA are applicable to both full power and LPSD (e.g., developing a fault tree). Therefore, the technical criteria developed by ASME for full power will be adopted by ANS to develop a LPSD standard. Consequently, the ANS standard will provide the criteria for modifying a full-power model for application at LPSD. For example,

- Initiating Events – There are many events in the full-power model which cannot occur at LPSD and therefore should be deleted. Similarly, there are events unique to LPSD conditions that are not included in the full-power model. Criteria for identifying these LPSD events are needed. A major input will be the work currently being pursued by the staff (discussed later in this report).
- Success criteria – at LPSD conditions, the success criteria (e.g., amount of coolant inventory needed to prevent core damage) is different than at full-power. Therefore, the event trees and fault trees, for example, will need to be modified to account for the different accident progression and different logic.
- Level 2 – The ASME Level 2 PRA standard at full-power is only for the estimation of LERF and relies heavily on the approach described in NUREG/CR-6595, "An approach for Estimating the Frequencies of Various Containment Failure Modes". This guideline does not fully cover LPSD conditions. For ANS to adopt this approach, work is needed to expand this method to address LPSD.

For the areas where information is needed for LPSD, the ANS project team writing the standard is obtaining this information from technical studies, where available. For example, the ANS project team is relying on staff work regarding risk significant LPSD events, and EPRI work on risk significant LPSD configurations. However, with regard to Level 2 PRA analyses, the ANS project team believes there is insufficient information to write the Level 2 part of the LPSD standard and additional work is needed (as discussed above). At present, there are no efforts underway in this area. The ANS project team is looking for support in this area. Without support, ANS will either reduce the scope of the standard to just Level 1 (with a LPSD Level 2 PRA standard potentially at some future date) or delay the schedule until ANS (through its project team members) can perform the necessary work. This delay would be substantial since this work (via the members) would be voluntary.

Although the Commission in its SRM of March 31, 2000, had not approved the staff's plan to perform Level 2 LPSD work, the staff recommends some limited Level 2 work to support the ANS LPSD PRA standard effort. Specifically, the staff proposes to revise NUREG/CR-6595 to fully account for LPSD conditions. The staff support to ANS in this area will help ensure that ANS meets its proposed schedule.

***Staff Activities:***

The staff is actively supporting the ANS LPSD standard development; the staff activities include:

- Provided funding to ANS through a grant to support their LPSD PRA standard development. This grant assists in the administrative costs and in recruiting LPSD PRA technical experts.
- Being active members in (a) the ANS Risk Committee responsible for setting policy and providing technical oversight and (b) the Project Team which has the responsibility to write the standard.
- Performing technical studies in the areas of important POSs and important initiating events. This work is being performed through NRC's participation in the LPSD Working Group of the International Cooperative PRA (COOPRA) Research Program, which is discussed below.

***COOPRA LPSD Working Group Activities:***

The International COOPRA Research Program is a program organized and administered by RES and consists of risk analysts from 22 different countries. The purpose of COOPRA is to provide a forum for technical exchange of information on PRA methods, data, and results. COOPRA has undertaken several initiatives, including LPSD risk, each of which is supported by a working group which sets specific objectives to be pursued in the identified area.

The NRC representative chairs the LPSD COOPRA working group. The objectives established by the working group are to share information specific to LPSD, identify areas of common interest, and identify and pursue cooperative research programs on LPSD risk.

Many areas of common interest (i.e., information needed to support the activities of participant organizations) have been identified by the LPSD working group including, but not limited to:

- Initiating event frequencies (includes controlled shutdowns)
- Fire
- Screening and splits in POSs
- Thermal-hydraulic analyses
- Boron dilution
- Human reliability analysis (including instrumentation)/recovery
- Common cause failures
- Instantaneous versus average risk
- Repair of equipment/recovery
- Mission time
- Cold overpressurization

Of these, the LPSD working group identified the areas of initiating events and POSs as the highest priority to pursue and is currently working on technical reports. The reports will include insights regarding the significance of LPSD risk for POSs and initiating events, respectively. These insights will be derived from LPSD PRAs and operational experience provided from each member country. From these reports, ANS will have the benefit of international knowledge to develop the LPSD standard in addition to U.S. experience.

**SCHEDULE:**

The staff efforts (including COOPRA LPSD working group) have been scheduled to support the ANS LPSD PRA activities. The major milestones (for COOPRA, NRC, and ANS) are as follows:

Milestone	Dates	Responsible Organization
POS and IE final technical reports	9/01	NRC/COOPRA
POS screening criteria	12/01	ANS
Benchmark technical analysis	12/01	EPRI
Level 2 (revise NUREG/CR-6595)	12/02	NRC
Configuration screening criteria	3/02	ANS
Quantitative LPSD criteria	3/02	ANS
Integrated LPSD draft standard	12/02	ANS
Published LPSD final standard	6/03	ANS

**RESOURCES:**

RES resources needed for supporting the ANS effort to develop LPSD PRA standard, including the new proposed work, are included in the current RES budget for FY 2001 and in the proposed FY 2002 and 2003 budgets. Specifically, the resources for the new proposed work for which the staff is requesting approval are about 0.1 FTEs and \$50k total (for FYs 2001, 2002, and 2003).

**COORDINATION:**

The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objections.

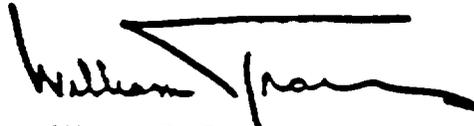
RECOMMENDATION

The staff recommends that the Commission approve:

- support to ANS for revising NUREG/CR-6595 to address LPSD conditions

The staff support to ANS in this area will help ensure that ANS meets its proposed schedule.

In the interim, the staff will continue to support ANS in developing a LPSD standard and continue to work with the COOPRA LPSD working group in producing technical reports on POSs and initiating events to support the ANS effort.



William D. Travers  
Executive Director  
for Operations

Commissioners' completed vote sheets/comments should be provided directly to the Office of the Secretary by COB Monday, May 7, 2001.

Commission Staff Office comments, if any, should be submitted to the Commissioners NLT April 30, 2001, with an information copy to the Office of the Secretary. If the paper is of such a nature that it requires additional review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

DISTRIBUTION:

Commissioners  
OGC  
OIG  
OPA  
OCA  
ACRS  
CIO  
CFO  
EDO  
SECY

June 29, 1998

MEMORANDUM TO: L. Joseph Callan  
Executive Director for Operations

FROM: John C. Hoyle, Secretary /s/

SUBJECT: STAFF REQUIREMENTS: SECY-98-059 - PROPOSED  
OPTIONS FOR ASSESSING THE PERFORMANCE AND  
COMPETENCY OF LICENSEE MANAGEMENT

The Commission, after considering the five options contained in SECY 98-059 for ensuring that licensees maintain competent management at their nuclear plants, approved only those elements of Option 2 associated with the current staff practice of inferring licensee management performance from performance-based inspections, routine assessments, and event follow up. Efforts to develop leading indicators of performance should not use licensee management performance or competency as an input, and the inspection program should focus on performance-based inspection findings.

The Commission approved the elimination of any FY 1998 resource expenditures specifically directed at developing a systematic method of inferring management performance. The Commission also disapproved any use of FY 1999 and FY 2000 resources for these purposes.

cc: Chairman Jackson  
Commissioner Dicus  
Commissioner Diaz  
Commissioner McGaffigan  
OGC  
CIO  
CFO  
OCA  
OIG  
Office Directors, Regions, ACRS, ACNW, ASLBP (by E-Mail)  
PDR  
DCS

SECY NOTE: This SRM, SECY 98-059, and the Commission Voting Record will be made available to the public 5 working days from the date of this SRM

3

# ON THE ROLE OF SAFETY CULTURE IN RISK-INFORMED REGULATION

J. N. Sorensen, Senior Fellow  
G. E. Apostolakis, Member  
D. A. Powers, Member  
Advisory Committee on Reactor Safeguards  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555-0001, USA

To be presented at  
International Conference on Probabilistic Safety Assessment and Management  
November 27 - December 1, 2000  
Osaka, Japan

## Abstract

There is a widespread belief that safety culture is an important contributor to safety of operations. The commonly accepted attributes of safety culture include good organizational communications, good organizational learning, and senior management commitment to safety. Safety culture may be particularly important in reducing latent errors in complex, well-defended systems. The role of regulatory bodies in fostering strong safety cultures remains unclear, and additional work is required to define the essential attributes of safety culture and to identify reliable performance indicators.

Note: The views expressed in this paper are the authors' and do not necessarily represent the views of the Advisory Committee on Reactor Safeguards.

## 1. Introduction

The importance of management and organization factors to nuclear facility safety was explicitly recognized in the aftermath of Three Mile Island. Following the Chernobyl accident, the International Nuclear Safety Advisory Group (INSAG) introduced the term 'safety culture' to represent the entirety of management and organization factors important to safety. Although INSAG intends that 'safety culture' capture all the management and organizational factors relevant to safe plant operation [1], many investigators use the term more narrowly. 'Safety culture' is often used to denote an element of organizational culture, which, in turn, is a component of the broader term 'management and organizational factors.'

The importance of organizational culture to the safety of operations has been established by studies in the chemical process industry, but similar data from nuclear power plants have been incomplete. Nonetheless, there is widespread belief that safety culture is an important indicator of, and contributor to, reactor safety.

## 2. The Concept of Safety Culture

Suggestions that 'culture' might help explain organizational behavior, and that management and organizational factors could influence safety performance, both predated INSAG's introduction of the term 'safety culture.' Ostram, et al.[2], note that "Heinrich's Domino Theory developed in the 1930s was based on the premise that a social environment conducive to accidents was the first of five dominos to fall in an accident sequence." Uttal [3] summarized the meaning of organizational culture as a system of shared values (what is important) and beliefs (how things work) that interact with a company's people, organizational structures, and control systems to produce behavioral norms (the way we do things around here)

While the literature does not support a single definition of safety culture, there is some agreement on the organizational attributes that indicate a strong safety culture. In studying safety in the chemical process industry, Lee [4] found that the characteristics of low accident rate plants included a high level of communication, good organizational learning, a strong focus on safety by the organization at all levels, and a strong senior management commitment to safety. Lee started by identifying 19 attitudes toward safety, such as confidence in safety procedures, personal caution over risks, trust in the workforce, perceived clarity of safety rules, and satisfaction with work relationships. An attitude survey was designed to measure the degree to which individual workers reflected those attitudes. Using self reported accident rates as the safety metric, Lee found a strong correlation between 15 out of 19 of the factors (attitudes) and low accident rates.

During the 1990s, the NRC sponsored work at Brookhaven National Laboratory to look at the relationship between organizational factors and safety. Jacobs & Haber [5] developed a set of twenty management and organization factors, including coordination of work, communications, organizational culture, safety culture, goal prioritization and human resource allocation. The investigators reported successfully correlating particular factors, such as good communications, with particular safety metrics, such as a low number of human error events. Development of the underlying

theory and design of the measurement process is well documented, but data collection appears to have been limited to one fossil power plant and two nuclear power plants

### 3. Safety Culture and Human Error

The term 'human error' is generally understood to mean an unsafe act by a system operator. The consequences of such an act may or may not be severe, depending on other circumstances. Such circumstances are often the product of organizational factors that determine system response. In his taxonomy of human error, Reason [6] distinguishes between active errors, "whose effects are felt almost immediately," and latent errors, "whose adverse consequences may lie dormant within the system for a long time ..." Active errors are associated with system operators such as airplane pilots, air traffic controllers, or power plant control room personnel. Latent errors are associated with personnel removed from operations, such as designers and maintenance personnel

Active errors, or unsafe acts, may interact with organizational factors and local workplace factors to create what Reason calls 'organizational accidents' [7]. The organizational factors and local workplace factors not only interact directly, but each may create latent condition pathways. Accidents with significant losses occur when all these conditions align in such a way that the defenses built into a system are overwhelmed.

Latent conditions may be sufficient to cause accidents. The prevalence of latent errors was identified in a recent study by the Idaho National Engineering and Environmental Laboratory (INEEL)[8]. INEEL analyzed 35 operating events and found that most identified errors were latent, with no immediate observable impact. The ratio of latent to active errors was 4:1.

The INEEL findings are supported by other analyses. In discussing a human performance improvement program at Duke Power Company, one Duke senior manager observed that "If you analyze an entire event, . . . you'll find it wasn't just one mistake - - it was five, six or seven mistakes that occurred and there weren't enough contingencies or barriers built in to prevent the event from happening [9]."

A systematic effort to improve human performance at Duke Power's McGuire, which addresses virtually the same factors identified by INSAG's model of safety

culture, has produced significant improvements in station performance. The program was started in 1994 at McGuire when declining performance required correction, and management determined that station processes and programs were to blame. Since the program was initiated, refueling outage times at McGuire have been reduced from about 90 days to about 33 days, and capacity factors have increased from about 72% to about 89%.

#### 4. A Regulatory Perspective

The Advisory Committee on the Safety of Nuclear Installations (ACSNI) identifies fostering safety culture as the next stage in the evolution of safety regulation [10]. They suggest that, "The regulators need to act in such a way as to encourage 'ownership' of safety by the whole staff of the licensee."

A theme that runs through the ACSNI study is that the most effective safety cultures will develop in less prescriptive regulatory structures. A subsequent report notes that, "It is recognized that there are a number of prescriptive regimes, such as the U.S. Nuclear Industry, where the encouragement of a positive safety culture is still essential. It is considered that those Operators with good Safety Cultures, within the US regulatory regime, tend to self-regulate around the constraints of the regulatory regime, to attain levels of safety which are beyond those minima specified in the regulations. The manner in which the Regulator can encourage such self regulation is not clear" [11].

This idea is explored in some detail in an earlier paper by Marcus [12], in which he examines the implementation of certain NRC requirements at several U.S. nuclear power plants. His conclusion was that, "... nuclear power plants with relatively poor safety records tended to respond in a rule-bound manner that perpetuated their poor safety performance and that nuclear power plants whose safety records were relatively strong tended to retain their autonomy, a response that reinforced their strong safety performance."

Current NRC programs to develop risk-informed regulatory processes and performance-based reactor oversight do not appear to be at odds with some degree of self-regulation. The new reactor oversight program [13] identifies a level of performance, as measured by a set of performance indicators, where regulatory involvement will be limited to a baseline inspection program. The program is

structured around seven cornerstones of safety performance, each monitored by one or more performance indicators. In addition to the cornerstones, the staff has identified three "cross-cutting" elements associated with each cornerstone: human performance, safety-conscious work environment, and corrective action programs. There are currently no performance indicators associated with these cross-cutting issues. The NRC staff argues that, if risk-informed inspections and plant performance indicators show that cornerstone objectives are being met, then the associated human performance is also acceptable [13]. The ACSNI study group [10] concluded, however, that research is required to increase the number of validated culture and performance indicators available, and to establish the extent to which the indicators remain valid once they have been identified and used as indicators.

An issue that is important from a regulatory standpoint is assuring that root-cause analyses are sufficiently thorough to identify safety culture deficiencies and their impact on safety. Weil and Apostolakis [14] have extended traditional root-cause analyses to include work processes and Reason's model of human error [6]. They applied their methodology to a number of incidents and identified six of the twenty factors proposed by Jacobs and Haber [5] as being important: communications, formalization, goal prioritization, problem identification, roles and responsibilities, and technical knowledge. The basis for choosing these six was identifying factors that affected a large number of tasks and/or were often cited as contributing to errors. They also found that the significance of each factor must be assessed in the context of the tasks that constitute the work processes at the plant.

## 5. Conclusions

Reason [7] observes that the quality of both production and protection depend on the same organizational processes. However, "... the partnership between production and protection is rarely equal ... partly because the information relating to production is direct, continuous, and readily understood." By contrast, "... safe operations generate a constant - and hence relatively uninteresting - non-event outcome." Safety culture and the attributes associated with safety culture are important contributors to both system safety and system performance.

The suggested next step in understanding the relationship among safety culture, safety of operations, and safety regulation is to develop consensus on the essential attributes of safety culture, and to identify suitable performance indicators. Equally

important is assuring that root-cause analyses and corrective action processes are capable of identifying safety culture issues. Models for human performance, such as ATHEANA, will not be realistic until the influence of the plant's safety culture on the "error-forcing context" is assessed [15]

Ultimately, the regulatory authorities will have to arrive at an understanding of how their regulatory processes can affect the safety cultures of their licensees, both positively and negatively. The role of the regulator needs to be determined, including the possibility that there is no role other than monitoring. As noted in section 4, regulatory practice does impact the licensee's safety culture. This impact needs to be understood.

## 6. References

1. International Nuclear Safety Advisory Group, "Safety Culture," Safety Series No 75-INSAG-4, International Atomic Energy Agency, Vienna, 1991
2. Ostram, L., Wilhelmsen, C., and Kaplan, B., "Assessing Safety Culture," Nuclear Safety, 34, 163-172, 1993
3. Uttal, B., "The Corporate Culture Cultures," Fortune, 108, 8, 66-72, 1983
4. Lee, T., "Assessment of Safety Culture at a Nuclear Reprocessing Plant," Work and Stress, 12, 217-237, 1998
5. Jacobs, R., and Haber, S., "Organizational Processes and Nuclear Power Plant Safety," Reliability Engineering and System Safety, 45, 75- 83, 1994
6. Reason, J., Human Error. Cambridge University Press, Cambridge, 1990
7. Reason, J., Managing the Risks of Organizational Accidents. Ashgate Publishing, Aldershot, 1997
8. INEEL, "Quantitative Analysis of Risk Associated with Human Performance," Presentation to the Human Factors Subcommittee of the Advisory Committee on Reactor Safeguards, Rockville, Maryland, March 15, 2000
9. Shiel, T., "The Human Performance Improvement Program at Duke Power Nuclear Stations," Nuclear News, 43, 6, 30-34, May 2000
10. ACSNI Study Group on Human Factors, Third Report: Organizing for Safety. Advisory Committee on the Safety of Nuclear Installations, Health and Safety Executive, United Kingdom, 1993
11. Berman, J., Brabazon, P., Bellamy, L., & Huddleston, J., The Regulator as a Determinant of the Safety Culture. Prepared for the Health and Safety

- Executive, Nuclear Safety Research Management Unit, Four Elements Limited,  
London, September 1, 1994
12. Marcus, A., "Implementing Externally Induced Innovations A Comparison of Rule-Bound and Autonomous Approaches," *Academy of Management Journal*, 31, 235-256, 1988
  13. U. S. Nuclear Regulatory Commission, *Recommendations for Reactor Oversight Process Improvements*, SECY-99-007, January 8, 1999
  14. Weil, R., and Apostolakis, G., "Identification of Important Organizational Factors Using Operating Experience," *Proceedings of the 3rd International Conference on Human Factor Research in Nuclear Power Operations*, Mihama, Japan, September 8-10, 1999
  15. Advisory Committee on Reactor Safeguards, *Letter to Richard A. Meserve, Chairman, USNRC, Subject. SECY-00-0053, NRC Program on Human Performance in Nuclear Power Plant Safety*, May 23, 2000



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

April 24, 2001

RECEIVED  
ACRS/ACNW  
US NRC

APR 25 2001

AM 7,8,9,10,11,12,1,2,3,4,5,6 PM

MEMORANDUM TO: Chairman Meserve  
 Commissioner Dicus  
 Commissioner Diaz  
 Commissioner McGaffigan  
 Commissioner Merrifield

FROM: J. Hopenfeld  
 Engineering Research Application Branch  
 Division of Engineering Technology  
 Office of Nuclear Regulatory Research

SUBJECT: DIFFERING PROFESSIONAL OPINION ON STEAM  
 GENERATOR TUBE INTEGRITY ISSUES

It is now almost 10 years since I originally raised several serious safety issues concerning the NRC practice of permitting excessively degraded steam generators tubes to remain in service during plant operations. This practice while benefiting the nuclear industry, has had a serious negative potential impact on public safety. After many and continuing attempts by NRC management to ignore these DPO issues, they remain unresolved. As demonstrated by the Indian Point 2 (IP2) accident, excessively degraded tubes continue to threaten public safety.

Blatantly disregarding the recent ACRS findings (items 1-9 below) the staff granted South Texas 2 relief on March 8, 2001.

This memo is to request that you take the appropriate actions and instruct PWR plants to plug all tubes that exceeded 2 volts at the beginning of the last fuel cycle. These plants are in violation of 10 CFR PART 100 and present an unacceptable safety risk. Further regulatory relief under GL95-05 should be suspended until all the ACRS safety concerns are addressed.

During the past ten years, the NRC has expended inordinate resources on my DPO safety issues and has publically claimed that they have been properly addressed. The new ACRS findings, NUREG-1750, clearly indicate that the staff contentions were flawed and misleading, and that the allocated resources have been wasted.

The ACRS had concluded last November that the staff position on the issues raised by the DPO is indefensible. Accordingly, the Executive Director for Operations, EDO, was requested to resolve these issues and report the outcome to the ACRS. Instead, the EDO merely instructed the divisions of RES and NRR to draft a new action plan and closed the DPO. Closing the DPO without specifying how it will be resolved is a clear violation of Management Directive (MD) 10.159(C). The EDO's latest action compounds previous violations of MD 10.159, making a sham of the entire process of encouraging employees to raise safety concerns. The NTEU union filed a grievance on my behalf to keep the DPO open until it is resolved.

The EDO has already tried before, and failed to cause the staff to address adequately the DPO issues. In a memo to me dated May 1, 1996, the EDO stated that the staff would undertake "a vigorous research program to investigate steam generator material behavior, adequacy of crack detection and analysis methods, behavior of steam generators under selected severe accidents scenarios, and improved understanding of iodine spiking in regard to radiological consequence, as recommended by the ACRS regard to your DPO."

Ten years of "vigorous research" clearly did not produce results that can be used to grant regulatory reliefs. These results only reflect technical ignorance and incompetence. Nevertheless, the EDO now plans to invest additional funds on "research". This practice of spending money on research for the ostensible purpose of masking regulatory inaction should be stopped.

The transcripts from the ACRS hearings and the following quotations from NUREG-1750 clearly demonstrate the poor state of knowledge at the NRC regarding steam generator safety issues.

1. "the staff has not adopted a technically defensible position on the choice of iodine spiking factor to be used on the analysis of design for compliance with requirements of 10 CFR Part 100 or General Design Criteria 19."
2. "The staff need to develop a defensible analysis of the uncertainties in its risk assessment, including uncertainties in its assessments of human error probabilities" (during design basis accidents.)
3. "The staff has not developed persuasive arguments to show that steam generator tubes will remain intact under the conditions of risk-important accidents which the reactor coolant remain pressurized."
4. "The Ad-Hoc Subcommittee found that the staff did not have a technically defensible understanding of these processes to assess adequately the potential for progression of damage of steam generator tubes."
5. "The Ad-Hoc Subcommittee did not feel that the staff has developed an adequate understanding of how movements of the tube support plate during an event could damage the tubes."
6. "The Subcommittee did not attempt to reach conclusions concerning occasions when staff granted exemptions to these criteria (1& 2 V) except to note that these exemptions should have been accompanied by more complete risk analysis."
7. "The databases for 7/8" tubes need to be greatly improved to be useful."
8. "This issue (tube shearing during depressurization), at the current level of understanding cannot be used to judge the adequacy of the alternative repair criteria described in GL-95-05."
9. "the issue of the possible evolution of severe accidents to involve gross failure of steam generator tubes and bypass of the containment is not yet resolved."

The EDO's memorandum to me dated March 5, 2001, misrepresented the ACRS findings by stating that the ACRS "found that no immediate regulatory actions are necessary." There is no reference in the ACRS report (NUREG -1750) to such findings. It is difficult to comprehend how anyone, even with minimal engineering background and knowledge of reactor operation, could conclude that the ACRS concerns do not raise serious safety issues that require immediate actions. Nevertheless, the EDO decided that these concerns can be resolved with additional research.

I disagree with the ACRS, to a degree, that the staff showed an inadequate understanding of the DPO issues. The staff has no understanding in certain major issues of the DPO. Given an environment where technical peer reviews do not exist, where staff with inadequate training is assigned to unfamiliar tasks, and where research results are preselected by management, it would be surprising if the staff had found an adequate resolution of the safety issues.

If the EDO believes that all that is required to resolve the ACRS concerns is additional research he is poorly informed concerning of how research is conducted at the NRC. In 1990, a prominent scientist, Dr. Novak Zuber told the American Nuclear Society at an award ceremony (Inside NRC, Nov 19, 1990) that the NRC conducts research in a manner which completely precludes the resolution of safety issues. What he said then is equally true today, "This (NRC) method of resolving the issue claims victory by waving arms, by twisting arms. However there is no resolution of the technical issues, and the problem is not solved, this problem will come up again next year...because it is not solved."

Technical solutions which are not favorable to the industry are set aside and are declared by management as "solved". Because the management is unwilling to confront the nuclear industry, staffers are afraid to express their concerns and must communicate by whispers in fear that they will be marked as "enemies" and their careers destroyed.

Last November the South Texas Project informed the staff that they would suffer a substantial financial loss if they had to plug tubes in South Texas Unit 2 beyond the 2V limit. Even though the ACRS concluded that leaving tubes beyond the 2V limit may not be conservative and South Texas did not properly address support plate movement and vibrations during depressurization, the staff quickly granted the licensees request.

The disregard of the ACRS findings and the approval of the South Texas Unit 2 request sends a clear signal to the nuclear industry: under the guise of "risk informed regulations", there is no need to have a valid and defensible technical position because regulatory relief is always granted when requested. Any rationale, even if it violates the basic laws of physics, can serve as a justification for requesting relief. Financial impact of the relief takes precedence over public safety.

Steam generators were originally sold to the utilities with the understanding that they would operate acceptably within design parameters for the lifetime of the plant. Because of inadequate and improper material selection, this expectation has never been fulfilled and some steam generators have been replaced after only a few years of service. U.S. plants alone have experienced 11 steam generator tube failure accidents, which can be traced to poor design and lack of meaningful NRC oversight. Additional, and possibly catastrophic, steam generator tube

failure accidents can be expected in the future since many nuclear power plants will be re-licensed for another 20 years.

The nuclear industry, however, has done essentially nothing to seriously address the safety issue. Licensees have demonstrated that their main goal is to continue using severely degraded steam generators as long as they want to do so. The NRC has been unwilling to insist that safety take priority over economics.

My DPO defined the main safety issues that should be addressed before relaxing the existing rules, for utilizing steam generators to the maximum extent possible without endangering the public. While the DPO failed to attain this goal, for ten years it has kept the public informed of the identified technical problems with severely degraded steam generator tubes. On at least one occasion, against NRC wishes, the DPO with public help, was instrumental in preventing severely degraded steam generators from being returned to service.

The NRC practices regarding steam generators contributed significantly to the recent IP2 accident. Fortunately this accident did not have significant safety consequences, it was, however, a serious precursor to the type of accidents which are described by the DPO. The NRC takes the unacceptable position that if the DPO accidents have not occurred they will not occur in the future.

The DPO has served as a reminder to the NRC that it can be held accountable for catastrophes that may follow steam generator tube failures. To remove this constant reminder, the NRC has used various methods in disregard of its own regulations: personal retaliations, attempts to select an unqualified DPO review panel, arm twisting (causing the resignation of one member from that panel), and a refusal to appoint an unbiased outside panel.

Though the ACRS findings apparently were not expected and could not be ignored, no efforts are being spared to minimize and obscure the findings. Regrettably, this continues the NRC culture of failing to keep the public informed of the danger to them from not removing severely degraded steam generators from service.

cc: W.D. Travers, EDO  
J. Larkins, ACRS  
D. Yeilding, NTEU

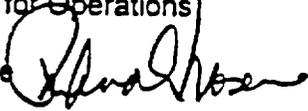


UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

May 4, 2001

CHAIRMAN

MEMORANDUM TO: William D. Travers  
Executive Director for Operations

FROM: Richard A. Meserve 

SUBJECT: DIFFERING PROFESSIONAL OPINION (DPO) ON STEAM  
GENERATOR TUBE INTEGRITY ISSUES

In a memorandum dated April 24, 2001, Dr. J. Hopenfeld informed the Commission of his concerns regarding "excessively degraded" steam generator tubes and your decision to close his Differing Professional Opinion (DPO) on steam generator tube integrity issues. Dr. Hopenfeld requested that the Commission take action to address what he believes to be an "unacceptable safety risk" to the public presented by excessively degraded steam generator tubes.

I request that you review Dr. Hopenfeld's memorandum and determine if there is any new information provided in it that would warrant additional examination or reconsideration of the staff's actions in granting the South Texas Unit 2 license amendment on March 8, 2001, or in granting other amendments allowing licensees to leave tubes in service that exceeded the 2V limit at the beginning of the last fuel cycle. If you determine that further consideration is warranted, you should take the necessary action and report your findings to the Commission. Your review and any actions that you initiate should be completed and the results reported to the Commission by June 1, 2001. Furthermore, I request that you keep me informed of any significant developments or delays associated with the staff's actions to address the Ad Hoc Subcommittee report.

As you are aware, an Ad Hoc subcommittee of the Advisory Committee for Reactor Safeguards (ACRS) was formed at your request to review the technical merits of the DPO. In a memorandum dated February 1, 2001, the Chairman of the Ad Hoc Subcommittee informed you that the ACRS had reviewed and endorsed the conclusions and recommendations of the Ad Hoc Subcommittee. Please be advised that I have also forwarded Dr. Hopenfeld's memorandum to the ACRS for an assessment of the accuracy of his characterization of the ACRS Ad Hoc Subcommittee report.

cc: Commissioner Dicus  
Commissioner Diaz  
Commissioner McGaffigan  
Commissioner Merrifield  
J. Hopenfeld, RES  
G. Apostolakis, ACRS  
✓ D. Powers, ACRS  
SECY

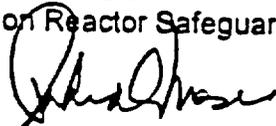


UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

May 7, 2001

CHAIRMAN

MEMORANDUM TO: George Apostolakis, Chairman  
Advisory Committee on Reactor Safeguards

FROM: Richard A. Meserve 

SUBJECT: DIFFERING PROFESSIONAL OPINION ON STEAM  
GENERATOR TUBE ISSUES

The Commission recently received the attached memorandum from Dr. Hopenfeld dated April 24, 2001, on the subject of his differing professional opinion on steam generator tube integrity issues. Dr. Hopenfeld asserts that the Executive Director for Operations (EDO), in a March 5, 2001 memorandum to him, does not accurately summarize the ACRS's findings on this matter. Specifically, Dr. Hopenfeld indicates that the EDO misrepresented the ACRS's findings in stating that the ACRS "found that no immediate regulatory actions are necessary." In light of Dr. Hopenfeld's concerns, I request that you provide the ACRS's views on whether immediate actions, other than those already being taken by the staff, are needed. In this connection, please note that the EDO has tasked the staff to develop an Action Plan that addresses the findings in the ACRS report.

You should also be aware that I have asked the EDO to review Dr. Hopenfeld's memorandum and determine if there is any new information provided in it that would warrant additional examination or reconsideration of the staff's actions in granting the South Texas Unit 2 license amendment on March 8, 2001, or in granting other amendments allowing licensees to leave tubes in service that exceeded the 2V limit at the beginning of the last fuel cycle.

Attachments:  
As stated

cc: Commissioner Dicus  
Commissioner Diaz  
Commissioner McGaffigan  
Commissioner Merrifield  
W. D. Travers, EDO  
SECY  
D. Powers, ACRS  
✓ J Larkins, ACRS



Union of  
Concerned  
Scientists

## Testimony on Nuclear Power before the Clean Air, Wetlands, Private Property, and Nuclear Safety Subcommittee of the United States Senate Committee on Environment and Public Works

My name is David Lochbaum. I have been the Nuclear Safety Engineer for the Union of Concerned Scientists (UCS) since October 1996. Prior to joining UCS, I spent more than 17 years in the industry on the startup and operation of nuclear power plants. UCS, established in 1969, seeks to ensure that all people have clean air, energy and transportation, as well as food that is produced in a safe and sustainable manner. We have worked on nuclear plant safety issues for nearly 30 years. In fact, far too many of the safety issues that I work on today were also worked on by my predecessor, Robert Pollard, and his predecessors, Daniel Ford and Henry Kendall. This experience convinces us that the United States should not consider an expanded role for nuclear power until we achieve something that we have never had—namely, a consistently effective regulator.

The Nuclear Regulatory Commission (NRC) has exclusive responsibility for regulating safety at US nuclear power plants. That the last US reactor meltdown happened 22 years ago (Three Mile Island) is circumstantial evidence that the NRC is not always an inept regulator. On the other hand, there is mounting circumstantial evidence in areas such as nuclear plant license renewal, steam generator tube cracking, risk-informed regulation, and nuclear plant security indicating that the NRC is not always an effective regulator either. These warning signs are described in the following sections.

### Nuclear Plant License Renewal

The NRC currently approves a 20-year extension to the original 40-year license for a nuclear plant after its owner "demonstrates that a nuclear power plant facility's structures and components requiring aging management review in accordance with §54.21(a) for license renewal have been identified and that the effects of aging on the functionality of such structures and components will be managed to maintain the CLB [current licensing bases] such that there is an acceptable level of safety during the period of extended operation."<sup>1</sup> In theory, this demonstration seems like a solid

---

<sup>1</sup> Part 54, Requirements for Renewal of Operating Licenses for Nuclear Power Plants, of Title 10 of the Code of Federal Regulations.

basis for continued safe operation. In reality, this demonstration amounts to little more than a paperwork exercise that is frequently contradicted by actual experience. Since the beginning of the 21<sup>st</sup> century, at least eight nuclear power plants have been forced to shut down due to equipment failures caused by aging:

1. March 7, 2000: The owner reported that Nine Mile Point Unit 2 in New York had automatically shut down when the system controlling the level of water over the reactor core failed. The owner attributed the failure as "Specifically, the manual-tracking card failed to provide an output signal when the feedwater master controller was switched from automatic to manual mode of operation ... The manual-tracking card failed due to aging." [emphasis added]
2. March 14, 2000: The owner reported that Catawba Unit 1 in South Carolina had automatically shut down due to an inadvertent electrical ground problem. The owner reported "A detailed failure analysis determined that the root cause of the connector failure was the misapplication of the connector insert insulating material which is made of neoprene. ... The neoprene insert at the failure point on the connector exhibits signs of accelerated aging [emphasis added]. The inserts are hardened and there are charred deposits on the end of the inserts which are indications of electrical tracking."
3. March 17, 2000: The owner reported that Indian Point Unit 2 in New York had been forced to declare an emergency condition and shut down after a steam generator tube failed and resulted in approximately 19,197 gallons leaking from the reactor coolant system. The owner stated "Preliminary analysis indicates that the cause of the tube failure is primary water stress corrosion cracking (PWSCC)" [i.e., aging].
4. March 27, 2000: The owner reported that Catawba Unit 2 in South Carolina had automatically shut down due to an inadvertent electrical ground problem. The owner reported "A detailed failure analysis determined that the root cause of the connector failure was the misapplication of the connector insert insulating material which is made of neoprene. ... The neoprene insert at the failure point on the connector exhibits signs of accelerated aging [emphasis added]. The inserts are hardened and there are charred deposits on the end of the inserts which are indications of electrical tracking."
5. September 12, 2000: The owner reported that Oyster Creek in New Jersey had been forced to shut down because a system needed to provide containment integrity had failed a periodic test. The owner determined "The cause of the degradation in Secondary Containment was age-related degradation [emphasis added] of the automatic ventilation exhaust valve seals."
6. September 27, 2000: The NRC reported that Diablo Canyon Unit 1 in California had automatically shut down after an electrical transformer failed and interrupted the supply of electricity to the reactor coolant pumps. The NRC stated "The licensee's evaluation concluded that a center bus bar overheated at a splice joint, which caused a polyvinyl chloride boot insulator over the splice joint to smoke. Eventually, heat-induced failure of fiberglass insulation on adjacent phases resulted in phase-to-phase arcing" [i.e., aging].
7. February 16, 2001: The owner reported that North Anna Unit 2 in Virginia had been forced to shut down due to leakage exceeding ten gallons per minute from the reactor coolant system. The owner determined "The cause of the stem packing material failure below the lantern ring is attributed to aging" [emphasis added].
8. April 2, 2001: The owner reported that San Onofre Unit 3 in California automatically shut down after an electrical breaker failed and started a fire. The failed breaker was reportedly 25 years old and scheduled for inspection *next* year. The owner "will

implement modifications to appropriate preventative maintenance [emphasis added] procedures to address the apparent failure causes."

Aging management programs are intended to monitor the condition of equipment and structures and implement repairs or replacements when necessary to prevent failures. The cited aging-related failures, occurring about once every 60 days, indicate beyond reasonable doubt that the aging management programs are inadequate because they are not preventing equipment failures. The NRC must ascertain the effectiveness of aging management programs—not merely the scope of these programs—before granting license extensions.

#### Steam Generator Tube Cracking

Dr. Joram Hopenfeld, who recently retired from the NRC staff, raised concerns about the integrity of steam generator tubes to his management nearly ten year ago. The agency—which steadfastly *claims* that safety is its top priority—essentially ignored them until an accident last year at Indian Point 2. The ensuing public outcry and Congressional attention resulting from that accident, which was initiated when a cracked steam generator tube failed, forced the NRC to dust off Hopenfeld's concerns and finally look into them. The NRC asked its ACRS to evaluate the decade-old concerns.

The NRC's Advisory Committee on Reactor Safeguards (ACRS) issued a report in February 2001.<sup>2</sup> The ACRS substantiated many of Dr. Hopenfeld's concerns. For example, the ACRS concluded:

- "The techniques [used to look for cracked steam generator tubes] are not nearly so reliable for determining the depth of a crack, and in particular, whether a crack penetrates through 40% of the tube wall thickness." [NRC's regulations do not allow a nuclear plant to start up with any steam generator tube cracked more than 40 percent of its wall thickness, but the methods used to inspect the tubes for cracks cannot reliably determine the depth of cracks.]
- "The NRC staff acknowledged that there would be some possibility that cracks of objectionable depth might be overlooked and left in the steam generator for an additional operating cycle." [Exactly what actually happened at Indian Point 2 to cause last year's accident.]
- "Both the [NRC] staff and the author of the DPO [Dr. Hopenfeld] agree that the alternative repair criteria [used by the NRC staff to allow nuclear plants to continue operating with steam generator tubes known to be cracked] increase the probability of larger primary-to-secondary flows during the MSLB [main steam line break] and SGTR [steam generator tube rupture] accidents."
- "The [ACRS] also finds that this contention of the DPO [namely, that an accident at a nuclear plant with cracked steam generator tubes could cause those tubes to completely break] has merit and deserves investigation."
- "This seems to be a plausible contention [that an accident at a nuclear plant with cracked steam generator tubes could widen the cracks and result in larger leakage], and the staff has not produced analyses or test results to refute it."
- "The [ACRS] concluded that the issue of the possible evolution of severe accident to involve gross failure of steam generator tubes and bypass of the containment is not yet

---

<sup>2</sup> Advisory Committee on Reactor Safeguards, Nuclear Regulatory Commission, "Voltage-Based Alternative Repair Criteria," NUREG-1740 (Washington, DC: February 2001).

resolved ... [and] that the issue needs consideration regardless of the criteria adopted for the repair and replacement of steam generator tubes."

- "Data available to the [ACRS] suggest that the constant probability of detection [of cracked steam generator tubes] adopted by the NRC staff is nonconservative for flaws producing voltage signals less than about 0.7 volts." [In other words, the NRC staff assumes that methods used to find cracked tubes are much better than the data shows them to be.]
- "The [ACRS] was unable to identify defensible technical bases for the [NRC] staff decisions to not consider the correlation of the iodine spiking factor with initial iodine concentration [when evaluating the potential offsite radiation dose consequences from accidents involving cracked steam generator tubes]."
- "The [ACRS] found that the [NRC] staff did not have a technically defensible understanding of these processes to assess adequately the potential for procession of damage to steam generator tubes." [In other words, the NRC staff has no sound basis for arguing that one broken tube will not cascade and cause the failures of other tubes.]
- "The [NRC] staff has not developed persuasive arguments to show that steam generator tubes will remain intact under conditions of risk-important accidents in which the reactor coolant system remains pressurized. The current analyses dealing with loop seals in the coolant system are not yet adequate risk assessments."
- "In developing assessments of risk concerning these design basis accidents, the [NRC] staff must consider the probabilities of multiple tube ruptures until adequate technical arguments have been developed to show damage progression is improbable." [In other words, the risk studies to date, which only consider failure of a single tube, may understate the true risk and therefore should not be relied upon.]

The concerns raised by Dr. Hopenfeld are extremely important safety issues. As the ACRS stated:

- "Steam generators constitute more than 50% of the surface area of the primary pressure boundary in a pressurized water reactor."
- "Unlike other parts of the reactor pressure boundary, the barrier to fission product release provided by the steam generator tubes is not reinforced by the reactor containment as an additional barrier."
- "Leakage of primary coolant through openings in the steam generator tubes could deplete the inventory of water available for the long-term cooling of the core in the event of an accident."

In the decade since Dr. Hopenfeld first raised his safety concerns, the NRC has allowed many nuclear plants to continue operating nuclear power plants with literally thousands of steam generator tubes known to be cracked. The ACRS concluded that the NRC staff made these regulatory decisions using incomplete and inaccurate information. After receiving the ACRS's report, the NRC staff considered Hopenfeld's concerns "resolved" even though it had taken no action to address the numerous recommendations in the ACRS report (enclosure 1).

The NRC must REALLY resolve Dr. Hopenfeld's concerns as soon as possible. In the interim, the NRC must stop making decisions affecting the lives of millions of Americans when it lacks "defensible technical bases."

#### Risk-Informed Regulation

Two of the NRC's four strategic goals are to maintain safety and to reduce unnecessary regulatory burden. The agency attempts to define "unnecessary" using plant-specific risk studies that

purportedly draw a nice clean line between what is necessary and what is not. But UCS released a report titled "Nuclear Plant Risk Studies: Failing the Grade" last August detailing numerous flaws in the publicly available plant-specific risk studies. Among other flaws, we compared the risk study results for three sets of nearly identical plants and found that they varied widely—not because the risks were that disparate but because different assumptions and methods were used. Consequently, it is extraordinarily easy to move that nice clean line simply by tweaking a few input assumptions and have a burden appear as either necessary or unnecessary.

For example, the FitzPatrick nuclear plant in New York has a problem three or four years ago with a valve that must open following a certain accident to provide cooling flow to the reactor core. But the valve's motor did not develop sufficient thrust to move the valve against the high pressure that would occur if that accident happened. Fixing the valve was therefore a very necessary burden. Yet the plant's owner went back to the risk study and re-calculated the risk from that accident happening concurrently with a complete failure of the electrical grid and adjusted the line until the burden became "unnecessary." This example is not sharpening one's pencil because the accident in question happens most frequently when the electrical grid remains available. Thus, this vital safety system would not have functioned properly for the most likely accident scenario.<sup>3</sup>

More recently, the NRC staff allowed Fermi Unit 2 in Michigan to continue operating after the company broke one of its emergency diesel generator due to either incompetence or negligence. The company submitted a risk study to the NRC staff that showed the continued operation increased the threat of an accident. But the NRC staff discounted that quantified threat by saying that the unquantified threat from shutting down and then restarting the nuclear reactor would somehow pose an even larger threat. This NRC decision contradicts its own regulations, policies, and procedures and UCS has asked the NRC's Inspector General to investigate this matter (enclosure 2).

The plant-specific risk studies that UCS reviewed for our report are nearly ten years old, but they are the most recent risk studies that are publicly available. The NRC is allowing plant owners to reduce the testing frequency for emergency equipment or to continue operating with degraded equipment based on results from more recent risk studies. The previously cited ACRS report on Hopenfeld's steam generator tube integrity concerns indicates that the more recent risk studies remain inaccurate and incomplete. Members of the public and organizations like UCS cannot challenge these regulatory decisions because we lack access to the risk studies. The NRC's own regulations, policies, and procedures require such information to be publicly available, but it is not. And the agency continues to make regulatory decisions affecting the lives of millions of Americans in a vacuum. The NRC must require the flaws in the risk studies to be corrected AND make sufficient information about the corrected risk studies publicly available.

#### Nuclear Plant Security

The NRC's handling of physical security at nuclear reactors is another example of regulatory ineffectiveness. The NRC began force-on-force tests of security preparedness at nuclear power plants in the early 1990s. These tests pit a handful of simulated intruders against a plant's physical defenses and squadrons of armed security personnel. By 1998, these tests had revealed significant

---

<sup>3</sup> Fortunately, this unsafe condition has been remedied. The plant's owner fixed the valve motor at the next scheduled refueling outage. The bogus risk study was used to allow the plant to continue running with the non-functional valve for months. The plant's operating license as granted by the NRC only permitted operation for up to 7 days with this vital safety equipment inoperable.

26

security weaknesses in about 47 percent of the plants tested. The NRC quietly discontinued the testing, but the ensuing public outrage forced the agency to re-institute the tests. Since the tests have been resumed, about 47 percent of the plants continue to have significant security flaws revealed. Last year, force-on-force tests at the Waterford plant in Louisiana and the Quad Cities plant in Illinois demonstrated serious security problems that warranted extensive repairs and upgrades. The owner of the Waterford spent more than \$2 million fixing its inadequate security system.

Having been foiled in its attempt to secretly deep-six the security tests, the agency resorted to Plan B in which they will allow the plant owners to conduct the tests themselves, grade the tests themselves, and simply mail in the scores—virtually guaranteed to be high marks—to the NRC. If someone like Timothy McVeigh drove to a nuclear power plant with intentions of causing harm, the people living near that plant would be better protected by security scoring 85 percent on a real test than 100 or even 110 percent on an open-book, take-home, self-scored test. The public deserves and must get that better protection than that provided by artificially inflated security test scores.

#### New Nuclear Plants

A new nuclear technology called the pebble-bed modular reactor is getting considerable mention as the type of nuclear reactor most likely to be built in the United States in the future. The pebble-bed reactor does offer certain safety advantages—at least, on paper. Proponents claim that the pebble-bed reactor cannot experience the meltdown-type accident as occurred at Three Mile Island in 1979. Perhaps, but can the pebble-bed reactor, which will use more graphite in each reactor module than is presently used in all existing US nuclear power plants combined, can on fire and burn as happened at Windscale in 1957 and Chernobyl in 1986? Can plant workers, either by mistake or by design, trigger an accident as occurred at the SL-1 nuclear reactor in 1961 and Dresden Unit 3 in 1974 and Browns Ferry in 1975? Can some unexpected component failure cause fuel damage, as occurred at Fermi Unit 1 in 1966?

The pebble-bed reactor is rumored to be competitive with other energy technologies. It appears from a preliminary design review that the proposed reactor achieves its economic advantages by replacing the steel-lined, reinforced-concrete containment structures used for our existing nuclear plants with a far less robust enclosure building. The NRC's own Advisory Committee on Reactor Safeguards characterized this as "a major safety trade-off."

The safety problem with the proposed "containment-lite" pebble-bed reactor design is compounded by the existing security weaknesses. Imagine the consequences from a fertilizer truck bomb detonated next to a "containment-lite" reactor with millions of curies of lethal radioactivity to contaminate the environment for many decades. That would truly be a nuclear nightmare.

Cost projections by the nuclear industry must be taken with a grain of salt, if not an entire salt shaker. According to the US Department of Energy, the actual construction costs for 75 nuclear power plants started between 1966 and 1977 were more than three times higher than their estimated costs.<sup>4</sup> Thus, claims that the projected costs of electricity from a proposed pebble-bed reactor are competitive with the actual costs of electricity from operating renewable energy technologies must be viewed with skepticism.

---

<sup>4</sup> United States Department of Energy, "Analysis of Nuclear Plant Construction Costs," DOE/EIA-0485 (Washington DC: 1985).

It cannot be overemphasized that a facility like the proposed pebble-bed modular reactor has never been constructed or operated in the world. Consequently, its expected performance characteristics are highly speculative. It would not be prudent at this time to place undue reliance on a risky technology with unproven safety performance. Nuclear experiments belong in the laboratory, not within the US electricity marketplace.

### Conclusions and Recommendations

Nuclear power plants are inherently dangerous. If nuclear power is to play an expanded role in the future, it is imperative that the Nuclear Regulatory Commission become a consistently effective regulator. UCS believes that this goal is attainable. The Maintenance Rule (10 CFR 50.63) and the revised reactor oversight process demonstrate that the agency is capable of effective regulation. That capability must be extended across all of the NRC's oversight functions and consistently sustained. This transformation may require that the agency receive additional resources, particularly during the transformation phase. Because the agency is currently a fee-based agency, it may require legislative changes to supplement the existing resources with taxpayer money.

Failing to reform the Nuclear Regulatory Commission could have tragic consequences. As reported in *The Wall Street Journal* (enclosure 3), the 1986 accident at the Chernobyl nuclear plant cost the former Soviet Union several times the net benefits from all Soviet reactors ever operated. The price tag for the accident was placed at 170 to 215 billion rubles while the net benefits from every Soviet nuclear power plant was only 10 to 50 billion rubles. With the price of failure so very high, it is absolutely imperative that the Nuclear Regulatory Commission be a consistently—rather than occasionally—effective regulator.

If Congress wants an expanded role for nuclear power, it must provide the NRC with the resources needed for the agency to implement consistently effective regulatory programs and must also oversee the agency's reform efforts to verify that they are successful.

Dr. Novak Zuber  
703 New Mark Esplanade  
Rockville, Maryland 20850  
Phone/Fax: 301-424-3585

March 14, 2001

Dr. John T. Larkins, Executive Director  
Advisory Committee on Reactor Safeguards (ACRS)  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Dear Dr.Larkins:

With this letter I wish to resign my position as Consultant to the ACRS. It has been a privilege to serve in this capacity for nearly ten years, and I am honored by the trust you placed in me.

Over the years, my consulting work has been a source of much gratification and stimulation as we have faced ever-changing technical problems and new developments. However, it has also been a source of much frustration and disappointment, and today I am left with some very real concerns regarding the activities of the industry and of the NRC. I have discussed many of these concerns in various memoranda to Dr. G. B Wallis:

- 1) "The Effect of Deregulation on NRC's Capabilities in the Field of Thermo-Hydraulics," April 6, 2000.
- 2) "ACRS Thermal-Hydraulic Subcommittee Meeting, November 13-14, 2000, Rockville, Maryland," November 25, 2000

and in my paper entitled:

"The Effects of Complexity, of Simplicity and of Scaling in Thermo-Hydraulics," Nuclear Engineering and Design, 204 (2001,) pp. 1-27

I trust that in the years to come, the ACRS will be able to set and uphold the technical standards that the public expects and deserves from a regulatory agency concerned with public safety. High technical standards, accountability

Dr. John T. Larkins  
March 14, 2001  
Page 2.

and transparency are *sine qua non* for nuclear power in a deregulated environment.

In closing, I would like to express my sincere gratitude to your staff, and in particular to Mr. Paul Boehnert, for the assistance they gave to me most generously throughout these years.

Yours truly,

A handwritten signature in black ink, appearing to read "Novak Zuber". The signature is fluid and cursive, with a long horizontal stroke at the end.

Dr. Novak Zuber

cc: The Hon. Richard A. Meserve, Chairman, USNRC  
Dr. G. B. Wallis, ACRS  
Dr. Th. Kress, ACRS  
Dr. A. Powers, ACRS  
Mr. P. Boehnert, ACRS  
Dr. V. E. Schrock, Consultant, ACRS

**ANTICIPATED WORKLOAD  
May 10-11 2001**

LEAD MEMBER	BACKUP	ENGINEER	ISSUE	FULL COMM. REPORT	SUBC. MTG.	
					CHAIR.	MEMBER
Apostolakis	--	Markley	Risk-Based Performance Indicators	Report	RPRA 4/17 P&P 5/9	PO 5/9
	All Members	Larkins	Meeting with the Commission	--		
	All Members	Larkins	Commission Meeting on Safety Research	--		
Bonaca	Leitch	Duraiswamy/Elliott	Final Review of the ANO Unit 1 License Renewal Application	Report		P&P 5/9 RPRA 4/17 PO 5/9
Kress	--	Singh	Management Directive 6.4 Associated with the Revised GSI process [Presentation Completed at the March meeting]	Report	--	P&P 5/9 RPRA 4/17 PO 5/9
Sieber	Apostolakis	Weston	South Texas Project Exemption Request [Committee Discussion]	--	PO 5/9	--

32

**ANTICIPATED WORKLOAD**  
**June 6-8, 2001**

LEAD MEMBER	BACKUP	ENGINEER	ISSUE	FULL COMM. REPORT	SUBC. MTG.	
					CHAIR.	MEMBER
Apostolakis	All Members	Larkins	Meeting with Commissioner Dicus	--	P&P 6/4	AR 6/4-5
Bonaca	--	Duraiswamy/ Elliott	Need for Revising 10 CFR Part 54-The License Renewal Rule [Committee Discussion]	--	--	P&P 6/4 AR 6/4-5
Kress	Apostolakis	Markley	Regulatory Challenges for future Nuclear Plants [Committee Discussion]	--	AR 6/4-5	P&P 6/4
		El-Zeftawy	Spent Fuel Accident Risk at Decommissioning Plants	Report		
Shack	Wallis	Markley	Proposed Risk-Informed Revisions to 10 CFR 50.46 and Revisions to the Framework for Risk-Informing the Technical Requirements of 10 CFR Part 50	Report	--	AR 6/4-5
Sieber	Apostolakis	Weston	South Texas Project Exemption Request	Report to be completed in July	--	AR 6/4-6
		Singh/Weston	Prearrangement Briefing to ACRS for Waterford & and Region IV site visit.	--	--	--

53

**ANTICIPATED WORKLOAD**  
**June 6-8, 2001**  
**(CONTINUED)**

LEAD MEMBER	BACKUP	ENGINEER	ISSUE	FULL COMM. REPORT	SUBC. MTG.	
					CHAIR.	MEMBER
Wallis	Bonaca	Boehner/ Cronenberg	Potential Margin Reductions for Relicensed/Up-rated Nuclear Power Plants [PRESENTATION BY Cronenberg]	Report (Tentative)	-	AR 6/4-5

34

**ANTICIPATED WORKLOAD  
July 11-13, 2001**

LEAD MEMBER	BACKUP	ENGINEER	ISSUE	FULL COMM. REPORT	SUBC. MTG.	
					CHAIR.	MEMBER
Apostolakis	-	Markley	Draft IPEEE Insights Report	Report	RPRA 6/22 (a.m.) RPRA 7/9 (a.m.) P&P 7/9 (p.m.)	PLR 6/22 (p.m.) PO/FP 6/27-28
Bonaca	Ford	Duraiswamy/Dudley	Need for Revising 10 CFR Part 54-The License Renewal Rule	Report	PLR 6/22 (p.m.)	RPRA 6/22 (a.m.) PO/FP 6/27-28 RPRA 7/9 (a.m.) P&P 7/9 (p.m.)
Leitch	-	Singh	Proposed Resolution of GSI-191, Assessment of Debris Accumulation on PWR Sump Performance	Report	-	PO/FP 6/27-28 PLR 6/22 (p.m.)
Sieber	Apostolakis	Weston	South Texas Project Exemption Request  Reactor Oversight Process [Committee Discussion]	Report  Draft Report	PO/FP 6/27-28	-

35

## II. ITEMS REQUIRING COMMITTEE ACTION

1. Proposed Final Rulemaking to Amend 10 CFR 50.55, Operators' Licenses," Regarding Operator License Eligibility and the Use of Simulation Facilities in Operator Licensing; and Final Revision 3 of Regulatory Guide 1.149, "Nuclear Power Plant Simulation Facilities for Use in Operator Training and License Examinations" (Open) (GML/MTM) ESTIMATED TIME: 1 hour

**Purpose:** Determine a Course of Action

**Requested by the NRC staff [C. Goodman, NRR].** In a memorandum dated May 2, 2001, the staff forwarded its proposed final rulemaking for 10 CFR 50.55, Operators' Licenses," regarding operator license eligibility and the use of simulation facilities in operator licensing and proposed final Revision 3 of Regulatory Guide 1.149, "Nuclear Power Plant Simulation Facilities for Use in Operator Training and License Examinations." The proposed final rule allows applicants for nuclear power plant operator and senior operator licenses to fulfil a portion of their prerequisites by manipulating the plant-reference simulator as an alternative to use of the actual plant. It also removes requirements for facility license certification of their simulation facilities and routine submittal of reports based on continuing assurance of simulator fidelity for four years. The proposed final rulemaking package was forwarded to the Committee on May 7, 2001. The ACRS previously considered the draft rulemaking on this matter and issued a memorandum to the EDO dated July 18, 2000, stating that the Committee has no objection to issuing this rule for public comment.

**The Planning and Procedures Subcommittee recommends that the Committee not review this matter and that Mr. Leitch provide his views.**

2. Need to Revise 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," (Open) (MVB/SD/RBE). ESTIMATED TIME: 1 ½ hours

**Purpose:** Discuss the Need to Revise 10 CFR Part 54

**Requested by the NRC staff [S. Hoffman, NRR].** As directed by the Commission, the staff needs to recommend, in July 2001, regarding the need to revise 10 CFR Part 54 as well as the nature of the revision. The staff is seeking ACRS views on possible revision to 10 CFR Part 54. The staff has suggested a Subcommittee meeting in June and full Committee discussion in July 2001. A meeting of the Plant License Renewal Subcommittee has been tentatively scheduled for June 22, 2001 (p.m.) Some members suggested that the Committee first identify potential changes to 10 CFR Part 54 during the June ACRS meeting and then discuss these changes with the staff and industry groups during the Subcommittee meeting.

**The Planning and Procedures Subcommittee recommends that this item be scheduled for the June ACRS meeting.**

3. Oconee Nuclear Station Unit 3 Reactor Pressure Vessel Head Leakage (Open)  
(WJS/JDS/MWW) ESTIMATED TIME: 1 ½ hours

Purpose: Determine a Course of Action

**Briefing requested by the ACRS.** On February, 18, 2001, Oconee Nuclear Station, Unit 3, found evidence of small accumulations of boric acid deposits at the base of several control rod drive mechanisms (CRDMs) on the top surface of the Reactor Pressure Vessel (RPV) head. The boric acid deposits were identified around nine of the sixty-nine CRDM nozzles. The amount of boric acid around each nozzle was signified that reactor coolant system pressure boundary leakage had occurred. The apparent root cause of the nine CRDM nozzle leaks is primary water stress corrosion cracking (PWSCC). The leaking CRDMs have been repaired.

On April 17, 2001, NRC sent NEI a letter of justification for continued operation of PWRs. A response is expected by May 11, 2001.

**The Planning and Procedures Subcommittee recommends that the staff be invited to provide a brief presentation to the full Committee and that cognizant Subcommittee Chairmen (Materials and Metallurgy, Plant License Renewal, Plant Operations, etc. ) provide their views on cross cutting issues. Dr. Shack and Mr. Sieber should provide their views.**

May 11, 2001

MEMORANDUM TO: John T. Larkins  
Executive Director

FROM: George E. Apostolakis, Chairman

SUBJECT: CERTIFICATION OF THE MINUTES OF THE PLANNING AND  
PROCEDURES SUBCOMMITTEE MEETING - MAY 9, 2001

I hereby certify that, to the best of my knowledge and belief, the minutes of the subject meeting, issued May 11, 2001, are an accurate record of the proceedings for that meeting.



---

George E. Apostolakis, Chairman  
Planning and Procedures Subcommittee

5/11/01  
(Date)