

CERTIFIED

Issued: 3/18/2002
Certified: 4/12/2002

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MINUTES OF ACRS SUBCOMMITTEE MEETING ON
PLANT LICENSE RENEWAL
TURKEY POINT UNITS 3 AND 4
MARCH 13, 2002
FLORIDA CITY, FLORIDA

The ACRS Subcommittee on Plant License Renewal held a meeting on March 13, 2002, at the City Hall, 404 West Palm Drive, Florida City, Florida. The purpose of the meeting was to review the resolution of the open items identified in the Safety Evaluation Report (SER) related to the license renewal of Turkey Point Nuclear Plant, Units 3 and 4. Mr. Noel Dudley was the cognizant ACRS staff engineer for this meeting. The meeting was convened at 1:30 p.m. and adjourned at 4:30 p.m.

ATTENDEES:

ACRS

M. Bonaca, Chairman
P. Ford, Member
T. Kress, Member
W. Shack, Member
J. Sieber, Member

J. Barton, Consultant
S. Duraiswamy, ACRS Staff
N. Dudley, ACRS Staff

NRC STAFF

C. Grimes, NRR
R. Auluck, NRR
J. Medoff, NRR

C. Julian, Region II
C. Christensen, Region II

FLORIDA POWER AND LIGHT COMPANY

E. Abbott, FPL
S. Hale, FPL
S. Collard, FPL

B. Beisler, FPL
J. Hoffman, FPL
J. Chrulski, FPL

A member of the public provided written comments. No requests were received for time to make oral statements. One member of the public attended the meeting and made oral statements. A list of meeting attendees is available in the ACRS Office files.

ACRS SUBCOMMITTEE CHAIRMAN'S INTRODUCTION

Dr. Mario Bonaca, Chairman of the Plant License Renewal Subcommittee, convened the meeting and stated that the purpose of the meeting was to review the staff's SER related to the license renewal application for Turkey Point Nuclear Plant, Units 3 and 4. He noted that the Subcommittee had reviewed the application and the associated SER with open items on September 25, 2001. Dr. Bonaca read the written comments from a member of the public and requested that the staff reply to the comments. A copy of the written comments are attached. He called upon Mr. Christopher Grimes, Office of Nuclear Reactor Regulations (NRR) to begin.

STAFF PRESENTATION

Mr. Christopher Grimes, NRR, thanked the ACRS for its involvement in reviewing the Turkey Point Nuclear Plant license renewal application and associated SER. He then introduced the NRC staff members who would be making the presentation.

Safety Evaluation Report

Dr. Raj Auluck, NRR, summarized the written comments from a public citizen, provided an overview of the design of Turkey Point Nuclear Plant, Units 3 and 4, and outlined the staff's review schedule. He identified the requirements that the staff used to review the application.

The ACRS members and the staff discussed whether the review of the Turkey Point application was more efficient due to the lessons learned during the review of previous license renewal applications. The staff explained that fewer requests for additional information (RAIs) were issued compared to previous applications. However, more time was expended in resolving issues prior the issuance of RAIs, and therefore there was no significant gain in overall efficiency.

Dr. Auluck and Mr. James Medoff, NRR, explained the staff's bases for accepting the applicant's resolution of the four open items identified in the SER with open items. The bases included the following:

1. The applicant reevaluated class II non-safety-related piping that could fail due to aging mechanisms, such as erosion/corrosion, and adversely affect safety-related components. For the piping that was determined to meet this criteria, the applicant identified specific aging management programs.
2. The applicant had inspected the internals of three of the five water tanks, which are in the scope of license renewal. The applicant concluded that the existing coatings would prevent any aging degradation and committed to inspect the internals of all five tanks prior to the end of the extended period to verify this conclusion.
3. The applicant committed to inspect the penetrations in both reactor vessel heads and to comply with the industry's recommendations for any associated aging management programs, once they are developed.
4. The applicant committed to two renewal application items identified in the Westinghouse report WCAP-15338 concerning reactor pressure vessel underclad cracking. One item was to verify that the number of design cycles and transients assumed in WCAP-15338 bounds the number of cycles for 60 years of operations. The second item was to ensure that the evaluation of the time limited aging analysis (TLAA) is summarily described in the Final Safety Analysis Report supplement.

The ACRS members and the staff discussed what criteria were used to judge the credibility of postulated nonsafety-related pipe failures that would adversely impact safety-related components and structures. They also discussed the use of operating experience from non-nuclear industries in concluding that the coatings on the internal surface of the water tanks are effective in preventing pitting and corrosion.

The ACRS members and the staff discussed how the identification of significant reactor vessel head penetration leakage at Davis-Besse Nuclear Power Plant affects the staff's SER conclusions. They discussed whether ultrasonic testing of the reactor vessel would identify cracks at the base metal and cladding interface.

Public Comments

Mr. Stan Smilan, a public citizen, noted that the airline industry was also concerned about corrosion of airplanes. He provided examples where corrosion had led to component failures. He stated that there had been no credible intervention or adversarial technical review of the Turkey Point license renewal application. He recommended that the local, state, or federal government fund technical experts to protect the public's interest.

Mr. Smilan described his past experiences as a civilian at early nuclear weapon tests and his present concerns about federal health care programs for civilians exposed to the radiation during these tests. He raised questions concerning terrorist threats associated with nuclear power plants, shipment of spent fuel through the Panama Canal, use of planes, and the likelihood of attacks being directed against the local Jewish population.

Dr. Bonaca expressed his appreciation for Mr. Smilan's views and noted that Mr. Smilan was welcome to present his concerns at the April 11-13, 2002 ACRS meeting in Rockville, Maryland. Dr. Auluck and Mr. Medoff explained that the four issues identified in writing by a member of the public had been previously reviewed and resolved by the NRC staff. They presented the resolution of each of the four issues.

1. In the early 1980s, voids were identified in the containment structure below the containment equipment hatch. FPL performed an analysis that concluded the structural strength of the containment was not affected by the voids and repaired the voids. The staff reviewed the reports and issued a safety evaluation that accepted the conclusions of the report. Pressure tests performed over the last 20 years have confirmed that the pressure integrity of the containment has been maintained.
2. The design criteria of Turkey Point Units 3 and 4 bound the maximum hurricane wind speeds and storm wave heights that have been observed in the area. The Units survived hurricane Andrew without adverse consequences to the public health and safety. Procedures are in place to shut down the reactors and to take additional precautions if a severe storm is expected.
3. Security at nuclear power plants is being reviewed by the Federal Government. The FPL has increased security at Turkey Point Nuclear Plant. The NRC may require additional security once a national policy is established. Due to the sensitive nature of security information, details of the revised security plans and proposed changes cannot be discussed in a public forum.
4. Required spent fuel pool capacity is defined by technical specification. Plants are allowed to operate only if spent fuel pool capacity meets these requirements. This is an operating plant issue and is not within the scope of license renewal. FPL has the options of increasing the storage capacity of the spent fuel pool by reracking the fuel or building an independent spent fuel storage installation.

The ACRS members and the staff discussed the following:

- generic implications of the voids identified in the containment structure,
- possible changes in the large early release frequency because of the identified voids,
- availability of diesel fuel oil from suppliers during station blackout events, and
- the possibility that radioactive water from a severe accident in the containment can get into the ground water through a leak in the water proofing membranes or water stops.

Inspections and Audits

Mr. Caudle Julian, Region II, described the inspections and audits performed at Turkey Point Nuclear Plant to verify information in the application. The ACRS members and the staff discussed the available inspection guidance and the development of plant-specific inspection plans.

Dr. Auluck concluded that all open items had been resolved and that the applicant had met the requirements for license renewal, as required by 10 CFR 54.29, "Standards for issuance of a renewed license."

SUBCOMMITTEE COMMENTS, CONCERNS, AND RECOMMENDATIONS

Dr. Shack noted that the application contained less technical information for accepting leak-before-break as an aging management program for cast austenitic stainless steel piping, than for the acceptability of other aging management programs.

Dr. Bonaca noted that the application contained a description of the plant at one point in time. He stated that the staff review of the application was thorough and was dependent on the inspection and audit results. He recommended that the staff consider summarizing in the SER the changes made to the licensing bases as a result of license renewal.

Mr. Barton stated that based on his observation of workers and conditions of the structures and equipment during the site visit, the safety culture appeared to be good and the material condition of the plant was excellent considering the harsh environment.

STAFF AND FPL COMMITMENTS

The staff agreed to determine whether there was any generic actions taken based on the identification of voids in the containment concrete.

The staff agreed to determine what effect, if any, the presence of voids in the containment wall would have on the large early release frequency.

SUBCOMMITTEE DECISIONS

The Subcommittee requested that FPL provide an overview of the Turkey Point Nuclear Plant, Units 3 and 4 license renewal application at the April 11, 2002 ACRS meeting.

The Subcommittee requested that the staff summarize the information it presented to the Subcommittee at the April 11, 2002 ACRS meeting. In addition, the Subcommittee requested that the staff provide the status of the following:

- staff review of WCAP reports,
- generic license renewal issue concerning station black out, and
- generic license renewal issue concerning class II over I piping.

FOLLOW-UP ACTIONS

None.

PRESENTATION SLIDES AND HANDOUTS PROVIDED DURING THE MEETING

The presentation slides and handouts used during the meeting are available in the ACRS Office files or as attachments to the transcript.

BACKGROUND MATERIAL PROVIDED TO THE SUBCOMMITTEE:

U.S. Nuclear Regulatory Safety Evaluation Report Related to the License Renewal of Turkey Point Nuclear Plant, Units 3 and 4, issued February 2002.

.....

NOTE: Additional details of this meeting can be obtained from a transcript of this meeting available in the NRC Public Document Room, One White Flint North, 11555 Rockville Pike, Rockville, MD, (301) 415-7000, downloading or viewing on the Internet at "http://www.nrc.gov/ACRSACNW," or can be purchased from Neal R. Gross and Co., 1323 Rhode Island Avenue, NW, Washington, D.C. 20005, (202) 234-4433 (Voice), 387-7330 (Fax), e-mail: nrgross@nealgross.com.

.....

Attachment 1

Mark P. Oncavage
12200 SW 110th Avenue
Miami, FL 33176

February 16, 2002

Mr. Noel Dudley
U. S. Nuclear Regulatory Commission
Advisory Committee on Reactor Safeguards
Washington, D.C. 20555-0001

Dear Mr. Dudley:

I live 14 miles from Turkey Point and I have safety concerns about the continued operation of Turkey Point through the license renewal period. I will not be able to attend the public meeting on March 13, 2002 as I will be out of the country. I request that you inform the members of the ACRS of my safety concerns.

1. In the early eighties the licensee replaced steam generator lower assemblies in units 3 and 4. The assemblies were too big to fit through the existing doors so the doorways were widened. Voids, up to 4 feet in length, were discovered in the doorway. All indications I have seen, show that no further examinations for voids in the walls of the containment buildings were ever performed. I am concerned that thousands of voids in each building may exist. These voids may accelerate age related degradation by increasing internal surface area which may be subject to oxidation, hydration, crumbling, microbiotic action, and faulting. This degradation could also weaken the tendons, reinforcement rods, and the steel liner. As the plant ages, the structural strength of the buildings may be increasingly questionable in regard to an intentional terrorist air crash. Region II officials have been aware of this issue since June 2001 and have taken no action.

2. An unconfirmed story states that Hurricane Andrew, 1992, isolated Turkey Point for days. Diesel fuel for station power was only a few hours away from being exhausted when help finally arrived. Hurricane Andrew was a category 4 storm, not a category 5 maximum hurricane. I'm concerned that the single road servicing Turkey Point is easily blocked, a maximum storm could disable diesel generators, diesel storage tanks could be damaged, batteries could be insufficient or damaged, the electrical grid could be off line, or the site could run out of fuel. A category 5 hurricane would bring a higher storm surge, higher waves, and higher winds than those experienced in Andrew. Station blackout would be more likely.

3. The Turkey Point site, on the shore of Biscayne Bay, has been raised to 18 feet above sea level. A category 5 hurricane is likely to produce an 18 to 20 foot storm surge with storm waves superimposed on top of the surge. I'm concerned that hurricanes or terrorist air crashes could collapse the auxiliary building over the spent fuel pools. The concrete roof collapsing into the spent fuel pool would radically change the spent fuel geometry possibly initiating uncontrollable criticality. An intentional terrorist air crash could possibly destroy the auxiliary building and simultaneously damage the control room if the aircraft made it's approach from the east.

4. An issue the NRC staff and the licensee refuse to acknowledge is the safety of spent fuel after 2009. In that year both units 3 and 4 lose their ability to offload a full core. Public safety has been put into a vacuum for the relicensing process. All negative factors such as aging management, hurricanes, station

blackout, and terrorist acts will be present but no safety studies of spent fuel storage options have been performed.

As an informed citizen, I find the relicensing process seriously deficient. I urge the Advisory Committee on Reactor Safeguards to refuse to meet on this matter until all safety issues have been satisfactorily resolved and an acceptable margin of safety has been provided.

Sincerely,

Mark P. Oncavage

CERTIFIED

Date Issued: 5/14/2002
Date Certified: 5/22/2002

TABLE OF CONTENTS
MINUTES OF THE 491st ACRS MEETING

APRIL 11-12, 2002

- I. Chairman's Report (Open)
- II. Final Review of the Turkey Point License Renewal Application (Open)
- III. Advanced Reactor Research Plan (Open)
- IV. CRDM Penetration Cracking and Reactor Pressure Vessel Head Degradation (Open)
- V. Westinghouse Owners Group (WOG) and Electric Power Research Institute (EPRI) Initiatives Related to Risk-Informed Inservice Inspection of Piping (Open)
- VI. General Electric (GE) Nuclear Energy Topical Report: "Constant Pressure Power Uprate" (Open)
- VII. Executive Session (Open)
 - A. Reconciliation of ACRS Comments and Recommendations
 - B. Report on the Meeting of the Planning and Procedures Subcommittee Held on April 9, 2002 (Open)
 - C. Future Meeting Agenda

The following reports were issued to Chairman Meserve, NRC, from George E. Apostolakis, Chairman, ACRS:

REPORTS

- GE Nuclear Energy Licensing Topical Report, NEDC-33004P, "Constant Pressure Power Uprate", dated April 17, 2002
- Report on the Safety Aspects of the License Renewal Application for the Turkey Point Nuclear Plant, Units 3 and 4, dated April 19, 2002

MEMORANDA

The following memoranda were issued to William D. Travers, Executive Director for Operations, NRC, from John T. Larkins, Executive Director, ACRS:

- Draft Regulatory Guide DG-1118 (Proposed Revision 1 to Regulatory Guide 1.53), "Application of the Single-Failure Criterion to Safety Systems," dated April 16, 2002
- Criteria for the Treatment of Individual Requirements in a Regulatory Analysis, dated April 17, 2002
- Draft Final Amendment to 10 CFR 50.55a, "Codes and Standards," dated April 19, 2002)

APPENDICES

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

491st ACRS Meeting
April 11-12, 2002

CERTIFIED

MINUTES OF THE 491st MEETING OF THE
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
APRIL 11-12, 2002
ROCKVILLE, MARYLAND

The 491st meeting of the Advisory Committee on Reactor Safeguards (ACRS) was held in Conference Room 2B3, Two White Flint North Building, Rockville, Maryland, on April 11-12, 2002. Notice of this meeting was published in the *Federal Register* on March 29, 2002 (65 FR 15256) (Appendix I). The purpose of this meeting was to discuss and take appropriate action on the items listed in the meeting schedule and outline (Appendix II). The meeting was open to public attendance. There were no written statements or requests for time to make oral statements from members of the public regarding the meeting.

A transcript of selected portions of the meeting is available in the NRC Public Document Room at the One White Flint North Building, Mail Stop 1F-15, Rockville, MD, 20852-2738. [Copies of the transcript are available for purchase from Neal R. Gross and Co., Inc., 1323 Rhode Island Avenue, NW, Washington, DC 20005-3701, and on the ACRS/ACNW Web page at (www.NRC.gov/ACRS/ACNW).]

ATTENDEES

ACRS Members: ACRS Members: Dr. George Apostolakis (Chairman), Dr. Mario V. Bonaca (Vice Chairman), Dr. F. Peter Ford, Dr. Thomas S. Kress, Mr. Graham M. Leitch, Dr. Dana A. Powers, Mr. Stephen L. Rosen, Dr. William J. Shack, and Mr. John D. Sieber. Dr. Graham B. Wallis did not attend this meeting. For a list of other attendees, see Appendix III.

I. Chairman's Report (Open)

[Note: Dr. John T. Larkins was the Designated Federal Official for this portion of the meeting.]

Dr. George E. Apostolakis, Committee Chairman, convened the meeting at 8:30 a.m. and reviewed the schedule for the meeting. He summarized the agenda topics for this meeting and discussed the administrative items for consideration by the full Committee.

491st ACRS Meeting
April 11-12, 2002

II. Final Review of the Turkey Point License Renewal Application (Open)

[Note: Mr. Sam Duraiswamy was the Designated Federal Official for this portion of the meeting.]

Dr. Mario Bonaca, Chairman of the Plant License Renewal Subcommittee, stated that the Subcommittee held a meeting on the Turkey Point license renewal application (LRA) on March 13, 2002, at the Turkey Point site. He stated that concerns had been raised by two members of the public regarding voids that had been found in Turkey Point concrete containment during the 1980's. During the March 13th meeting, the applicant explained to the Subcommittee how the issue had been addressed by Turkey Point. As a result, the Subcommittee was reasonably confident that the issue had been adequately addressed for both units at Turkey Point. However, the Subcommittee still had questions about whether the issue had generic implications, and how the issue was being addressed generically by the staff.

Mr. P.T. Kuo, Program Director for the License Renewal and Environmental Impacts Programs, Office of Nuclear Reactor Regulation (NRR), introduced Mr. Frank Gillespie, the Assistant Director of the Division of Regulatory Improvement Programs, NRR, to give opening remarks. Mr. Gillespie addressed the containment void issue. He explained the generic issue was being addressed under the allegations process, and that the staff might not be able to fully address the generic aspects at this point. They were, however, prepared to address how it was resolved for Turkey Point.

Industry Presentation

Mr. Steve Hale from the Florida Power and Light Company (FPL) then gave the applicant's presentation. Mr. Hale gave an overview of the application and the process used to develop it. The key points from Mr. Hale's presentation include:

- FPL utilized lessons learned from previous LRAs, NRC requests for additional information (RAIs) and associated responses, and generic issue resolutions in developing their application. FPL also utilized all available guidance in developing their LRA, including the draft Standard Review Plan for License Renewal; the draft Generic Aging Lessons Learned Report; the draft Regulatory Guide DG-1047, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses"; and the industry guidance in NEI 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule."

- For performing aging management reviews (AMRs) on structures and components (SCs) determined to be within the scope of license renewal, FPL utilized industry and Turkey Point operating experience. Turkey Point also has a metallurgical lab which is used to evaluate nonconforming conditions when they occur. The metallurgical lab history was utilized in supporting aging effect conclusions reached during AMRs.
- FPL included a list in the Final Safety Analysis Report Supplement of all commitments made to support their LRA related to their aging management programs (AMPs). The applicant also included a list of all of their time limited aging analyses (TLAAs).
- To resolve an open item related to Seismic Category 2 piping systems over Seismic Category 1 piping and equipment (Seismic II/I), FPL included additional piping segments within the scope of license renewal. Specifically, FPL did not originally include the Seismic Category 2 piping within scope unless it was at a safety related/non-safety related functional boundary and was included in the seismic analysis. For all other Seismic II/I piping, FPL had originally included only the pipe supports within the scope of license renewal. The staff's concern is that there are other potential interactions between Category II piping and Category I piping/equipment that can occur if the Category 2 piping fails (e.g., pipe whip, jet impingement, physical contact, and leakage). The staff concluded that Category 2 piping (not just the supports) whose failure can in any way prevent a safety system from performing its safety function must be included within the scope of license renewal consistent with 10 CFR 54.4. Accordingly, FPL included these piping segments within the scope of license renewal.
- The staff identified an open item based on three issues related to one-time inspections of field erected tanks in the Turkey Point LRA: 1) the acceptance criteria was not clearly defined, 2) there were no provisions identified for additional examinations if the inspection reveals extensive loss of material, and 3) FPL did not provide adequate justification for the use of a one-time inspection. In its response, FPL justified the use of a one-time inspection because no significant aging is expected. This conclusion is justified based on the plant's operating experience. The acceptance criterion is that the loss of material cannot exceed the tank's corrosion allowance. Additional inspections, if needed, would be added based on the one-time inspection findings.

In response to questions from the Committee, Mr. Hale provided the following additional information:

- Turkey Point withstands hurricanes very well, including effects of missiles. For Hurricane Andrew, the plant withstood 150-160 mile per hour winds. The main damage occurred when a tower from one of the adjacent fossil fuel plants fell over, damaging one of the nuclear plant's fire water tanks. Despite significant numbers of missiles during Hurricane Andrew, the plant withstood the impacts very well. Turkey Point is adequately designed to withstand category 5 hurricanes. There are two primary concerns with hurricanes: wind and storm surge. Both units are designed for wind speeds up to 300 miles per hour, which is adequate to withstand category 5 wind speeds. For storm surges, Turkey Point is located 18 feet above sea level. FPL has installed stop logs at the site to block surges up to 20 feet. In addition, safety-related components are located at 22.5 feet or higher. Mr. Hale stated that 22.5 feet is easily adequate to withstand any surges that could be expected from a category 5 hurricane.
- The stacks on the adjacent fossil fuel plants are included within the scope of license renewal in the application due to seismic concerns. The stacks are 400 feet tall.
- Bechtel performed a detailed evaluation for FPL on the root cause of the voids found in the containment. Bechtel concluded that the voids were caused by the difficulty of pouring concrete in the area of the construction joint around the hatch. Bechtel also concluded that voiding elsewhere in the containment concrete was unlikely. Based on Bechtel's findings, FPL concluded that the containment integrity was not threatened by the presence of the voids, and that the event was not reportable under 10CFR21.
- Turkey Point completed 100% visual inspections of the reactor vessel heads in both units during their last refueling outage. No leakage or degradation of the reactor vessel head was identified. Each reactor vessel head has a radiation monitor located above it. No corrosion products have been found in the radiation monitor filters.

NRC Staff Presentation

Mr. Raj Auluck, the NRC Project Manager for the Turkey Point LRA review, gave the presentation on the staff's safety evaluation report (SER). Mr. Auluck explained that the Turkey Point application was the fifth LRA received by the NRC, and the first LRA for a Westinghouse-designed plant. The current licenses are due to expire in 2012 for Unit 3 and 2013 for Unit 4. The staff's review consisted of reviews of the applicants' scoping and screening methodologies and results, AMPs, and TLAAs. These reviews were supplemented by NRC site audits and inspections. The staff conducted one audit

491st ACRS Meeting
April 11-12, 2002

on-site and two inspections of the Applicant's scoping, screening, and aging management reviews. The scoping and screening methodology review was conducted in two parts: 1) an initial desk top review of the LRA supporting information, and 2) an on-site audit to review supporting documentation (e.g., selected engineering reports, engineering procedures, and design documentation).

Mr. Auluck stated that two parties petitioned for a hearing on the Turkey Point LRA. The Atomic Safety and Licensing Board held a pre-hearing conference in Homestead, Florida on petitioner standing and the admissibility of contentions. In an order issued on February 26, 2002, the Board ruled that both parties had standing to intervene; however, neither petitioner proffered admissible contentions. As such, their intervention petitions were denied.

The staff discussed the resolution of the four open items identified in the draft SER and one new emerging issue. The open items are 1) scoping for Seismic II/I piping systems, 2) acceptance criteria for field erected tanks internal inspection aging management program, 3) scope of reactor vessel head alloy 600 penetration inspection program, and 4) reactor pressure vessel underclad cracking. The resolution of the first two open items were previously discussed in the applicant's presentation above.

Mr. Jim Medoff, from the License Renewal and Environmental Impacts Programs, NRR, discussed the reactor vessel head alloy 600 penetration inspection program open item. This open item was resolved by FPL's commitments to continue participation in the industry program for inspection of vessel head penetration nozzles, and to update this program as necessary based on industry experience.

Mr. Barry Elliot from the Materials and Chemical Engineering Branch, NRR, discussed the staff's review of Westinghouse Electric's generic license renewal reports. Specifically, he discussed four Westinghouse topical reports (WCAPs) dealing with aging management of pressurizers, reactor internals, reactor coolant system supports, and Class 1 piping and associated pressure boundary components. He also discussed a fifth WCAP on cracking associated with weld deposited cladding in operating PWR plants. The staff had not completed its review of the first four WCAPs in time for FPL to credit them in the Turkey Point LRA; however, FPL was able to demonstrate the applicability of the reports to Turkey Point in their responses to the staff's RAIs. The fifth report on cracking associated with weld deposited cladding was credited in the application as part of the applicant's TLAA's, and was utilized to resolve the open item on reactor pressure vessel underclad cracking.

The staff discussed the new emerging issue on station blackout (SBO). He stated that the staff's position had changed from the position discussed with the Plant License

491st ACRS Meeting
April 11-12, 2002

Renewal Subcommittee. Because the issue is emerging late in the process, it will be addressed in a supplemental SER. Mr. Jim Lazevnick from the Electrical Branch, NRR, discussed the staff's position. Specifically, to meet the requirements of the SBO rule (10 CFR 50.63), the plant has to demonstrate its ability to cope with the event. The length of time that the licensee must be able to cope with an SBO event is determined by four factors. One of these factors is the probable time needed to reconnect to offsite power (i.e., the ability to recover from the event). If aging effects for the offsite power connection are not managed, then Turkey Point may need a longer coping duration to account for a longer recovery time. Accordingly, the staff's final position is that the off-site power circuits between the switchyard and the safety buses should be included within the scope of license renewal.

The staff presented its response to comments received by the ACRS from a public citizen, Mr. Oncavage. Specifically, four issues were identified: 1) the effect of voids on aging degradation rates and the structural integrity of concrete containment structures, 2) the effect of hurricane wind speeds and storm waves on the safe operation of the Turkey Point plant, 3) the effect of terrorist air attacks on the safety and operability of the Turkey Point plant, and 4) the effect of inadequate spent fuel storage capacity on the plant's ability to operate in the renewed period of operation.

Mr. Hans Ashar and Mr. Goutam Bagchi from NRR addressed the voids issue. The key points of their discussion is that the purpose of the concrete is to hold the reinforcing steel in place. All tensile structural loads are absorbed by the reinforcing steel. Leak tightness is maintained by the steel liner. Small voids will not be identified by structural integrity tests (SITs), however, they are of little consequence because the containment loads are handled by the reinforcement steel, not the concrete. Large voids, if they occur would be identified during the SIT.

Mr. Medoff addressed the remaining concerns from Mr. Oncavage. The staff believes that the plant is adequately designed to withstand category 5 hurricane wind forces and storm surges. The safety related equipment at Turkey Point are located at a level above any anticipated storm surge. Terrorist concerns are being handled generically by the NRC. Spent fuel storage capacity is addressed by the plant technical specifications which provide the maximum number of assemblies that can be stored in the spent fuel pool.

The staff has reviewed Mr. Oncavage's concerns through its allegation process. They provided Mr. Oncavage with a written response on their findings and closed the allegation. The staff committed to providing a copy of the NRC's response to Mr. Oncavage to the Committee. In addition, the staff committed to returning to the ACRS

491st ACRS Meeting
April 11-12, 2002

at a future date to discuss the issue of containment voids, and how it was resolved generically.

Committee Action

The Committee issued a report on this subject on April 19, 2002. The Committee will continue its review on the generic issue of voids in concrete containments at a future meeting.

III. Advanced Reactor Research Plan (Open)

[Note: Dr. Medhat El-Zeftawy was the Designated Federal Official for this portion of the meeting.]

Dr. Thomas Kress, Advanced Reactor Subcommittee Chairman, stated that the Office of Nuclear Regulatory Research (RES) has developed a draft advanced reactor research plan as a result of the staff's commitment to the Commission. RES considers this plan to be in its early stages as the plan will necessarily change as knowledge and experience grow.

Dr. John Flack, RES, stated that the staff in developing the plan, focused on determining the critical information that will be needed to establish safety standards for new reactor designs. Currently, the plan does not delineate the research that will be conducted by RES, rather it, identifies the information gap that exists at NRC in terms of the necessary tools and data.

The key topics in the proposed research areas follow:

- Regulatory framework based on risk-informed, performance-based principles,
- Accident analysis (probabilistic risk assessment methods, human factors, and instrumentation and control),
- Reactor/plant analysis (thermal-fluid dynamics, nuclear analysis and fission product release and transport),
- Fuel analysis (fuel performance testing, and fuel qualification),
- Materials analysis (graphite behavior and high-temperature materials performance),

491st ACRS Meeting
April 11-12, 2002

- Structural analysis (containment vs. confinement performance, external challenges),
- Consequence analysis (dose calculations, environmental impact studies),
- Nuclear materials safety and nuclear waste, and
- Nuclear safeguards and security.

The staff indicated that, where possible, the plan outlined a technology-neutral perspective. However, when design-specific safety issues are addressed, the plan discriminates between different technologies. The proposed plan will provide a platform for communicating program objectives and goals and receiving feedback from internal and external stakeholders. The research activities within the scope of the current plan include the Pebble Bed Modular Reactor (PBMR), Gas Turbine Modular Helium Reactor (GT-MHR), International Reactor Innovative and Secure (IRIS), and the AP-1000 designs.

There are two types of research that were considered in the proposed plan. These are research to establish the technical basis for regulatory decision-making, and research necessary to address uncertainties and gain insights into safety margins and failure points.

The staff also took advantage of the Department of Energy-sponsored Modular High-Temperature Gas Cooled Reactor (MHTGR) pre-application review that was performed in the late 1980s and early 1990s.

The advanced reactor research efforts for the arena of Safeguards and Security will support the regulatory offices in the assessment of proliferation potential and the evaluation of security measures, material control, and accounting systems needed for preventing and detecting nuclear material diversion. RES will support other offices and agencies as requested for assessing and limiting the vulnerability of advanced reactor plants and fuel cycle activities to sabotage outside threats.

The staff indicated that the proposed plan addresses the issues that were raised in Dr. Powers' trip report regarding the High Temperature Gas-Cooled Reactor Workshop held on October 10-12, 2001. The staff anticipates that this is the first of a series of meetings with the ACRS, and that more detailed discussions with the ACRS on the proposed plan will follow in subsequent meetings.

491st ACRS Meeting
April 11-12, 2002

Committee's Action

This briefing was for information only. The Committee expects to follow-up on the staff's proposed advanced research plan during future meetings.

IV. CRDM Penetration Cracking and Reactor Pressure Vessel Head Degradation (Open)

[Mrs. Maggalean W. Weston was the Designated Federal Official for this portion of the meeting.]

Dr. F. Peter Ford, Chairman of the Materials and Metallurgy subcommittee, introduced this topic to the committee. Mr. John D. Sieber, Chairman of the Plant Operations subcommittee, co-chaired this effort. The Committee heard presentations by and held discussions with representatives of NEI, EPRI/MRP, Davis Besse, and the NRC staff. The purpose of this meeting was to hear information regarding NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration (VHP) Nozzles," issued August 3, 2001, which requested information relating to the structural integrity of the VHP nozzles and NRC Bulletin 2002-01: Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity, issued March 18, 2002. This required information relating to reactor pressure vessel (RPV) head inspection and maintenance programs and a basis for continued operation until the inspections can be performed. The presentation provided a status of Davis-Besse's vessel head degradation, responses to Bulletin 2001-01, information regarding Bulletin 2002-01, and preliminary results of the augmented inspection (AIT) at Davis-Besse.

NRC Staff and Industry Presentations

The staff presentations were made by Mr. Allen Hiser and Mr. Kenneth Karwoski, NRR, and Mr. John Grobe, Region III. The industry presentations were made by Mr. Larry Mathews, EPRI/MRP; and, Mr. John Wood and Mr. Ken Byrd, First Energy Nuclear Operating Company (FENOC).

During a recent UT examination of VHP nozzles required by NRC Bulletin 2001-01, Davis-Besse Nuclear Power Plant found that five VHP nozzles required repair due to cracking in the nozzle adjacent to the J-welds which attach the VHP nozzles to the vessel head. On March 5, 2002, during a repair of the nozzles, the licensee identified an unexpected rotation and lateral movement of one of the nozzles during the machining operation. On March 6, the licensee removed the VHP nozzle and discovered significant metal loss from the reactor vessel head, adjacent to VHP nozzle No. 3 where cracking had been identified. The eroded area of the vessel head is 4 to 5 inches across and completely penetrates the low-alloy steel to the stainless steel

491st ACRS Meeting
April 11-12, 2002

cladding. Some further undercutting of the low-alloy steel along the stainless steel cladding has been identified. Davis-Besse estimates that the eroded volume contains about 40 pounds of steel.

Examination of the reactor vessel head adjacent to VHP nozzle No. 2 found a smaller area of erosion. This area is up to 3/16 inch from the nozzle and about 1 ½ inches across.

The reactor vessel head is fabricated from low-alloy steel, approximately 6 inches thick, with an inner cladding of stainless steel, about 1/4 to 3/8 inches thick.

The AIT report provided information on the containment air cooler clogging, containment radiation monitor filter clogging and boric acid buildup and corrosion on the reactor head as opportunities missed to identify the problem with the vessel head at Davis-Besse. The preliminary root of the cavity was postulated to be caused by boric acid corrosion from leakage through cracks in the nozzle and that significant corrosion began at least 4 years ago.

NRC Bulletin 2002-01 was issued March 18, 2002 and required that within 15 days, pressurized water reactor addressees provide information on their RPV head inspection and maintenance programs and these programs' ability to identify degradation. Additional requirements were included for 15, 30, and 60 days.

Committee Action

The Committee concluded that these issues required another briefing in the near future to discuss data to support some of the statements being made and to hear long term plans to manage potential degradation at nuclear power plants. No report was written at this meeting because of a lack of information on the final AIT report, the completion of the root cause analysis, the Davis-Besse repair plan, and data to substantiate statements made.

V. Westinghouse Owners Group (WOG) and Electric Power Research Institute (EPRI) Initiatives Related to Risk-Informed Inservice Inspection of Piping (Open)

[Note: Mr. Howard J. Larson was the Designated Federal Official for this portion of the meeting.]

Dr. William Shack, cognizant ACRS member, provided a preamble stating that the Committee had reviewed risk-informed inservice inspection of piping in the past and

491st ACRS Meeting
April 11-12, 2002

agreed with the staff that better inspections could be performed by focusing those inspections to identify the degradation of piping in the segments for which failure had the most severe consequences.

The Committee heard presentations by, and held discussions with, representatives of the NRC staff concerning the staff's draft safety evaluation of an addendum (EPRI-BER-TR) to EPRI Topical Report EPRI-ISI-TR. The staff previously approved EPRI-ISI-TR. The intent of the addendum is to modify risk-informed inservice inspection programs to include break exclusion region (BER) piping sections or "no break zones" such as containment penetrations. In addition to the EPRI addendum, NRC has also received an addendum to the WOG RI-ISI program to modify the ISI program to include risk-informed methodologies for selected augmented inspection programs. The staff is waiting on additional information from the WOG in order to complete its review and does not expect to provide its draft safety evaluation to the ACRS until later in 2002.

The NRC staff reviewed the background and regulatory approach for implementing RI-ISI programs at reactor facilities. The staff noted that it expected 99 of the operating reactor units plan to implement RI-ISI programs and that 50 reactor units have already submitted programs to NRC for approval, 37 using the EPRI methodology and 13 using the WOG methodology.

The NRC staff noted that there was very little change to the original methodology to include the inspection of BER piping. The NRC staff stated that by implementing RI-ISI for BER piping the industry could substantially reduce the radiological dose associated with the inspections as well as place greater emphasis on higher risk piping.

During the above discussions the ACRS members noted the following points:

Dr. Apostolakis questioned why NRC had to approve licensees' implementation of EPRI-ISI-TR since the staff has already approved the methodology. The staff stated that it required approval because it requested relief from the ASME Code regarding Class 1 and 2 piping. In addition, the staff noted that most licensees do not follow the methodologies in total, but make some changes to the accepted methodology for its particular facility.

Dr. Kress and Dr. Apostolakis requested clarification on the BER. The staff stated that the BER was the result of General Design Criterion 4, "Environmental and Dynamic Effects Design Basis," that requires structures, systems, and components important to safety be designed to accommodate the effects of a postulated accident and include appropriate protection against dynamic and environmental effects of postulated pipe ruptures. The staff added that it generally consisted of piping between the interior and exterior containment isolation valves. Dr. Kress noted that BER piping must be designed and inspected to exclude the possibility of breaking. The staff also added that

491st ACRS Meeting
April 11-12, 2002

the biggest difference between BER and non-BER is that a piping break in a BER pipe does not need to be postulated. Therefore, the effects of a break in BER do not have to be considered in the design of surrounding equipment.

Dr. Apostolakis raised a concern that not postulating breaks in BER piping goes against the defense-in-depth philosophy.

Dr. Apostolakis questioned the use of 10 CFR 50.59 to make changes to the BER inservice inspection program. The staff noted if the change affected the methodology used in EPRI-BER-TR then it could not be changed in 10 CFR 50.59.

Dr. Kress expressed concern that when using the guidelines of Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis," you should not violate the defense-in-depth philosophy and that a break in BER piping appeared to violate defense-in-depth.

Dr. Apostolakis and Dr. Kress agreed with the staff that based on inspection experience, it makes sense to focus the inspections on the areas where degradation is expected to occur and areas where the consequences of a piping failure are high.

Dr. Kress questioned whether all of the BER piping would eventually get inspected. The staff stated that if degradation was found during inspections the scope of the inspections would increase. Eventually, this could lead to the inspection of 100% of the piping.

Dr. Apostolakis questioned how the staff was applying uncertainty analysis as presented in RG 1.174. This question was raised because it was his understanding that most licensee's probabilistic risk assessments do not routinely contain uncertainty analyses. The staff noted that it believes that RG 1.174 states that uncertainty could be addressed if a reasonably conservative analysis or a bounding analysis is performed.

Committee Action

This was an information briefing and the Committee did not take any action. The Committee members agreed with the staff that the addendum was an appropriate extension of the previously approved EPRI Topical Report. The Committee plans to continue its review of future addendums to both the EPRI and the WOG Topical Reports on this subject.

VI. General Electric (GE) Nuclear Energy Topical Report: "Constant Pressure Power Uprate" (Open)

[Note: Paul A. Boehnert was the Designated Federal Official for this portion of the meeting.]

Mr. Sieber, cognizant ACRS Member for this issue, introduced this topic to the Committee. He noted that the Thermal-Hydraulic (T/H) Phenomena Subcommittee discussed this matter during meetings held on January 16-18 and March 6, 2002. Elements of the CPPU methodology were previously reviewed by the Committee during the March ACRS Meeting, as used by the Clinton plant licensee for its Extended Power Uprate (EPU) application. Two issues are of note for this review: GE's modeling of the core spray distribution as impacted by EPU, and, whether the staff needs to exercise additional oversight of reload analysis methodology, pursuant to use of CPPU.

GE Nuclear Energy Presentation (Open/Closed)

Representatives of GE Nuclear Energy discussed the following topics relative to the CPPU Licensing Topical Report:

- Introduction
- Key Elements of CPPU Program
- Power Uprate Implementation Status
- CPPU License Topical Report
 - Approach
 - Heat Balance/Power-Flow Map
 - Relation to ELTR 1&2
 - CPPU Process Simplification
 - Issue Dispositions
 - LTR Format
 - Plant-Specific Submittal
- Specific Topics
 - Standard BWR Reload Analysis Scope
 - Core Spray Distribution
- Concluding Remarks

GE's approach is aimed at streamlining the licensee's submittal and the NRC staff's review process by keeping the LTR scope narrow. Using the CPPU approach results in no change to: RCS pressure or core flow, the MELLLA/MEOD plant operational upper boundary limit¹, source term methods, fuel mechanical design, cycle length or

¹ GE has submitted a LTR to allow expansion of the MELLLA power/flow operating region. Known as the "MELLLA +" approach, this Topical Report is currently under staff review.

operational enhancements. Review topics are disposed generically or on a plant-specific basis (~ 50% for each). For the generic topics, the goal is process efficiency; thus, the fuel dependent evaluations will be performed via the cycle reload analysis. For the plant-specific review topics, key aspects of the uprate (e.g., vessel fluence, ECCS LOCA performance, ATWS, fire protection, etc.) will be evaluated to allow a focused, standardized plant-specific analysis.

In response to Committee Members' questions, the following was noted:

- Use of CPPU does not change the scope of the reload analysis.
- Mr. Leitch asked how the issue of the impact of uprate on a plant's standby gas treatment system was handled generically. GE said that bounding assumptions were made that apply to all BWR plants; however, licensees must still perform an analysis to confirm that its plant operates within the acceptable parameters.
- Regarding the reload analyses, most are performed by GE and are retained in their record files. Most licensees participate directly in this process with GE and all licensees audit GE's work. However, some licensees perform their own independent analysis and GE said that they have been audited by the NRC staff several times over the past 8-9 years, in addition to the three recent EPU audits.
- Mr. Rosen requested information regarding the impact of EPU on the core power distribution. GE indicated that this information will be available for the Committee's upcoming review of the Brunswick plant.

NRC Staff Presentation

Representatives of NRR made a brief presentation regarding their review of the GE CPPU LTR. Topics discussed included: NRR Audits of GE Methodology, Fuel Design and Operation, Thermal Limits Assessment, Conclusions.

NRR found the CPPU LTR acceptable to reference for BWR extended power uprates. Staff audits have confirmed compliance to restrictions on staff-approved methodology.

In response to questions from Dr. Powers, NRR said that the bases for judging that current fuel designs are meeting safety criteria rests on staff/vendor analyses, results of staff audits, and the limited amount of applicable test data that is currently available. Mr. Marsh noted that the staff will be providing the Committee a response, in the near future, to the concerns it recently expressed regarding this matter. In response to Mr Sieber, NRR said that it intends to continue to perform audits, as noted above, for plants pursuing the CPPU power uprate approach.

Committee Action

The Committee issued a report to Chairman Meserve on this matter, dated April 17, 2001. The Committee's report recommended that GE's CPPU LTR be approved for application to BWR power increases of up to 20 percent of original licensed thermal power.

X. Executive Session (Open)

[Note: Dr. John T. Larkins was the Designated Federal Official for this portion of the meeting.]

A. **Reconciliation of ACRS Comments and Recommendations**

[Note: Mr. Sam Duraiswamy was the Designated Federal Official for this portion of the meeting.]

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

- The Committee discussed the response from the Executive Director for Operations (EDO) dated March 29, 2002, to the ACRS comments and recommendations included in the ACRS report dated February 14, 2002, concerning the review and evaluation of the NRC safety research program.

The Committee decided that it was satisfied with the EDO's response.

- The Committee considered the response from the EDO dated March 22, 2002, to comments and recommendations included in the ACRS report dated February 14, 2002, concerning staff efforts regarding a reevaluation of the technical basis for assurance of reactor vessel integrity under pressurized thermal shock (PTS) conditions.

The Committee was satisfied with the EDO's response.

B. **Report on the Meeting of the Planning and Procedures Subcommittee (Open)**

The Committee heard a report from the ACRS Chairman and the Executive Director, ACRS, regarding the Planning and Procedures Subcommittee meeting held on April 9, 2002. The following items were discussed:

491st ACRS Meeting
April 11-12, 2002

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

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

Anticipated Workload for ACRS Members

The anticipated workload for ACRS members through June 2002 was discussed. The objectives were:

- 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.

Quadripartite Meeting Update

As recommended by the Committee at the March 2002 ACRS meeting, Drs. Apostolakis and Larkins met with the NRC Chairman to obtain feedback regarding the extent to which ACRS can participate and discuss Safeguards and Security issues at the Quadripartite meeting. The NRC Chairman did not object to ACRS participation in the discussion of Safeguards and Security issues. However, care should be exercised not to divulge the proposed NRC and industry activities associated with enhancing the Safeguards and Security programs.

During the March meeting it was agreed that the following technical papers would be submitted for discussion at the Quadripartite meeting:

- Safety Culture and Safety Management
- Risk-Informed Regulation
- Thermal-Hydraulic Analysis and Code Issues
- Stress Corrosion Cracks in Pressure Retaining Components in Nuclear Power Plants
- Risk Analysis of Spent Fuel Storage

Staff Requirements Memorandum

In a Staff Requirements Memorandum (SRM) dated December 20, 2001, resulting from the ACRS meeting with the Commission on December 5, 2001, the Commission requested the following:

- The ACRS should continue to review staff efforts on risk-based PIs and improvements to the significance determination process.
- The staff, with ACRS input, should provide recommendations for resolving, in a transparent manner, apparent conflicts and discrepancies between aspects of the revised reactor oversight process that are risk-informed (e.g., significance determination process) and those that are performance-based (e.g., performance indicators).
- The ACRS should continue its efforts to ascertain regulatory challenges for future reactor designs. The Committee should also ensure that it is prepared to review NRC staff efforts on advanced reactors in the near term, including issues related to Westinghouse's AP1000, General Atomics' gas turbine modular helium reactor, and Exelon's pebble bed modular reactor.

As recommended by the Committee during its February 2002 meeting, Mr. Sieber agreed to develop a plan for addressing the ROP issues in the SRM after an informal meeting with the staff, which is to be held during the April ACRS meeting.

Dr. Kress agreed to develop a plan to address the issues on future plant designs after the Committee's review of the Advanced Reactors Research Plan in April.

ACRS Meeting with the NRC Commissioners

The ACRS is scheduled to meet with the NRC Commissioners on Wednesday, July 10, 2002, between 2:00 and 4:00 p.m. The Committee proposed the following topics during the March meeting. These topics have been sent to the Commission.

- Overview by the ACRS Chairman
- Status of ACRS activities on power uprates, license renewal, and Human Reliability Research Plan
- Advanced reactor designs
- Mixed Oxide Fuel Fabrication Facility
- Risk-Informing Special Treatment Requirements of 10 CFR Part 50
- PTS reevaluation project

491st ACRS Meeting
April 11-12, 2002

Celebration of the 500th ACRS Meeting

During the March 2002 meeting, the Committee agreed to a plan proposed by Dr. Kress for celebrating the 500th ACRS meeting (now planned for March 2003, which is also coincidental with the Committee's 50th anniversary). A proposed schedule was discussed.

ACRS Senior Fellow Position

The vacancy announcement for the ACRS Senior Fellow position has closed and a Rating Panel has reviewed the applications and provided a list of best-qualified candidates. ACRS management is in the process of interviewing the best-qualified candidates. It was recommended that the Planning and Procedures Subcommittee members interview these candidates on behalf of the full Committee.

Joint ACRS/ACNW Workshop

The ACRS and ACNW Committees have agreed to hold a joint workshop on August 27 (p.m.) - 29, 2002, to discuss uncertainty and the use of formal decision analysis in the regulatory decisionmaking process. This workshop will be held in the NRC Auditorium. The NRC staff and external stakeholders will be invited to participate and provide presentations.

Program Plan for the 2003 Research Report

The Committee has agreed to submit a comprehensive report to the Commission on the NRC Safety Research Program for 2003. Dr. Ford has the lead responsibility for coordinating the report.

Financial Disclosure Form

Mr. John Szabo, OGC, has forwarded the Financial Disclosure Form (SF 278) to all members. This form should be completed and submitted to OGC by May 15, 2002. Those who need an extension to complete this form should contact Rebecca Lambert, OGC (301-415-1613) or rl@nrc.gov. Extension of up to 45 days after May 15th can be granted by OGC for good cause. Subsequent to reviewing the completed forms, OGC will send a conflict-of-interest statement to each member.

C. Future Meeting Agenda

Appendix IV summarizes the proposed items endorsed by the Committee for the 492nd Meeting, May 2-3, 2002.

The 491st meeting was adjourned at 6:30 pm on Friday, April 12, 2002.