



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
ADVISORY COMMITTEE ON NUCLEAR WASTE  
WASHINGTON, D.C. 20555-0001

January 30, 2007

MEMORANDUM TO: ACNW Members  
ACNW Staff

FROM: *Michele S. Kelton*  
Michele S. Kelton  
Technical Secretary, ACNW

SUBJECT: CERTIFIED MINUTES OF THE 174<sup>TH</sup> MEETING OF THE ADVISORY  
COMMITTEE ON NUCLEAR WASTE (ACNW) NOVEMBER 13-16, 2006

The proposed minutes of the subject meeting have been certified as the official record of the proceedings for that meeting.

Attachment:  
Certified Minutes of the 174<sup>th</sup> Meeting  
November 13-16, 2006

cc: A. Bates, SECY (O-16C1)  
S. Jones, NMSS (T-8A23)  
J. Lamb, OEDO (O-16E15)



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
ADVISORY COMMITTEE ON NUCLEAR WASTE  
WASHINGTON, D.C. 20555-0001

MEMORANDUM TO: Antonio Dias, Team Lead  
Advisory Committee on Nuclear Waste

FROM: Michael T. Ryan, Chairman  
Advisory Committee on Nuclear Waste

SUBJECT: PROPOSED MINUTES OF THE 174<sup>TH</sup> MEETING OF THE  
ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)  
NOVEMBER 13–16, 2006

I certify that, based on my review of these minutes<sup>1</sup>, and to the best of my knowledge and belief, I have observed no substantive errors or omissions in the record of this proceeding subject to the comments noted below.

Comments:

Michael T. Ryan, Chairman  
Date: 1/30/07

<sup>(1)</sup> Minutes of the 174<sup>th</sup> Meeting of the ACNW held November 13–16, 2006, dated January 30, 2007



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
ADVISORY COMMITTEE ON NUCLEAR WASTE  
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January 30, 2007

MEMORANDUM TO: Michael T. Ryan, Chairman  
Advisory Committee on Nuclear Waste

FROM: *Michele S. Kelton*  
Michele S. Kelton, Technical Secretary  
Advisory Committee on Nuclear Waste

SUBJECT: PROPOSED MINUTES OF THE 174<sup>TH</sup> MEETING OF THE  
ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)  
NOVEMBER 13-16, 2006

Enclosed are the proposed minutes of the 174<sup>th</sup> meeting of the ACNW. This draft is being provided to give you an opportunity to review the record of this meeting and provide comments. Your comments will be incorporated into the final certified set of minutes as appropriate. Please provide your corrections and comments to me.

Please note that these minutes are being issued in two parts: (1) main body (working copy form) and (2) appendices. The appendices are being sent only to those members who have requested them.

A copy of the certified minutes with appendices will be forwarded to each member.

Enclosure: As stated

cc w/o Encl. 2: ACNW Members  
ACNW Staff

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**CERTIFIED**

1/30/07

By MICHAEL T. RYAN

Issued: 1/30/07

**CERTIFIED MINUTES OF THE 174<sup>TH</sup> MEETING OF THE  
ADVISORY COMMITTEE ON NUCLEAR WASTE  
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The U.S. Nuclear Regulatory Commission (NRC) Advisory Committee on Nuclear Waste (ACNW or the Committee) held its 174<sup>th</sup> meeting on November 13–16, 2006, at One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The ACNW published a notice of this meeting in the *Federal Register* on November 2, 2006 (71 FR 64568) (see Appendix A). This meeting served as a forum for attendees to discuss and take appropriate action on agenda items (see Appendix B). The entire meeting was open to the public.

A transcript of selected parts of the meeting is available in the NRC's Public Document Room at One White Flint North, Room 1F19, 11555 Rockville Pike, Rockville, Maryland. Copies of the transcript are available for purchase from Neal R. Gross and Company, Inc., 1323 Rhode Island Avenue, NW, Washington, DC 20005. Members of the public may download transcripts from, or review them on, the Internet at <http://www.nrc.gov/reading-rm/doc-collections/acnw/tr/> at no cost.

ACNW members Dr. Michael T. Ryan (ACNW Chairman), Mr. Allen G. Croff (ACNW Vice Chairman), Dr. James H. Clarke, Dr. William J. Hinze, and Dr. Ruth Weiner attended this meeting. Appendix C includes a list of other attendees.

**I. CHAIRMAN'S REPORT (OPEN)**

[Dr. Antonio Dias was the Designated Federal Official for this part of the meeting.]

Dr. Ryan, ACNW Chairman, convened the meeting at 10:00 a.m. and briefly reviewed the agenda. He noted that the meeting was being conducted in conformance with the Federal Advisory Committee Act. Dr. Ryan asked members of the public who were present and wished to address the Committee to inform the ACNW staff so that time could be allocated for them to speak. Mr. Theodore Rockwell from Radiation, Science & Health, Inc., received time to present his comments on the effects of low doses of ionizing radiation.

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**II. UPDATE ON STATUS OF SEISMIC DESIGN BASES AND METHODOLOGY: NRC PERSPECTIVE (OPEN )**

[Mr. Michael Lee was the Designated Federal Official for this part of the meeting.]

In May 2006, the NRC staff issued Interim Staff Guidance (ISG), "Review Methodology for Seismically Initiated Event Sequences," designated DHLWRS-ISG-01 (NRC, 2006<sup>1</sup>), for public comment. This ISG is intended to supplement the existing Yucca Mountain Review Plan (YMRP) for the staff's review of seismically initiated event sequences.<sup>2</sup> Such event sequences are expected to be described in any U.S. Department of Energy (DOE) Preclosure Safety Analysis (PCSA) submitted as part of a Title 10, Part 63, "Disposal of High-Level Radioactive Wastes In a Geologic Repository at Yucca Mountain, Nevada," of the *Code of Federal Regulations* (10 CFR Part 63) license application safety analysis report.

At this meeting, the Committee's 174<sup>th</sup>, Drs. Mysore Nataraja and Mahendra Shah, representing the NRC's Division of High-Level Waste and Repository Safety (DHLWRS), provided the ACNW with an overview of DHLWRS-ISG-01. As background, the first speaker (Nataraja) noted that the NRC's geologic repository regulations in 10 CFR Part 63 do not specifically identify seismicity as a potentially adverse site feature. Alternatively, the regulations require that the DOE PCSA and postclosure total-system performance assessment reflect consideration of geologic hazards known to exist at the Yucca Mountain site or thought to exist with a high degree of assurance and an analysis of repository system performance reflecting consideration of those hazards. With respect to the PCSA itself, the analysis is described in the regulations as a systematic examination of natural and manmade hazards at the geologic repository operations area (see 10 CFR. 63.112, "Requirements for Preclosure Safety Analysis of the Geologic Repository Operations Area"). The PCSA is similar to a traditional fault or event tree analysis and is to include the identification of potential hazards, the potential for

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- 1 U.S. Nuclear Regulatory Commission, "Notice of Availability of Draft Interim Staff Guidance Document HLWRS-ISG-01 Review Methodology for Seismically Initiated Event Sequences [Notice of Availability]," *Federal Register*, Vol. 71, No. 98, p. 29369, May 22, 2006.
  - 2 As described in 10 CFR 63.2, "Definitions," "event sequence" means a series of actions and/or occurrences within the natural and engineered components of a geologic repository operations area that could potentially lead to exposure of individuals to radiation. An event sequence includes one or more initiating events and associated combinations of repository system component failures, including those produced by the action or inaction of operating personnel. Those event sequences that are expected to occur one or more times before permanent closure of the geologic repository operations area are referred to as Category 1 event sequences. Other event sequences that have at least 1 chance in 10,000 of occurring before permanent closure are referred to as Category 2 event sequences.

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initiating event sequences for those hazards and their consequences, and proposed site structures, systems, and components (SSCs) intended to mitigate or prevent the accident sequence. As required by 10 CFR Part 63, the PCSA results must be compared to the 10 CFR Part 20, "Standards for Protection against Radiation," worker dose limits, as well as public exposure limits set forth in Subpart K, "Preclosure Public Health and Environmental Standards," to 10 CFR Part 63 to ensure that potential radiation exposures are within allowable limits.

The staff speaker also noted that a key feature of the 10 CFR Part 63 PCSA is the identification and analysis of Category 1 and Category 2 "design-basis events" (DBEs) (see 10 CFR 60.2). A Category 1 DBE is associated with "normal" operating conditions. Such an event may happen one or more times during the preclosure phase (lasting about 100 years) and thus can be expected to occur with a probability of 1. Category 2 DBEs represent unlikely but credible coupled events with a much lower recurrence frequency—on the order of about  $10^{-6}$  events/year. For example, the analysis of a specific Category 2 DBE sequence would include the identification of an initiating event (e.g., a seismic hazard curve produced from the DOE-sponsored probabilistic seismic hazards analysis<sup>3</sup> being used by the Department to estimate appropriate vibratory ground motion and fault displacement levels that could be used to design geologic repository SSCs) and the associated combinations of repository system or component failures (e.g., the seismic fragility of an overhead crane) that could potentially lead to SSC failure and subsequent worker exposures. Hence, the intent is to have two levels of design robustness for SSCs to ensure that the 10 CFR Part 20 and 10 CFR Part 63, Subpart K, public exposure limits (at 10 CFR 63.204, "Preclosure Standard") are maintained—a higher Category 1 DBE and a lesser (but still important) Category 2 DBE. The challenge facing DOE is to design the geologic repository operations area to maintain radiological releases within applicable limits for both Category 1 and Category 2 event sequences.

In 2001, consistent with its site-specific regulation, the speaker noted that the staff began to develop the YMRP. The most recent version of the YMRP (Revision 2) is dated July 2003 and provides guidance to the NRC staff on how to evaluate a DOE 10 CFR Part 63 license application. Although the NRC staff has been conducting preclosing consultations with DOE on seismic issues for many years, the speaker noted that it was only after preparation of the YMRP that it was determined that additional guidance was needed regarding how that review plan was to address the treatment of seismic issues in the context of a PCSA. Following publication of a May 2006 public comment draft (71 FR 29369), the NRC staff conducted a technical exchange meeting in June 2006 with DOE representatives to discuss that draft. Later, in September 2006, the staff conducted a separate public meeting on the proposed ISG with representatives of the Nuclear Energy Institute (NEI) and the Electric Power Research Institute (EPRI).

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3 See U.S. Geological Survey, "Probabilistic Seismic Hazards Analyses for Fault Displacement and Vibratory Ground Motion," Denver, 3 vols., September 1998.

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Following presentation of this background, the second staff speaker (Shah) summarized the guidance itself. It was noted that the agency issued the final version of DHLWRS-ISG-01 in September 2006.<sup>4</sup> The speaker noted that the staff review guidance is intended to complement the existing YMRP and is not intended as defacto regulatory guidance to DOE, although the Department is free to implement the guidance as part of its license application development. He also noted that the review methodology described in DHLWRS-ISG-01 is consistent with the seismic review methodology previously proposed by the staff for the review of the mixed-oxide fuel fabrication facility at the Savannah River site in South Carolina (NRC, 2005<sup>5</sup>), as well as the recently issued American Society of Civil Engineers (ASCE) consensus standard, ASCE/SEI 43-04, on seismic design criteria for nuclear facilities (ASCE, 2005<sup>6</sup>). It was also noted that NRC's Office of Nuclear Regulation is currently attempting to integrate ASCE/SEI 43-04 into its review methodology for new nuclear power plant licensing.

Following the completion of their presentation, Drs. Nataraja and Shah responded to questions and comments about DHLWRS-ISG-01 from the ACNW members, staff, and members of the public who were in attendance. At times, they were assisted in their responses by Dr. John Stamatakos, representing the Center for Nuclear Waste Regulatory Analyses, Messers. Timothy McCartin and Robert K. Johnson, and Dr. James Rubenstone, all representing the DHLWRS. The questions and comments resulted in the following discussion points.

- The staff received 23 comments from 5 different organizations on draft DHLWRS-ISG-01. The staff has responded satisfactorily to all technical comments on DHLWRS-ISG-01 received from stakeholders.
- Some stakeholders (specifically NEI and EPRI) may have continuing nontechnical concerns about the use of the ISG format as staff guidance in the area of high-level

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4 U.S. Nuclear Regulatory Commission, "Review Methodology for Seismically Initiated Event Sequences; Availability of Final Interim Staff Guidance Document [Notice of Availability]," *Federal Register*, Vol. 71, No. 189, pp. 57579–57584, September 29, 2006.

5 U.S. Nuclear Regulatory Commission, "Final Safety Evaluation Report on the Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina—Docket No. 70-3098, Duke Cogema Stone & Webster, LLC," Division of Fuel Cycle Safety and Safeguards, NUREG-1821, March 2005.

6 American Society of Civil Engineers, "Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities," Nuclear Standards Committee, ASCE/SEI 43-05, Reston, Virginia, 2005.



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radioactive waste (HLW) management. NEI and EPRI intend to present their views on DHLWRS-ISG-01 to the ACNW at its December 2006 (175<sup>th</sup>) meeting.

- The staff expressed the view that the guidance outlined in DHLWRS-ISG-01 does not place more rigorous seismic design requirements on DOE than would be found in a typical nuclear power plant. For the most part, it was noted that nuclear power plant design reviews are concerned with single component failures whereas the 10 CFR Part 63 regulatory framework is more performance- or dose-based, placing greater emphasis on overall system performance rather than on the performance of a single SSC.<sup>7</sup>
- The staff has no intention of codifying DHLWRS-ISG-01 into the 10 CFR Part 63 regulation. Other ISGs, on other 10 CFR Part 63 regulatory topics, are currently under development. The staff intends to issue a Revision 3 to the YMRP, at a later date, reflecting all HLW ISGs, once the full suite of ISG topic areas has been prepared and issued.
- Although a panel of knowledgeable subject matter experts developed ASCE/SEI 43-04, which is intended for implementation by future NRC licensees, no NRC Federal advisory committee has independently reviewed it.

**III. RESULTS FROM THE LIQUID RADIOACTIVE RELEASE LESSONS-LEARNED TASK FORCE (OPEN)**

[Mr. Derek Widmayer was the Designated Federal Official for this part of the meeting.]

Messrs. Stuart Richards and Timothy Frye of the Division of Inspection and Regional Support of the Office of Nuclear Reactor Regulation (NRR) discussed the results of the recently completed work of the Liquid Radioactive Release Lessons-Learned Task Force (also known as the Tritium Task Force). They provided background on the recent discoveries that led to the establishment of the task force, particularly the events at the Braidwood and Indian Point nuclear power reactors. The task force was composed of 14 individuals, 6 of whom had health physics backgrounds. The charter of the task force asked the membership to look at the regulatory process for liquid effluents, including unplanned events, for power plants only, and to look back 10 years for significant events. The task force looked also at the response of the industry.

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<sup>7</sup> For the purposes of comparison to 10 CFR Part 63, nuclear power plants have individual dose goals of 10<sup>-4</sup> events/year from core damage frequency and 10<sup>-5</sup> events per year for large early releases. The requirements of 10 CFR Part 63 permit the screening of features, events, and processes for the purposes of dose assessments if their frequency of occurrence is in the range of 10<sup>-6</sup> to 10<sup>-8</sup> events/year or less.

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One major conclusion of the task force is that the potential exists for unplanned and unmonitored liquid releases to migrate off site undetected. The task force also found that ground water contamination can be difficult to monitor and predict and that external stakeholder interest in these events is high. Another important conclusion is that none of the events led to any public health impacts.

The task force made 26 recommendations to NRC staff to improve or change the regulatory framework and process to address the weaknesses found. Mr. Richards and Mr. Frye discussed only the highlights of the recommendations, which included (1) leakage from a power plant should be detected before it migrates off site, (2) additional guidance should be developed to address spills and leaks, and (3) changes to the "significance determination process" (SDP) should be made. They mentioned that the industry also has a detailed initiative to respond to the events underway.

In response to questions, Mr. Richards and Mr. Frye stated that NRC program offices would be responding individually to the task force recommendations. The committee asked several questions about how these lessons learned will be used in new reactor designs. Several references were made to efforts being undertaken within the Office of Federal and State Materials and Environmental Management Programs (FSME) to revise 10 CFR 20.1406, "Minimization of Contamination," and to implement changes to the Standard Review Plans (SRPs) for review of nuclear power plant safety analysis reports. The task force also found other radionuclides of interest within the events they looked at over the last 10 years, including strontium-90 and cesium-137.

In response to questions, the observation was made that the initial characterization of a nuclear power plant site conducted for licensing may not serve very well as a baseline hydrogeological characterization because all of the excavations and installation of systems and components that take place when the plant is built can substantially change the site's hydrogeologic characteristics. The Committee suggested that this knowledge could be developed slowly over a period of several years in an efficient manner, rather than in the "emergency" fashion that is taking place right now which is very expensive. A representative of the nuclear energy industry provided a brief summary of the industry initiative that was mentioned earlier in the briefing.

The Committee agreed not to write a letter to the Commission on the results of the task force, but to include observations and recommendations in a White Paper in 2007 that consolidates work on several decommissioning topics.

**IV. PREPARATION FOR MEETING WITH NRC COMMISSIONERS (OPEN)**

[Dr. Antonio Dias was the Designated Federal Official for this part of the meeting.]

The Committee reviewed and revised draft slides in preparation for the Commission briefing on December 14, 2006. The presenters will finalize the slides and rehearse their presentations at the December 2006 Committee meeting.

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**V. ACNW WORKING GROUP ON DECOMMISSIONING LESSONS LEARNED (Open)**

[Mr. Derek Widmayer was the Designated Federal Official for this part of the meeting.]

During its 174<sup>th</sup> meeting on November 13, 2006, ACNW held a working group meeting on lessons learned in decommissioning. The working group meeting was organized as a followup to information previously presented to the Committee on the NRC's lessons-learned initiatives and to specifically obtain information to address a request from the Commission to review best practices in decommissioning to look for ways to improve the design and construction of reactor and materials facilities that would lead to less environmental impact and more efficient decommissioning. The working group specifically focused on obtaining information on ways of risk-informing future rulemaking and guidance to achieve the objectives of the NRC staff's lessons-learned initiative. The Committee was again supported by invited experts in decommissioning who have supported the Committee during several previous decommissioning working group meetings. The invited experts were Mr. Thomas Nauman of Shaw, Stone and Webster Nuclear Services; Mr. Tracy Ikenberry from Dade Moeller and Associates; Dr. Dave Kocher from SENES Oak Ridge; and Mr. Eric Darois from Radiation Safety and Control Services.

The working group meeting comprised two sessions, (1) Lessons Learned in Decommissioning and (2) Factoring Lessons Learned in NRC Directives. The summaries below describe each session.

**Session 1: Lessons Learned in Decommissioning.** This session featured representatives from industry, licensees, DOE, and decommissioning practitioners. The focus was on lessons learned in decommissioning, especially those that could lead to risk-informed approaches to minimizing releases and less costly decommissioning.

Mr. Ralph Andersen from NEI provided information on lessons learned in decommissioning nuclear power reactors and the efforts of EPRi and NEI to preserve these lessons learned for future power plant licensees. He pointed out that a serious gap in time will occur from the current plant decommissioning and future decommissioning efforts as a result of plant life extensions. He also noted that new plant designs will impact any lessons that may have been learned from current decommissioning. He summarized lessons learned from several nuclear plant projects that have been, or are nearly, completed. These include Big Rock Point, Maine Yankee, Trojan, Yankee Rowe, Connecticut Yankee, and Rancho Seco. Lessons learned from these decommissioning projects are being summarized and will soon be made available to the NRC and other audiences in a report. He talked about some lessons learned, including the need for up-front planning (or lifecycle approach), interactions with stakeholders, and a good historical record of activities at the sites.

Mr. Andersen highlighted some areas that new plant design and construction could address which would lead to easier decommissioning. These include taking detailed photos and videos at construction, in addition to better drawings and records; prohibiting onsite disposal of

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construction debris; improving hydrologic characterization of the site and maintaining better records of ground water levels and movement during operations; providing berms, moats, and collection areas; and improving surface waterflow management. Other areas that could lead to better decommissioning include avoiding the use buried piping and addressing the weaknesses in design of spent fuel pools.

Mr. Jeff Lux from the Fuel Cycle Facilities Forum provided information on lessons learned in the decommissioning of complex materials and fuel cycle facilities. Mr. Lux pointed out the successes the NRC has already achieved in improving decommissioning activities. He identified the items encountered in decommissioning that create the most cost. These include unanticipated contamination after remedial actions have started, final status surveys and site characterization, cleaning or removal of inaccessible components, and implementation of health physics programs at the site. He also pointed out the items that cause the most environmental impact. These are concentration of effluents and discharges downstream and penetration of liquids into porous media.

Mr. Lux identified several items that could affect the final cost and impact of decommissioning. He suggested minimizing embedded piping or making it more accessible. He also identified minimizing the use of easily corroding metals, having provisions for secondary containment of contaminated liquids, avoiding floor penetrations, using coatings, minimizing the use of wet processing, if possible, and using a rail line if major volumes of waste will be generated.

Mr. Lux also pointed out that multiple agency jurisdiction has had a significant impact on efforts to decommission major complex materials sites. He noted added improvements that the NRC could make to its decommissioning program, including more flexibility in eliminating final surveys, more use of partial decommissioning as operations continue, and calculation of derived concentration guideline levels (DCGLs) during operations and modification of them as more is learned.

Mr. Lawrence Boing from the Argonne National Laboratory provided information on lessons learned in decommissioning DOE facilities. He provided information on several DOE sites undergoing dismantlement and decommissioning, and he noted that many of these facilities were built quickly and their design and construction did not include any decommissioning considerations. Thus, DOE staff has learned the importance of good recordkeeping. He noted that a major cost component is waste generation, but not waste disposal because of the availability of DOE disposal facilities. He stated that implementing a workable "clearance" policy would allow for cheaper waste generation. DOE staff has also learned a number of lessons concerning industrial safety during decommissioning. Mr. Boing pointed out the advantage to having an agreed-upon final end-state for the facility in achieving good decommissioning objectives. He also noted the impact on cost of transporting waste from facilities that are far from disposal facilities, which are mostly located in the western part of the United States. Mr. Boing pointed out some improvements in facilities that could result in better decommissioning. These included avoiding embedded piping, avoiding massive concrete structures by using a modular approach, using secondary containment, optimizing the plant

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layout for eventual removal of components, and using standardized designs. Mr. Boing presented the top 10 lessons learned from DOE decommissioning projects, which included better communication, better planning and cost estimating, the use of available off-the-shelf technologies, and other points made by previous speakers.

Mr. Hans Honerlah from the Army Corps of Engineers provided information on lessons learned from completion of Formerly Utilized Sites Remedial Action Program (FUSRAP) remediation sites and other facilities cleaned by the Corps. His major messages echoed those made by previous speakers on many topics, but he did offer several unique lessons. These include the need for (1) jurisdictional differences and regulation interpretation to be aligned, (2) a more risk-informed disposal system to open up more disposal facilities (including hazardous waste facilities) to slightly contaminated materials, and (3) implementation of a risk-informed release or clearance policy.

The speakers responded to questions from the panel of invited experts and discussions took place. In one case, two invited experts discussed the break in logic in trying to plan more for decommissioning many years in advance with the fact that disposal drives so much of the cost, and we have no idea what disposal arrangements will be available or what disposal will cost when these future plants are decommissioned. The invited experts also noted that several speakers pointed to the potential problem of allowable discharges accumulating in the environment and resulting in contamination issues at decommissioning. There was further discussion on the ability or cost-effectiveness of reusing buildings after decommissioning as opposed to dismantlement and disposal.

**Session 2: Factoring Lessons Learned into NRC Directives.** This session featured a representative of an Agreement State and several NRC staff who addressed their efforts in decommissioning lessons learned to date that could lead to risk-informed approaches to minimizing releases and reduced decommissioning costs, as well how these lessons are being (or will be) factored into rulemaking and guidance.

Mr. Thomas Conley from the Kansas Department of Health and Environment presented the views of an Agreement State on decommissioning lessons learned. His presentation differed from earlier ones as his lessons were learned mostly from decommissioning of smaller facilities. Mr. Conley and his staff have learned that prevention of contamination is the easiest way for a small facility to control the cost and environmental impact at decommissioning. Because small facilities do not generate the amounts of money needed to adequately address decommissioning after the life of the facility is over, prevention is key. Thus, smaller facilities need to address monitoring, use of liners and leachate collection, and changing the culture of the operators. Another issue causing problems at smaller facilities is change of ownership, when decommissioning liabilities are passed on to a second owner. The inspection process needs to be more aggressive in identifying problems early because it is much easier to address a problem immediately after it happens. The smaller facilities also need to maintain better records.

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A representative of FSME also presented lessons learned. This was an update of information heard by the Committee in previous meetings. Mr. Rafael Rodriguez of FSME noted the progress made in implementing the collection of lessons learned, including the addition of these lessons to the NRC's decommissioning Web site. He also noted that FSME used this information as a basis for a memorandum to NRR and the Office of New Reactors (NRO), capturing lessons learned that could be used in design and construction of new nuclear power plants.

Dr. William Ott from the Office of Research (RES) presented information on the development of a regulatory guide for implementation of the requirements of 10 CFR Part 20.1406 and other work of NRC staff in NRR, NRO, and RES that will include some aspects of the decommissioning lessons-learned effort. He noted that when the rule went into effect, the agency did not contemplate needing guidance because it had been so long since a reactor was licensed. Consequently, the staff is playing catchup. Dr. Ott provided a summary of the schedule for the development of the guidance, which indicates that a draft will be available in March 2007.

Mr. Steve Koenig of NRR presented information on the update on how the SRP chapters for the review of a license application for a new nuclear power plant will include decommissioning lessons learned. He said staff was on schedule to finalize the SRP chapters by the end of March 2007. He briefly explained the process being used to finalize the chapters in order for them to become effective in time to review new power plant license applications expected around September 2007. (The Committee is scheduled to hear a detailed presentation of SRP Chapter 11.2, which implements most of the decommissioning lessons learned, at the 175<sup>th</sup> ACNW Meeting in December 2006.)

Mr. Jim Shepherd from FSME provided an update to the rulemaking on 10 CFR Part 20.1406. Staff is considering including some form of decommissioning lessons learned in some of the provisions of the proposed draft revisions to the rule. Mr. Shepherd reported that the rulemaking has been delayed to September 2007 in order to implement the recommendations in the Tritium Task Force Report. He discussed some of the changes that are being contemplated, including the possibility of limiting implementation to only new licensees, because of backfit analysis requirements. He briefly summarized the proposed changes to the rule and its applicability to 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants," license applicants. He summarized considerations for possible additional guidance for 10 CFR Part 20.1501 to apply to existing facilities.

A question-and-comment session involving the Committee members, the invited decommissioning experts, and the speakers followed the formal presentations. During this discussion, several speakers summarized the top decommissioning lessons learned in various ways to provide highlights of the working group, as discussed in the next section. Further discussion took place on the utility of today's lessons learned and the necessity to impact the design and construction of new plants, rather than relying on better monitoring alone to achieve

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future cleanup goals, which will undoubtedly differ from those of today. The need for adequate definitions of monitoring and monitoring objectives was noted. Some discussion centered on whether changing regulation and guidance now can be considered effective only in a public perception context rather than in achieving any real gains in decommissioning costs. More discussion ensued on the accumulation of allowable releases into a potential issue at decommissioning. Additional discussions involved harmonizing "risk" from all materials that require control (hazardous and radioactive) and the regulations designed to control them. One of the speakers stressed the need for establishing the regional waste disposal capacity that was envisioned several years ago to even out the cost of transportation for decommissioning sites in different parts of the country.

**Working Group Meeting Highlights**

Participants provided a broad range of experience in decommissioning projects and exhibited a great deal of knowledge about the decommissioning of a variety of facilities containing radioactive (and other hazardous) materials. Many of the lessons learned at one type of facility were very similar to lessons learned at another type of facility. However, certain decommissioning issues typically arise at only one type of facility. For example, nuclear power plants have many types of decommissioning issues which smaller facilities do not have to face. Participants generally agreed that preserving and learning from decommissioning experience at this time was a useful way to reduce the impact on the environment and costs from future facilities.

Meeting participants expressed other key points, including the following:

- A gap of about 25–30 years will occur before any more of the currently operating nuclear power plants are decommissioned. It will be a challenge to preserve, and then actually employ, a lesson learned with that long of a gap between collecting and using the information.
- It is recommended that the decommissioning plan for a facility be considered a "living" document that is prepared in advance of decommissioning and is updated with information on spills, equipment replacement, and the like. (The NRC rules now require this for large and complex facilities.) It would also be beneficial to emphasize more decommissioning-related subjects in inspections, for example, identification and tracking of spill sites.
- One expert questioned the usefulness of lessons learned from today's decommissioning when so little can be accurately predicted about the conditions (especially the regulations) that will be relevant in the decommissioning of future power plants.
- Nuclear power plants undergoing decommissioning are now starting to store all classes of low-level waste (LLW) on site in anticipation of the closure of the Barnwell, South Carolina, disposal facility.

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- More and better site characterization and historical information about site and facility use would have been of great value; therefore, a lifecycle approach to decommissioning is recommended.
- Many older facilities have poor records of "as-built" conditions. Any facilities built now should be able to avoid this problem. A substantial amount of technology exists today that was unavailable just a short time ago that can be used to facilitate recording how a facility is built.
- Intact large component/equipment removals save money and reduce exposure to workers. It would be advantageous to build this into newer facilities.
- Decommissioning costs in the commercial sector (but not for DOE) are driven by disposal decisions and management. Many potential solutions to decommissioning cost issues can be made with changes to disposal restrictions and other disposal "policy" changes. Transportation represents a large component of the cost for many facilities undergoing decommissioning because the only disposal facility available for most "very-low concentration" LLW is in the western United States, far from many facilities undergoing decommissioning.
- In some cases, health physics monitoring costs more than the actual decommissioning of the facilities and removal of wastes.
- The following conditions lead to less environmental impact and/or less waste, and therefore, less costly decommissioning—(1) avoid imbedded piping, (2) provide secondary containment of liquids, (3) avoid floor penetrations, (4) avoid corrosion issues (e.g., use plastic piping), (5) use dry rather than wet processes, and (6) seek homogenous site conditions (i.e., better siting of facility).
- One expert recommended establishing the DCGLs for cleanup during the licensing process and allowing the licensee the ability to decommission portions of its facility/site as part of the operating license.
- FSME delivered a memorandum to NRR and NRO providing decommissioning lessons learned, which the reactor offices are factoring into certain SRP chapters for nuclear power plant license application reviews. RES is also preparing a regulatory guide on implementing the requirements of 10 CFR 20.1406, which will also incorporate decommissioning lessons learned. These documents are also incorporating appropriate lessons learned from the Liquid Radioactive Release Lessons-Learned Task Force Report.
- One expert noted that some decommissioning issues seem to be arising from unanticipated accumulations or concentrations of releases that are allowable under the current regulations. This issue may need to be addressed.



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The Committee will write a letter to the Commission based on the working group meeting and other information regarding decommissioning lessons learned.

**VI. DOSE EFFECT RELATIONSHIPS AND ESTIMATION OF THE CARCINOGENIC EFFECTS OF LOW DOSES OF IONIZING RADIATION (OPEN)**

[Mr. Neil Coleman was the Designated Federal Official for this part of the meeting.]

Two French scientists, Drs. Yves Garcier and Bernard Le Guen, briefed the Committee regarding the content and recommendations of the recent report on low radiation dose effects by the French Academy of Sciences and National Academy of Medicine. Dr. Le Guen, a physician and Medical Advisor for Nuclear Plant Operations at EDF (Electricité de France), gave most of the presentation. Dr. Le Guen is also a coauthor of the March 2005 French Academies report. This report raises doubts about the validity of using the linear no-threshold model (LNT) for evaluating carcinogenic risks of low doses (less than 100 milliSieverts (mSv)), and even more so for very low doses (less than 10 mSv).

Assessment of carcinogenic risks associated with exposures from 0.2 Sv to 5 Sv is based on epidemiological data. However, this dose range is much higher than that received by nuclear workers, by people who receive normal X-ray examinations, or among people who live in regions of high natural background irradiation. No excess of cancers is detectable following small doses. However, the lack of an increase does not exclude the possibility of a small excess of cancers. Epidemiological studies do not have sufficient statistical power to determine risks from low-dose exposures. Recent research has led to new findings that question some of the previously established radiobiological paradigms and concepts.

The conclusions reached in the March 2005 French Academies report are contrary to those of the National Academy of Sciences BEIR VII report, which states that when the complete body of research is considered, a consensus view emerges that health risks of ionizing radiation, while small at low doses, are a function of dose. BEIR VII goes on to conclude that there is no compelling evidence to indicate a dose threshold below which the risk of tumor induction is zero.

Dr. Le Guen described the many biological mechanisms that play a role in the response and repair mechanisms within and among cells. Below 10 milliGray (mGy), the biological responses are less clear than at higher doses. In this very low dose range, there is a much more sensitive interplay of biological processes and phenomena than at medium (200 mGy) and high doses (greater than 1 Gy). At very low doses, many different biological processes are activated or modulated. At higher doses, mainstream processes like cell cycle arrest, DNA repair, or cell death become predominant and fully determine the cellular radiation responses.

Dr. Le Guen commented that the LNT model describes well the relation between dose and carcinogenesis in the higher dose range where it can be scientifically tested. Use of LNT is also recognized as a pragmatic administrative tool for worker protection at doses above

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10 mSv. However, using LNT to extrapolate carcinogenic risk below 100 mSv is not based on valid scientific data. Epidemiological and biological data are compatible with the existence of a practical dose threshold somewhere in the range of 10 to 60 mSv. The actual threshold cannot be demonstrated with data available today. A threshold may exist because of the elimination of lesions from the genome by mechanisms including the absence of intracellular signaling, and therefore, the lack of activation of DNA repair systems at very low doses or dose rates, and the combination of error-free DNA repair with the death of the cells of which the DNA has not been repaired. An empirical relationship which has been validated for doses higher than 200 mSv may lead to an overestimation of risks associated with doses 100 times lower, and this overestimation could discourage patients from undergoing useful examinations and introduce a bias in radioprotection measures against very low doses (less than 10 mSv).

Dr. Le Guen reported that collective dose cannot be used to evaluate the cancer risk in a population. An example of this erroneous use of LNT is to "calculate" the number of deaths induced if millions of people were exposed to a few microSieverts. This incorrectly assumes that a very low dose administered to many people has the same carcinogenic effect as a higher dose administered to a small number of people. These calculations do not have any meaning, as pointed out by the United Nations Scientific Committee on the Effects of Atomic Radiation and the International Committee on Radiological Protection (ICRP). Without any scientific justification, these calculations propagate the idea that even a very small dose of radiation is harmful and do not contribute to an understanding of the biological and medical issues. The French report comes to an opposite conclusion; it considers that for a given collective dose, the risk is much greater when doses of more than 0.2 Gy are delivered than when the doses are below 20 mGy.

Dr. Le Guen summarized the following conclusions:

- While LNT may be useful for the administration of radioprotection, its use for assessing carcinogenic risks from low doses is not based on valid scientific data.
- Available data show the lower effectiveness of low doses and dose rates. Moreover, the discrepancy between the results of the various epidemiological and animal studies supports the view that there are several dose-effect relationships rather than only one.
- Parameters of dose-effect relationships depend on the type of cancer, the type of ionizing radiation, dose, dose rate, fractionation of irradiation, species, breeding line within a species, target tissues, volume irradiated, age, and individual sensitivity factors.
- Epidemiological and biological data are compatible with the existence of a threshold for radiation-induced carcinogenesis, but its existence cannot be demonstrated today, nor can its value be assessed. However, the threshold does lie somewhere between 10 and 60 mSv.

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- The concept of collective dose should not be used to evaluate the cancer risk in a population.

**VII. WHITE PAPER ON POTENTIAL ADVANCED FUEL CYCLES (OPEN)**

[Mr. John Flack was the Designated Federal Official for this part of the meeting.]

Consultant and emeritus ACNW member Dr. Ray Wymer, consultant Dr. Lawrence Tavlirides, Professor of Biomedical and Chemical Engineering at Syracuse University, and Dr. John Flack, Senior Technical Advisor to the Advisory Committee on Reactor Safeguards/ACNW, briefed the Committee on the draft Advanced Fuel Cycle White Paper. The white paper supports the ACNW response to a staff requirements memorandum (SRM) dated February 7, 2006, that directed the ACNW to remain abreast of technical developments in the area of reprocessing.

Dr. Flack opened the presentation with an overview of current fuel cycle initiatives in the ACNW Fiscal Year (FY) 2006–2007 Action Plan and meetings held with the NRC staff and DOE on recycling and the associated Global Nuclear Energy Partnership (GNEP) program. He noted DOE plans to drop the engineering-scale demonstration facility and add new plans to build a commercial-scale consolidated fuel treatment facility and advanced burner reactor. DOE intends to make the commercial facilities licensable by the NRC and expects to come to the NRC with a license application in December 2008.

Dr. Wymer followed with a description of the recycle white paper's contents. He discussed early reprocessing activities within the United States, including efforts to reprocess spent nuclear fuel commercially at West Valley, New York, the only reprocessing facility ever licensed to reprocess fuel in the United States. Although construction began on two other facilities, Barnwell Nuclear Fuel Service Plant and GE Morris, neither became licensed facilities. Dr. Wymer addressed reprocessing experience in other countries including France, the United Kingdom, Russia, Japan, China, and India. He discussed proliferation-resistant fuel cycle initiatives, including the International Nuclear Fuel Cycle Evaluation, GNEP, and the Russian Global Nuclear Infrastructure.

Dr. Wymer discussed the Generation IV initiative and its goal to develop next-generation nuclear energy systems. Five different reactor systems were considered—a pressurized-water reactor, a boiling-water reactor, a fast breeder reactor, a high-temperature gas-cooled reactor (HGTR), and a molten salt reactor. He discussed light-water reactor fuel reprocessing using the PUREX process, noting that PUREX was the only process practiced on a large scale throughout the world. A simplified view of the PUREX process was presented. Dr. Wymer discussed each of the various UREX processes and waste streams, indicating that DOE settled on the UREX+1a process to prevent proliferation by keeping plutonium mixed with other transuranic elements. He noted that the French had devised a similar process called COEX, which they plan to introduce to the La Hague plant around the year 2040.

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Dr. Tavlarides followed Dr. Wymer's presentation with a discussion of the UREX+1a process and associated flowsheets developed to analyze the waste streams. The purpose of his study was to determine the compositions of the process streams and waste products and the effluents and whether they would create problems for workers or the public. He presented four case studies, two with 45 gigawatt days per metric ton of irradiated heavy metal (GWD/MTIHM), and two with 60 GWD/MTIHM, each with 5-year and 30-year cooldown times. The flowsheets were based on ORIGEN code runs performed by Ruston, Guald, and Murphy at Oak Ridge National Laboratories. The information was forwarded to Argonne National Laboratories, to be used as input for AMUSE code runs that will provide the process stream compositions for the four cases. (This work is to be completed.)

Dr. Tavlarides described each of the four stages that make up the UREX+1a process and the waste streams and off-products to be followed. The first step extracts the uranium with the technetium. The technetium is separated out by ion exchange and made into a metal; the uranium becomes a uranyl nitrate solution to be mixed at a later stage with the transuranic elements. The rest of the product or raffinate (Pu/Np/Am/Cm/Cs/Sr/RE/FP) goes into the second step, the CCD-PEG process that separates out the cesium with the strontium to be made into an aluminum silicate product. The raffinate from this process enters a third step or TRUEX process that removes as raffinates the nonlanthanide fission products for calcination. The final product contains the transuranic elements and rare earths. This product enters the fourth process, called TALSPEAK, which separates and blends the transuranic elements into fuel for the burner reactors. Dr. Tavlarides closed his presentation by summarizing the UREX+1a waste and effluent streams for the head-end, central, and tail-end phases of the process.

Dr. Wymer summarized the white paper input prepared by Mr. Howard Larson that included plant siting considerations, design considerations, and effluent waste streams. He noted that the actual amounts and types of wastes that will be generated by UREX+1a will be based on the AMUSE runs currently being performed at Argonne National Laboratory. Effluent gases were identified as krypton-85, iodine-129, carbon-14, and tritium, and Dr. Wymer noted that, in the past, several of these had been released to the atmosphere, but this practice may not be allowed in the future. Solids are either vitrified or stored as a solid form, and liquids are generally stored in tanks for 4 or 5 years before being vitrified. Finding a stable chemical form for iodine-129, however, still remains an issue. Another issue is the need to have highly trained personnel to operate reprocessing facilities. Training generally requires 1 to 1.5 years.

Dr. Wymer briefly described the fuel fabrication for LWRs, fast burned reactors, and HTGRs. He noted that reprocessing HTGR fuels will also be a challenge because of the large amounts of graphite. Nitride fuel will also present problems because, by capturing a neutron, it becomes a principal source of carbon-14.

Dr. Flack followed with a discussion of the regulatory framework and its application to recycle facilities. Regulatory areas include the NRC licensing of recycle facilities, oversight of operations, and decommissioning. He briefly described the application of environmental

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protection regulations under 10 CFR Part 51 that require the applicant to submit an environmental report that then becomes the basis for the environmental impact statement. He summarized the Generic Environmental Statement on the Use of Recycled Plutonium in Mixed Oxide in Light-Water-Cooled Reactors (GESMO) study performed in August 1976 that addressed the wide-scale use of mixed oxide fuel under various scenarios and the associated key environmental factors and issues. The EPA standards at 40 CFR Part 190, also released at that time, specify acceptable levels of effluents for the uranium fuel cycle. Stakeholders raised major issues suggesting that the standards were unnecessarily conservative. Dr. Ryan also pointed out the inconsistency in the regulation between the provisions of ICRP-2 and 10 CFR Part 20.

Dr. Flack presented three options for licensing reprocessing facilities along with the advantages and disadvantages—(1) to modify the current regulations, (2) to develop a new rule (10 CFR Part XX), or (3) to use the technology-neutral framework in 10 CFR Part 53. He noted the shortcomings associated with using an integrated safety assessment (ISA) as required under 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," and issues raised by the ACNW in its January 14, 2002, letter challenging the NRC staff decision to use ISA rather than probabilistic risk assessment (PRA). He summarized the ACNW recommendations that encourage the use of risk and consideration of uncertainties. He also summarized regulations that were put in place following the West Valley experience to enhance decommissioning. Dr. Flack closed by summarizing key regulatory areas to focus on as the agency moves forward in anticipation of regulating reprocessing facilities. Dr. Wymer followed by summarizing suggested issues for ACNW consideration and opened the meeting for discussion.

The questions and comments that followed clarified a number of items and identified issues which are summarized below:

- In response to Dr. Clarke's question on the impact of reprocessing on Yucca Mountain, Dr. Wymer indicated that by reprocessing spent nuclear fuel, the storage capacity of Yucca Mountain could be increased by a factor of 10. Vice-Chairman Croff indicated that the repository was limited by heat; by taking the cesium and strontium out of the waste, there is little heat remaining so the remaining waste can really be packed in.
- In response to Dr. Clarke's question on where DOE plans to build a demonstration facility, Dr. Wymer indicated that there is a push to build the facility at Idaho Falls, although a facility is already available at Oak Ridge that could be used.
- Dr. Clarke asked about the status of the DOE HTGR hydrogen production initiative, and Dr. Wymer indicated that Argonne National Laboratory had put together a protocol to measure the feasibility of three competing thermochemical cycles, but the Department was far from building a demonstration plant.
- Dr. Weiner asked whether information was being considered from other projects, such as Fort St. Vrain, Fast Flux Test Facility, and EBR 1 and 2, and Dr. Wymer explained that it

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was being incorporated. In response to Dr. Weiner's question as to whether in situ leach mining would impact the GESMO study, Dr. Flack indicated that any change in mining would need to be reflected if the study were to be updated.

- Dr. Ryan cautioned that, because none of the practices are perfect, uranium could have different waste classifications depending on the details. He also cautioned that there may not be enough reactors to burn up the inventory of plutonium that could evolve from reprocessing.
- In response to Dr. Ryan's question as to why sodium-cooled burner reactors are not more prevalent, Dr. Wymer indicated that burners were further down the road and that more research on the neutronics still needs to be done.
- Dr. Ryan commented that a more flexible and interpretive approach may be needed to deal with the waste classification system. Dr. Wymer noted that it will require an iterative approach based on how well the DOE separation process performs, but the NRC may need some latitude built into the regulatory process to account for undetermined information. Dr. Ryan indicated that it would be better to explore these issues earlier rather than later when things are up and running.
- Dr. Hinze asked if the white paper would present options on various issues, and Dr. Flack indicated that the white paper would mostly be used to identify issues and their basis.
- Dr. Hinze raised two items of concern; the first focused on the process used for selecting a site, including site characterization, and the second the collocation of waste storage at the site used for reprocessing. Dr. Ryan followed with a question regarding the role of EPA and the NRC with respect to DOE projects such as reprocessing that were not in the commercial sector. Dr. Wymer indicated that DOE would be self-regulating for demonstration facilities, but if reprocessing were to become of commercial interest, then it becomes a gray area. Mr. Croff added that, in any case, DOE has to use EPA standards, and that as a first option, the NRC and DOE would need to work out whether the facility needed an NRC license. Congress can always weigh in and direct responsibility.
- In follow-on to Dr. Ryan's earlier comments on waste classifications, Mr. Croff indicated that to accommodate the various waste streams from reprocessing, the existing waste classification system would be severely strained. Dr. Ryan stated that the current definitions are origin based and not risk based, and this may offer an opportunity to move away from origin-based definitions. He stated that this places 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," and 10 CFR Part 63, "Disposal of High-Level Waste in a Geologic Repository at Yucca Mountain, Nevada," back on the table again.
- Mr. Croff commented that GNEP could lead to radically different greater-than-class C waste which the environmental impact statement would need to consider. Additionally,

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EPA did not complete the job it began on 40 CFR Part 190, and he questioned whether EPA will need to revisit carbon-14, tritium, iodine, and krypton in the context of the standard. Mr. Croff also noted that 10 CFR Part 20 explicitly mentions compliance with the requirements of 10 CFR Part 190.

- Mr. Croff asked what the difference was between UREX+1a and GANEX, and Dr. Wymer stated that it was much the same process except for the number of separation steps. He added that the French were more practical in the way they were proceeding.
- Dr. Weiner asked if chemical safety at the reprocessing facility would be under the Occupational Safety and Health Administration, and Dr. Ryan indicated that the process hazards analysis standard would apply.
- In response to Dr. Hamdan's question on whether the amount of waste would decrease, Mr. Croff indicated that the amount of waste entering Yucca Mountain would decrease. Dr. Wymer stated that there would be a plethora of smaller waste streams, but about the same amount of total mass.
- Dr. Abu-Eid commented that the International Atomic Energy Agency (IAEA) is developing new guidance on waste classification, and Mr. Croff noted that the Committee is interested in the IAEA work and had previously requested a briefing from the staff on the subject. Dr. Abu-Eid also noted the inconsistency between ICRP-2 and 10 CFR Part 20, and Dr. Ryan thanked him for this observation.

Mr. Croff closed the meeting by summarizing his views on how to move forward with respect to a future meeting with the staff on GNEP, completing the first draft of the white paper, and drafting a letter to the Commission, noting the potential for a future working group meeting on recycle. Dr. Ryan commented that the white paper will need to identify issues that are clear, as well as those that are not so clear, and thanked all the participants for the briefing.

**VIII. PROPOSED REVISION TO REGULATORY GUIDE 1.112, "CALCULATION OF RELEASES OF RADIOACTIVE MATERIALS IN GASEOUS AND LIQUID EFFLUENTS FROM LIGHT-WATER-COOLED REACTORS" (OPEN)**

[Dr. Antonio Dias was the Designated Federal Official for this part of the meeting.]

Dr. Stephanie Bush-Goddard, Chief of the Health Effects Branch in RES, briefed the Committee on a proposed revision to Regulatory Guide (RG) 1.112. NRR requested that the Committee review Revision 1 to RG 1.112 within the context of new reactor licensing activities.

Dr. Bush-Goddard presented an overview of the regulations pertaining to calculations of effluent releases, supporting NUREGs and standards, and a summary of the interim changes to RG 1.112. The RG describes an acceptable method for calculating the annual radioactive

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liquid and gaseous source terms used in evaluating the adequacy of radioactive effluent control systems for nuclear reactors.

The staff's short-term focus will be to (1) make changes to the RG for consistency with American National Standards Institute (ANSI) Standard 18.1-1999 and (2) update the RG to be consistent with the current terminology and other requirements in 10 CFR Part 20. A technical update to the RG is slated to occur in late 2007, with a focus on revising the GALE (Gaseous and Liquid Effluents) code, which is the main basis of the RG. The GALE Code, as defined in NUREG-0016 (BWR-GALE) and NUREG-0017 (PWR-GALE)<sup>8</sup>, are two acceptable computer models used for calculating average annual expected releases of radioactive material in gaseous and liquid effluents from a reactor. NUREG-0016 and NUREG-0017 provide a technical basis for the defined parameters used in the code, describe input format, and define what data are needed for the source term. The BWR and PWR GALE were last updated in 1979 and 1985, respectively. Dr. Bush-Goddard informed the Committee that many of the assumptions and parameters in the GALE code are represented by fixed values based on design approaches and operating experiences for reactors before 1980. For example, the radionuclide concentration in the reactor coolant is actually hard-wired into the code. However, it was explained to the Committee that the GALE code does not offer (1) the capabilities to consider new process and effluent treatment technologies, (2) improvements in fuel designs (i.e., new cladding types other than Zircaloy), and (3) operations in FORTRAN with no windows interface. Dr. Bush-Goddard stated that the staff plans to issue another revision to RG 1.112 once a technical update of the GALE code has been completed.

The presentation was followed by questions and comments from the ACNW members and attendees concerning the GALE code. Based on these discussions, the following points are worth noting:

- The GALE code is outdated and appears to be a deterministic code. The code also does not use principles of risk-informed PRA or other kinds of modern approaches. In addition, the GALE does not take into account uncertainty in radionuclide release fractions, is not flexible in terms of use input, and does not consider climatic conditions. Updates to the technical basis documents (e.g., the PWR and BWR GALE code) that support this RG should be done before making administrative changes. Making administrative changes to the RG before the GALE code and its basis are updated is not efficient or technically defensible.
- It was reported that many of the assumptions and parameters in the GALE codes are represented by fixed values (hard-wired) based on design approaches and

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8 The BWR and PWR GALE Codes are computerized mathematical models for calculating the releases of radioactive material in gaseous and liquid effluents (i.e., the gaseous and liquid source terms) to determine conformance with the requirements of Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Reactor Effluents," to 10 CFR Part 50.



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operating experience for reactors before 1980. The Committee is concerned about the relevance of these values to new applications.

- The revised RG should include applicable lessons learned from the tritium task force.

**IX. PROPOSED REVISION TO REGULATORY GUIDE 4.15, "QUALITY ASSURANCE FOR RADIOLOGICAL MONITORING PROGRAMS (INCEPTION THROUGH NORMAL OPERATIONS TO LICENSE TERMINATION—EFFLUENT STREAMS AND THE ENVIRONMENT)" (OPEN)**

[Dr. Antonio Dias was the Designated Federal Official for this part of the meeting.]

The full details of this presentation, including questions and comments, are captured in the ACNW's verbatim meeting transcripts for its 174<sup>th</sup> meeting.

Mr. William Ott, Chief, of the Waste Research Branch of RES, briefed the Committee on how the revisions made to RG 4.15 will support future plant licensing (the New Reactor Program). RES is currently reviewing and revising numerous guides in the agency's series of RGs for new reactor licensing.

The NRC initially issued RG 4.15 in December 1977 and released Revision 1 to the RG in February 1979. Since that time, significant improvements have been made in radioanalytical measurement and sampling methodologies. Various Federal, State, industry, and professional organizations have developed standards and practices that provide guidance and contemporary expectations for quality assurance (QA) for radioactive effluent and environmental measurements. The most significant of these advances were published in the "Multi-Agency Radiological Laboratory Analytical Protocols Manual" (MARLAP) in 2004. The MARLAP Manual addresses the need for a nationally consistent approach to producing radioanalytical laboratory data that meet a project or program data requirements. MARLAP provides guidance for the planning, implementation, and assessment phases of those projects that require the laboratory analysis of radionuclides. The MARLAP manual also uses a performance-based approach to laboratory measurements. The guidance contained in the manual is applicable to a wide range of projects and activities that require radioanalytical laboratory measurements. Examples of data collection activities that MARLAP supports include site characterization activities, site cleanup and compliance demonstration activities, license termination activities, decommissioning of nuclear facilities, remedial and removal actions, effluent monitoring of licensed facilities, emergency response activities, environmental site monitoring, background studies, routine ambient monitoring, and waste management activities. Similarly, national organizations have promulgated industry standards and recommendations for quality systems. For example, the RG incorporates ANSI/American Society for Quality Control (ASQC) E4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs," and ANSI N42.23-2003, "American National Standard Measurement and Associated Instrument Quality Assurance for Radioassay Laboratories."

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Therefore, RES sought to revise the RG (1) to be performance based, (2) to be a document that could facilitate consistent environmental monitoring programs, and (3) to shift the effort from "for measurement sake" to "measurement with a purpose." The revision also reflects advances in radioactive effluent and monitoring techniques and methodologies; contemporary radioanalytical sampling and measurement concepts; and current references and guidance consistent with industry and interagency standards and practices. Not only has the revision been updated with more recently promulgated NRC regulations, but it now provides a contemporary approach to environmental QA and quality control practices consistent with the NRC regulations and industry standards.

The presentation was followed by questions and comments from the ACNW members and attendees concerning quality assurance//quality control (QA/QC) protocol. Based on these discussions, the following points are worth noting:

- The updated RG should include 10 CFR Part 71. These regulations are used for approval of transportation packages for radioactive material. A certificate holder for a transportation package must have an NRC-approved QA program.
- The updated RG should be ISO compliant.

An additional comment worth noting was from one attendee, who was the lead NRC staff member involved in the development of MARLAP. The staff member provided an abbreviated overview of MARLAP from an NRC point of view.

The meeting adjourned at 3:00 p.m. on Thursday, November 16, 2006.

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**NOTE:** The transcript of the meeting includes additional details and is available for downloading or viewing on the Internet at <http://www.nrc.gov/ACRSACNW>. The transcript also is available for purchase from Neal R. Gross and Company, Inc. (Court Reporters and Transcribers), 1323 Rhode Island Avenue, NW, Washington, DC 20005, telephone (202) 234-4433.

f. Indicate the relationship between the timing of the preparation of the environmental analyses and the Commission's tentative planning and decision-making schedule.

g. Identify any cooperating agencies and, as appropriate, allocate assignments for preparation and schedules for completing the supplement to the GEIS to the NRC and any cooperating agencies.

h. Describe how the supplement to the GEIS will be prepared, and include any contractor assistance to be used.

The NRC invites the following entities to participate in scoping:

a. The applicant, PPL Susquehanna, LLC.

b. Any Federal agency that has jurisdiction by law or special expertise with respect to any environmental impact involved, or that is authorized to develop and enforce relevant environmental standards.

c. Affected State and local government agencies, including those authorized to develop and enforce relevant environmental standards.

d. Any affected Indian tribe.

e. Any person who requests or has requested an opportunity to participate in the scoping process.

f. Any person who has petitioned or intends to petition for leave to intervene.

In accordance with 10 CFR 51.26, the scoping process for an EIS may include a public scoping meeting to help identify significant issues related to a proposed activity and to determine the scope of issues to be addressed in an EIS. The NRC will hold public meetings for the SSES, Units 1 and 2 license renewal supplement to the GEIS, at the Eagles Building, 107 South Market St., Berwick, Pennsylvania, on Wednesday, November 15, 2006. There will be two identical meetings to accommodate interested parties. The first meeting will convene at 1:30 p.m. and will continue until 4:30 p.m., as necessary. The second meeting will convene at 7 p.m. and will continue until 10 p.m., as necessary. Both meetings will be transcribed and will include: (1) An overview by the NRC staff of the NRC's license renewal review process; (2) an overview by the NRC staff of the NEPA environmental review process, the proposed scope of the supplement to the GEIS, and the proposed review schedule; and (3) the opportunity for interested government agencies, organizations, and individuals to submit comments or suggestions on the environmental issues or the proposed scope of the supplement to the GEIS. Additionally, the NRC staff will host informal discussions one hour prior to

the start of each session at the same location. No formal comments on the proposed scope of the supplement to the GEIS will be accepted during the informal discussions. To be considered, comments must be provided either at the transcribed public meetings or in writing, as discussed below. For more information about the proposed action, the scoping process, and the EIS, please contact the NRC Environmental Project Manager, Mrs. Alicia Mullins, at Mail Stop O-11F1, U.S. Nuclear Regulatory Commission, Washington, DC 20555, by telephone at 1-800-368-5642, extension 1224, or by e-mail at [axm7@nrc.gov](mailto:axm7@nrc.gov). Persons may register to attend or present oral comments at the meetings on the scope of the NEPA review by contacting Mrs. Mullins. Members of the public may also register to speak at the meeting within 15 minutes of the start of each meeting. Individual oral comments may be limited by the time available, depending on the number of persons who register. Members of the public who have not registered may also have an opportunity to speak, if time permits. Public comments will be considered in the scoping process for the supplement to the GEIS. Mrs. Mullins will need to be contacted no later than November 6, 2006, if special equipment or accommodations are needed to attend or present information at the public meeting, so that the NRC staff can determine whether the request can be accommodated.

Members of the public may send written comments on the environmental scope of the SSES, Units 1 and 2 license renewal review to: Chief, Rules and Directives Branch, Division of Administrative Services, Office of Administration, Mail Stop T-6D59, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and should cite the publication date and page number of this **Federal Register** notice. Comments may also be delivered to the U.S. Nuclear Regulatory Commission, Mail Stop T-6D59, Two White Flint North, 11545 Rockville Pike, Rockville, Maryland, 20852, from 7:30 a.m. to 4:15 p.m. during Federal workdays. To be considered in the scoping process, written comments should be postmarked by December 18, 2006. Electronic comments may be sent by e-mail to the NRC at [SusquehannaEIS@nrc.gov](mailto:SusquehannaEIS@nrc.gov), and should be sent no later than December 18, 2006, to be considered in the scoping process. Comments will be available electronically and accessible through ADAMS.

Participation in the scoping process for the supplement to the GEIS does not

entitle participants to become parties to the proceeding to which the supplement to the GEIS relates. Matters related to participation in any hearing are outside the scope of matters to be discussed at this public meeting.

At the conclusion of the scoping process, the NRC will prepare a concise summary of the determination and conclusions reached, including the significant issues identified, and will send a copy of the summary to each participant in the scoping process. The summary will also be available for viewing in ADAMS. The staff will then prepare and issue for comment the draft supplement to the GEIS, which will be the subject of separate notices and separate public meetings. Copies will be available for public viewing at the above-mentioned addresses, and one copy per request will be provided free of charge, to the extent of supply. After receipt and consideration of the comments, the NRC will prepare a final supplement to the GEIS, which will also be available for public viewing.

Information about the proposed action, the supplement to the GEIS, and the scoping process may be obtained from Mrs. Mullins at the aforementioned telephone number or e-mail address.

Dated at Rockville, Maryland, this 26th day of October 2006.

For The Nuclear Regulatory Commission.

**Frank P. Gillespie,**

*Director, Division of License Renewal, Office of Nuclear Reactor Regulation.*

(FR Doc. E6-18466 Filed 11-1-06; 8:45 am)

BILLING CODE 7990-01-P

**NUCLEAR REGULATORY COMMISSION**

**Advisory Committee on Nuclear Waste; Notice of Meeting**

The Advisory Committee on Nuclear Waste (ACNW) will hold its 174th meeting on November 13-16, 2006, Room T-2B3, 11545 Rockville Pike, Rockville, Maryland.

The schedule for this meeting is as follows:

**Monday, November 13, 2006**

*10 a.m.-10:05 a.m.: Opening Remarks by the ACNW Chairman (Open)*—The ACNW Chairman, Dr. Michael Ryan, will make opening remarks regarding the conduct of today's sessions.

*10:05 a.m.-12 p.m.: Update on Status of Seismic Design Bases and Methodology: NRC Perspective (Open)*—Staff representatives from the NRC Office of Nuclear Material Safety and Safeguards (NMSS) will brief the

Committee on seismic issues and review methodologies for both pre- and post-closure phases of the Yucca Mountain repository operation.

*1 p.m.–2:30 p.m.: Results from the Liquid Radioactive Release Lessons Learned Task Force*—A representative from the NRC Office of Nuclear Reactor Regulation (NRR) will brief the Committee on the results from the recently completed report from the Liquid Radioactive Release Lessons Learned Task Force.

*2:30 p.m.–5:30 p.m.: Preparation for Meeting with NRC Commissioners (Open)*—The Committee will discuss topics of mutual interest in preparation for ACNW meeting with the NRC Commissioners that is scheduled for Thursday, December 14, 2006. There may be a 15 minute break at some point during this activity.

#### Tuesday, November 14, 2006

*ACNW Working Group Meeting on Decommissioning Lessons Learned (Open)*

*8:30 a.m.–8:45 a.m.: Opening Remarks and Introductions (Open)*—The ACNW Chairman will make opening remarks regarding the conduct of today's sessions. ACNW Member Dr. James Clarke will provide an overview of the Working Group Meeting (WGM), including the meeting purpose and scope, and introduce invited subject matter experts.

*Session I: Decommissioning Lessons Learned*

*8:45 a.m.–11:30 a.m.*: Representatives from the Nuclear Energy Institute, the Fuel Cycle Facilities Forum, the Argonne National Laboratory, and the Army Corps of Engineers will discuss their lessons learned in decommissioning of facilities.

*11:30 a.m.–12:30 p.m.: Session I Panel Discussion*—Committee Member Clarke will lead a panel discussion with the invited subject matter experts on decommissioning lessons learned.

*Session II: Implementing Decommissioning Lessons Learned in NRC Rules And Guidance*

*1:30 p.m.–4 p.m.*: A representative from the Kansas Department of Health and Environment will discuss decommissioning lessons learned from an Agreement State perspective. Staff representatives from NRR and the NRC Office of Federal and State Materials and Environmental Management Programs (FSME) will discuss decommissioning lessons learned efforts within NRC and implementation of selected decommissioning lessons learned in NRC rules and guidance.

*4:15 p.m.–5:15 p.m.: Session II Panel Discussion*—Committee Member Clarke will lead a panel discussion with the invited subject matter experts on implementing decommissioning lessons learned in NRC rules and guidance.

*5:15 p.m.–5:30 p.m.: Wrap Up*—ACNW Member Dr. James Clarke will provide a summary of the Working Group Meeting, including a discussion of a possible letter report to the Commission.

#### Wednesday, November 15, 2006

*8:30 a.m.–8:35 a.m.: Opening Remarks by the ACNW Chairman (Open)*—The Chairman will make opening remarks regarding the conduct of today's sessions.

*8:35 a.m.–12:30 p.m.: Dose Effect Relationships and Estimation of the Carcinogenic Effects of Low Doses of Ionizing Radiation (Open)*—French scientists will brief the ACNW regarding the content of the recent report by the French Academy of Sciences and National Academy of Medicine. There may be a 15 minute break at some point during this presentation.

*1:30 p.m.–4 p.m.: White Paper on Potential Advanced Fuel Cycles (Open)*—The draft ACNW white paper on spent nuclear fuel recycling will be discussed. This paper focuses on various known reprocessing methods and their resulting effluents and waste. Licensing of a new reprocessing facility will also be addressed.

*4:15 p.m.–5:30 p.m.: Discussion of Draft ACNW Letter Reports (Open)*—The Committee will discuss potential and proposed ACNW letter reports.

#### Thursday, November 16, 2006

*8:30 a.m.–8:35 a.m.: Opening Remarks by the ACNW Chairman (Open)*—The Chairman will make opening remarks regarding the conduct of today's sessions.

*8:35 a.m.–10 a.m.: Proposed Revision to Regulatory Guide 1.112, Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Reactors (Open)*—Staff representatives from the NRC Office of Nuclear Regulatory Research (RES) will brief the Committee on the proposed modifications to Regulatory Guide 1.112 in support of new reactor licensing.

*10:15 a.m.–11:45 a.m.: Proposed Revision to Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations to License Termination)—Effluent Streams and the Environment (Open)*—RES representatives will brief the Committee on the proposed revision to Regulatory

Guide 4.15 in support of new reactor licensing.

*1 p.m.–3 p.m.: Discussion of Potential ACNW Letter Reports (Open)*—The Committee will discuss potential and proposed ACNW letter reports.

*3:15 p.m.–5 p.m.: Miscellaneous (Open)*—The Committee will discuss matters related to the conduct of ACNW activities and specific issues that were not completed during previous meetings, as time and availability of information permit. Discussions may include future Committee Meetings.

Procedures for the conduct of and participation in ACNW meetings were published in the *Federal Register* on October 12, 2006 (71 FR 60196). In accordance with these procedures, oral or written statements may be presented by members of the public. Electronic recordings will be permitted only during those portions of the meeting that are open to the public. Persons desiring to make oral statements should notify Mr. Antonio F. Dias (Telephone 301-415-6805), between 8:15 a.m. and 5 p.m. ET, as far in advance as practicable so that appropriate arrangements can be made to schedule the necessary time during the meeting for such statements. Use of still, motion picture, and television cameras during this meeting will be limited to selected portions of the meeting as determined by the ACNW Chairman. Information regarding the time to be set aside for taking pictures may be obtained by contacting the ACNW office prior to the meeting. In view of the possibility that the schedule for ACNW meetings may be adjusted by the Chairman as necessary to facilitate the conduct of the meeting, persons planning to attend should notify Mr. Dias as to their particular needs.

Further information regarding topics to be discussed, whether the meeting has been canceled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted, therefore can be obtained by contacting Mr. Dias.

ACNW meeting agenda, meeting transcripts, and letter reports are available through the NRC Public Document Room (PDR) at [pdr@nrc.gov](mailto:pdr@nrc.gov), or by calling the PDR at 1-800-397-4209, or from the Publicly Available Records System component of NRC's document system (ADAMS) which is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> or <http://www.nrc.gov/reading-rm/doc-collections/> (ACRS & ACNW Mtg schedules/agendas).

Video Teleconferencing service is available for observing open sessions of ACNW meetings. Those wishing to use

this service for observing ACNW meetings should contact Mr. Theron Brown, ACNW Audiovisual Technician (301-415-8066), between 7:30 a.m. and 3:45 p.m. ET, at least 10 days before the meeting to ensure the availability of this service. Individuals or organizations requesting this service will be responsible for telephone line charges and for providing the equipment and facilities that they use to establish the video teleconferencing link. The availability of video teleconferencing services is not guaranteed.

Dated: October 27, 2006.

Annette L. Vietti-Cook,  
Secretary of the Commission  
[FR Doc. E6-18468 Filed 11-1-06; 8:45 am]  
BILLING CODE 7590-01-P

#### NUCLEAR REGULATORY COMMISSION

##### Advisory Committee on Nuclear Waste Meeting on Planning and Procedures; Notice of Meeting

The Advisory Committee on Nuclear Waste (ACNW) will hold a Planning and Procedures meeting on November 13, 2006, Room T-2B1, 11545 Rockville Pike, Rockville, Maryland. The entire meeting will be open to public attendance, with the exception of a portion that may be closed pursuant to 5 U.S.C. 552b (c) (2) and (6) to discuss organizational and personnel matters that relate solely to internal personnel rules and practices of ACNW, and information the release of which would constitute a clearly unwarranted invasion of personal privacy.

The agenda for the subject meeting shall be as follows:

**Monday, November 13, 2006—8:30 a.m.—9:30 a.m.**

The Committee will discuss proposed ACNW activities and related matters. The purpose of this meeting is to gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Members of the public desiring to provide oral statements and/or written comments should notify the Designated Federal Official, Mr. Antonio F. Dias (Telephone: 301/415-6805) between 8:15 a.m. and 5 p.m. (ET) five days prior to the meeting, if possible, so that appropriate arrangements can be made. Electronic recordings will be permitted only during those portions of the meeting that are open to the public.

Further information regarding this meeting can be obtained by contacting the Designated Federal Official between

8:15 a.m. and 5 p.m. (ET). Persons planning to attend this meeting are urged to contact the above named individual at least two working days prior to the meeting to be advised of any potential changes in the agenda.

Dated: October 26, 2006.

Michael R. Snodderly,  
Branch Chief, ACRS/ACNW.  
[FR Doc. E6-18469 Filed 11-1-06; 8:45 am]  
BILLING CODE 7590-01-P

#### NUCLEAR REGULATORY COMMISSION

##### Advisory Committee on Reactor Safeguards Subcommittee Meeting on Future Plant Designs; Notice of Meeting

The ACRS Subcommittee on Future Plant Designs will hold a meeting on November 30, 2006, Room T-2B3, 11545 Rockville Pike, Rockville, Maryland.

The entire meeting will be open to public attendance.

The agenda for the subject meeting shall be as follows:

**Thursday, November 30, 2006—8:30 a.m. until the conclusion of business.**

The Subcommittee will summarize and discuss the technical content of Draft Regulatory Guide DG-1145, "Combined License Applications for Nuclear Power Plants (LWR Edition)," public comments on DG-1145, and public comment resolution. Certain sections of DG-1145 will be discussed in greater detail. The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Members of the public desiring to provide oral statements and/or written comments should notify the Designated Federal Official, Mr. David C. Fischer (telephone 301-415-6889) between 7:30 a.m. and 5 p.m. (ET) five days prior to the meeting, if possible, so that appropriate arrangements can be made. Electronic recordings will be permitted.

Further information regarding this meeting can be obtained by contacting the Designated Federal Official between 7:30 a.m. and 5 p.m. (ET). Persons planning to attend this meeting are urged to contact the above named individual at least two working days prior to the meeting to be advised of any potential changes to the agenda.

Dated: October 26, 2006.

Michael R. Snodderly,  
Branch Chief, ACRS/ACNW.  
[FR Doc. E6-18467 Filed 11-1-06; 8:45 am]  
BILLING CODE 7590-01-P

#### RAILROAD RETIREMENT BOARD

##### Agency Forms Submitted for OMB Review, Request for Comments

**Summary:** In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. Chapter 35), the Railroad Retirement Board (RRB) is forwarding an Information Collection Request (ICR) to the Office of Information and Regulatory Affairs (OIRA), Office of Management and Budget (OMB) to request an extension of its approval for the following collection of information: 3220-0141, Vocational Report, consisting of RRB Form G-251, Vocational Report. Our ICR describes the information we seek to collect from the public. Review and approval by OIRA ensures that we impose appropriate paperwork burdens.

The RRB invites comments on the proposed collection of information to determine (1) the practical utility of the collection; (2) the accuracy of the estimated burden of the collection; (3) ways to enhance the quality, utility and clarity of the information that is the subject of collection; and (4) ways to minimize the burden of collections on respondents, including the including the use of automated collection techniques or other forms of information technology. Comments to RRB or OIRA must contain the OMB control number of the ICR. For proper consideration of your comments, it is best if RRB and OIRA receive them within 30 days of publication date.

**Previous Requests for Comments:** The RRB has already published the initial 60-day notice (71 FR 43824 on August 2, 2006) required by 44 U.S.C. 3506(c)(2). That request elicited no comments.

##### Information Collection Request (ICR)

**Title:** Vocational Report.  
**OMB Control Number:** 3220-0141.  
**Form(s) submitted:** G-251, Vocational Report.

**Type of request:** Extension of a currently approved collection.

**Affected public:** Individuals or households.

**Abstract:** Section 2 of the Railroad Retirement Act provides for the payment of disability annuities to qualified employees and widower(s). In order to determine the effect of a disability on an applicant's ability to



## APPENDIX B

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON NUCLEAR WASTE  
WASHINGTON, D.C. 20555-0001

November 8, 2006 (REVISED)

AGENDA  
174<sup>th</sup> ACNW MEETING  
NOVEMBER 13-16, 2006

**MONDAY, NOVEMBER 13, 2006, CONFERENCE ROOM T-2B3, TWO WHITE FLINT  
NORTH, ROCKVILLE, MARYLAND**

- 1) 10:00 - 10:05 A.M. **Opening Remarks by the ACNW Chairman** (Open) (MTR/AFD)  
The ACNW Chairman, Dr. Michael Ryan, will make opening remarks regarding the conduct of today's sessions.
- 2) 10:05 - <sup>11:42</sup>~~12:00~~ P.M. **Update on Status of Seismic Design Bases and Methodology: NRC Perspective** (Open) (WJH/MPL)  
Staff representatives from the NRC Office of Nuclear Material Safety and Safeguards (NMSS) will brief the Committee on seismic issues and review methodologies for both pre- and post-closure phases of the Yucca Mountain repository operation.
- 11:42  
12:00 - 1:00 P.M. **\*\*\*LUNCH\*\*\***
- 3) 1:00 - 2:30 P.M. **Results from the Liquid Radioactive Release Lessons Learned Task Force** (Open) (JHC/DAW)  
A representative from the NRC Office of Nuclear Reactor Regulation (NRR) will brief the Committee on the results from the recently completed report from the Liquid Radioactive Release Lessons Learned Task Force.
- 4) 2:30 - <sup>5:09</sup>~~5:30~~ P.M. **Preparation for Meeting with NRC Commissioners** (Open) (All)  
Discussion of topics of mutual interest in preparation for ACNW meeting with the NRC Commissioners that is scheduled for Thursday, December 14, 2006. There may be a 15 minute break at some point during this activity.  
5:09 - 5:30  
Discussion of Igneous Activity White Paper  
5:30 P.M. **Adjourn**

**TUESDAY, NOVEMBER 14, 2006, CONFERENCE ROOM T-2B3, TWO WHITE FLINT  
NORTH, ROCKVILLE, MARYLAND**

**ACNW WORKING GROUP ON DECOMMISSIONING LESSONS LEARNED (OPEN)**

- 5) <sup>8:38 8:45</sup>~~8:30 - 8:45~~ A.M. **Opening Remarks and Introductions** (MTR/JHC/DAW)  
The ACNW Chairman will make opening remarks regarding the conduct of today's sessions. ACNW Member Dr. James Clarke will provide an overview of the Working Group Meeting, including the meeting purpose and scope, and introduce invited subject matter experts.

**SESSION I: DECOMMISSIONING LESSONS LEARNED**

- 8:40 9:15  
6) ~~8:45 - 9:30~~ A.M. Ralph Anderson (Nuclear Energy Institute) will discuss lessons learned in decommissioning of nuclear power reactors.
- 9:30 10:05  
7) ~~9:30 - 10:05~~ A.M. Jeff Lux (Tronox and the Fuel Cycle Facilities Forum) will discuss lessons learned in decommissioning of fuel cycle and other materials facilities.
- 10:05 10:45  
8) ~~10:05 - 10:45~~ A.M. Larry Boing (Argonne National Laboratory) will discuss lessons learned in decommissioning of selected Department of Energy and other facilities.
- 10:45 11:00  
~~10:45 - 11:00~~ A.M. **\*\*\*BREAK\*\*\***
- 11:00 11:30  
9) ~~11:00 - 11:30~~ A.M. Hans Honerlah (Army Corps of Engineers) will discuss lessons learned in decommissioning Formerly Utilized Site Remedial Action Program (FUSRAP) and other Corps of Engineers facilities.
- 11:30 12:30  
10) ~~11:30 - 12:30~~ P.M. **Session I Panel Discussion** (All)  
Committee Member Clarke will lead a panel discussion with the invited subject matter experts on decommissioning lessons learned.
- 12:30 1:30  
~~12:30 - 1:30~~ P.M. **\*\*\*LUNCH\*\*\***

**SESSION II: IMPLEMENTING DECOMMISSIONING LESSONS LEARNED IN NRC RULES AND GUIDANCE**

- 1:30 2:00  
11) ~~1:30 - 2:00~~ P.M. Thomas Conley (Kansas Department of Health and Environment) will discuss decommissioning lessons learned from an Agreement State perspective.
- 2:00 4:00  
12) ~~2:00 - 4:00~~ P.M. Staff representatives from NRR and the NRC Office of Federal and State Materials and Environmental Management Programs (FSME) will discuss decommissioning lessons learned efforts within NRC and implementation of selected decommissioning lessons learned in NRC rules and guidance. *Rob: ... at Ken ... Shephard*
- 4:00 4:15  
~~4:00 - 4:15~~ P.M. **\*\*\*BREAK\*\*\***
- 4:15 5:15  
13) ~~4:15 - 5:15~~ P.M. **Session II Panel Discussion** (All)  
Committee Member Clarke will lead a panel discussion with the invited subject matter experts on implementing decommissioning lessons learned in NRC rules and guidance.

- 14) ~~6:15~~ - 5:30 P.M. **Wrap Up**  
*4:09 4:12*  
 ACNW Member Dr. James Clarke will provide a summary of the Working Group Meeting, including a discussion of a possible letter report to the Commission.
- 4:12*  
**5:30 P.M. Adjourn**

**WEDNESDAY, NOVEMBER 15, 2006, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

- 15) 8:30 - 8:35 A.M. **Opening Remarks by the ACNW Chairman** (Open) (MTR/NMC)  
 The Chairman will make opening remarks regarding the conduct of today's sessions.
- 16) 8:35 - 12:30 A.M. **Dose Effect Relationships and Estimation of the Carcinogenic Effects of Low Doses of Ionizing Radiation** (Open) (MTR/NMC)  
*8:35 - 10:00*  
*10:00 - 10:15*  
 French scientists will brief the ACNW regarding the content of the recent report by the French Academy of Sciences and National Academy of Medicine. There may be a 15 minute break at some point during this presentation. *10:15*
- 10:15 - 10:30*  
**12:30 - 1:30 P.M. \*\*\*LUNCH\*\*\***
- 17) 1:30 - 4:00 P.M. **White Paper on Potential Advanced Fuel Cycles** (Open) (AGC/JHF)  
*4:00*  
 The draft ACNW white paper on spent nuclear fuel recycling will be discussed. This paper focuses on various known reprocessing methods and their resulting effluents and waste. Licensing of a new reprocessing facility will also be addressed.
- 4:00*  
**4:00 - 4:15 P.M. \*\*\*BREAK\*\*\***
- 18) 4:15 - 5:30 P.M. **Discussion of Draft ACNW Letter Reports** (Open) (All)  
 Discussion of proposed ACNW reports on the following:  
 18.1) Developing Model Confidence through the Use of Site Monitoring (JHC/DAW)  
 18.2) Spent Nuclear Fuel Transportation Package Responses to Tunnel Fire Scenarios (RFW/MPL)
- 5:30*  
**5:30 P.M. Adjourn**

**THURSDAY, NOVEMBER 16, 2006, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

- 19) 8:30 - 8:35 A.M. **Opening Remarks by the ACNW Chairman** (Open) (MTR/AFD)  
 The Chairman will make opening remarks regarding the conduct of today's sessions.



- 20) 8:35 - 10:00 A.M. **Proposed Revision to Regulatory Guide 1.112, Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Reactors** (Open) (MTR/CLB)  
RES representatives will brief the Committee on the proposed modifications to Regulatory Guide 1.112 in support of new reactor licensing.
- ~~10:00-10:15 A.M.~~ **\*\*\*BREAK\*\*\***
- 21) 10:15 - ~~11:45~~ <sup>11:15</sup> A.M. **Proposed Revision to Reg Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations to License Termination) – Effluent Streams and the Environment** (Open) (MTR/CLB)  
RES representatives will brief the Committee on the proposed revision to Reg Guide 4.15 in support of new reactor licensing.
- ~~11:45-1:00 P.M.~~ **\*\*\*LUNCH\*\*\***
- 22) 1:00 - 2:00 P.M. **Discussion of Potential ACNW Letter Reports** (Open) (All)  
Discussion of possible ACNW reports on:  
22.1) Update on Status of Seismic Design Bases and Methodology: NRC Perspective (WJH/MPL)  
22.2) Results from the Liquid Radioactive Release Lessons Learned Task Force (JHC/DAW)  
22.3) ACNW Working Group Meeting on Design and Construction Considerations for Decommissioning (JHC/DAW)  
22.4) Dose Effect Relationships and Estimation of the Carcinogenic Effects of Low Doses of Ionizing Radiation (MTR/NMC)  
22.5) Proposed Revision to Reg Guide 1.112, Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Reactors (MTR/CLB)  
22.6) Proposed Revision to Reg Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operations) – Effluent Streams and the Environment (MTR/CLB)
- 23) ~~2:00-3:00 P.M.~~ <sup>2:00-3:00</sup> P.M. **Discussion of Draft ACNW Letter Reports** (Open) (All)  
Continued discussion of proposed ACNW reports listed under Item 22.
- ~~3:00-3:15 P.M.~~ **\*\*\*BREAK\*\*\***
- 24) ~~3:15-5:00 P.M.~~ <sup>3:00</sup> P.M. **Miscellaneous** (Open)  
The Committee will discuss matters related to the conduct of ACNW activities and specific issues that were not completed during previous meetings, as time and availability of information permit. Discussions may include future Committee Meetings.
- ~~5:00 P.M.~~ **Adjourn**

**NOTES:**

- Presentation time should not exceed 50 percent of the total time allocated item. The remaining 50 percent of the time is reserved for discussion.
- **Thirty five (35) hard copies and one (1) electronic copy of the presentation materials should be provided to the ACNW in advance of the briefing.**
- ACNW meeting schedules are subject to change. Presentations may be canceled or rescheduled to another day. If such a change would result in significant inconvenience or hardship, be sure to verify the schedule with Mr. Antonio F. Dias at 301-415-6805 between 8:00 a.m. and 5:00 p.m. prior to the meeting.

**APPENDIX C: MEETING ATTENDEES  
174<sup>TH</sup> ACNW MEETING  
NOVEMBER 13-16, 2006**

**ACNW MEMBERS**

Michael Ryan, Chairman  
Allen Croff, Vice Chairman  
James Clarke  
William Hinze  
Ruth Weiner

**ACNW CONSULTANT**

David Kocher  
Howard Larson  
Raymond Wymer  
Lawrence Tavlarides

**INVITED EXPERTS**

Ralph Anderson, Nuclear Energy Institute  
(NEI)  
Larry Boing, Argonne National Lab.  
Thomas Conley, Kansas Dept. of Health  
and Environment  
Eric Darois, CHP, Radiation Safety &  
Control Services, Inc.  
Hans Honerlah, Army Corps of Engineers  
Tracy Ikenberry, Dade Moeller & Associates  
Jeff Lux, Tronox and the Fuel Cycle  
Facilities Forum  
Thomas Nauman,

**ACNW STAFF**

John Larkins  
Christopher Brown  
Neil Coleman  
Antonio Dias  
John Flack  
Latif Hamdan  
Michele Kelton  
Michael Lee  
Michael Snodderly  
Derek Widmayer

**APPENDIX C  
174<sup>TH</sup> ACNW MEETING  
NOVEMBER 13-16, 2006**

**ATTENDEES FROM THE NUCLEAR REGULATORY COMMISSION**

**NOVEMBER 13, 2006**

M. Nataraja	NMSS
M. Shah	NMSS
R. Johnson	NMSS
C. Grossman	NMSS
J. Rubenstone	NMSS
M. Bailey	NMSS
K. Heck	NRR
P. Justus	NMSS
G. Hatchett	OCM/GBJ
P. Reed	RES
S. Richards	NRR
T. Frye	NRR
J. Shepherd	FSME
S. Sakai	NRR
S. Ray	NRR
K. Street	NRR
A. Persinko	FSME
T. McCartin	NMSS

**NOVEMBER 14, 2006**

A. Kock	OEDO
C. Pittiglio	NRR
A. Schwartzman	RES
M. Miernicki	NRO
J. Shepherd	FSME
E. O'Donnell	RES
R. Johnson	FSME
R. Rodriguez	FSME
R. Pedersen	NRR
Q. Gan	FSME
J.-C. Dehmel	NRR
T. Frye	NRR

**NOVEMBER 15, 2006**

S. Baggett	OCM/PL
V. Holahan	RES
D. Cool	FSME
J. Schaperow	RES
T. Brock	RES
J. Mitchell	RES
Q. Gan	FSME

**APPENDIX C  
174<sup>TH</sup> ACNW MEETING  
NOVEMBER 13-16, 2006**

**ATTENDEES FROM THE NUCLEAR REGULATORY COMMISSION (CONT'D)**

**NOVEMBER 15, 2006 (Cont'd)**

P. Reed	RES
T. Cox	NMSS
P. Loeser	NMSS
P. Yadov	NMSS
A. Snyder	NMSS
W. Smith	NMSS
A. Murray	NMSS
S. Magruder	NMSS
C. Bajwa	NMSS

**NOVEMBER 16, 2006**

**ATTENDEES FROM OTHER AGENCIES AND GENERAL PUBLIC**

**NOVEMBER 13, 2006**

E. von Tiesenhausen	Clark County
N. Henderson	Bechtel SAIC
R. McCullen	NEI
L. Reiter	Nuclear Waste Technical Review Board (consultant)
G. Oliver	NEI
C. Jones	Carter Ledyard & Milburn LLP Lincoln County, NV

**NOVEMBER 14, 2006**

E. von Tiesenhausen	Clark County, NV
C. Farrell	NEI
J. S. Bland	Chesapeake Nuclear Services
M. Kennedy	ISL, Inc.
H. Morton	Self
C. Nalezny	DOE
B. Neuman	Carter Ledyard & Milburn Lincoln County, NV

**APPENDIX C  
174<sup>TH</sup> ACNW MEETING  
NOVEMBER 13-16, 2006**

**ATTENDEES FROM OTHER AGENCIES AND GENERAL PUBLIC (CONT'D)**

**NOVEMBER 15, 2006**

E. von Tiesenhausen	Clark County, NV
T. Rockwell	Radiation, Science & Health, Inc.
J. Muckerheide	Radiation, Science & Health, Inc.
J. Duguid	Bechtel SAIC
E. Regnier	DOE
N. Metting	DOE
G. Oliver	NEI
R. Jostes	NAS
E. Double	NAS
K. Crowley	NAS
G. Reeves	NGIT
W. A. Williams	DOE
J. Brann	Dept. of Defense
J. Cook	General Accountability Office
A. Dravo	Booz Allen
W. Bixby	Energy Solutions
B. Neuman	Carter Ledyard & Milburn Lincoln County, NV

**NOVEMBER 16, 2006**

E. Von Tiesenhausen	Clark County, NV
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## APPENDIX D: FUTURE AGENDA

The Committee approved the following topics for discussion during its 175<sup>th</sup> meeting December 12–14, 2006:

- Semi-Annual Briefing by the Office of Nuclear Material Safety and Safeguards (NMSS)
- RACER: Tools and a Process to Guide Decisions about Risk Reduction for Contaminants in the Environment
- Nuclear Energy Institute (NEI) and Electric Power Research Institute (EPRI) Views on NRC Interim Staff Guidance (ISG) DHLWRS-ISG-01 on Seismic Event Sequences
- Proposed Revision to Standard Review Plan Chapter 11.2, "Liquid Waste Management System"
- Conceptual Licensing Process for Global Nuclear Energy Partnership (GNEP) Facilities
- Closure of Generic Safety Issue 196: Boral Degradation
- ACNW December 2006 Briefing to the Commission
- Discussion of draft and possible letters and reports on the following:
  - Developing Model Confidence through the Use of Site Monitoring
  - ACNW Working Group Meeting on Lessons Learned in Decommissioning
  - Dose Effect Relationships and Estimation of the Carcinogenic Effects of Low Doses of Ionizing Radiation
  - Proposed Revision to Reg Guide 1.112, Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Reactors
  - Semi-Annual Briefings by the Office of Nuclear Material Safety and Safeguards (NMSS) and the Office of Federal and State Materials and Environmental Management Programs (FSME)
  - RACER: Tools and a Process to Guide Decisions about Risk Reduction for Contaminants in the Environment
  - Nuclear Energy Institute (NEI) and Electric Power Research Institute (EPRI) Views on NRC Interim Staff Guidance (ISG) DHLWRS-ISG-01 on Seismic Event Sequences
  - Proposed Revision to Standard Review Plan Chapter 11.2, "Liquid Waste Management System"
  - Public Comments on NRC 2006 Low-Level Radioactive Waste (LLW) Strategic Planning Initiative
  - Conceptual Licensing Process for Global Nuclear Energy Partnership (GNEP) Facilities
  - Generic Safety Issue 196: Boral Degradation

**APPENDIX E  
LIST OF DOCUMENTS PROVIDED TO THE COMMITTEE**

[Note: Some documents listed below may have been provided or prepared for Committee use only. These documents must be reviewed prior to release to the public.]

**MEETING HANDOUTS**

<b><u>AGENDA ITEM NO.</u></b>	<b><u>DOCUMENTS</u></b>
<b>2</b>	<b><u>Update on Status of Seismic Design Bases and Methodology: NRC Perspective</u></b> <ol style="list-style-type: none"><li>1. Preclosure Seismic Design Methodology and Performance Demonstration, presented by Mysore Nataraja and Mahendra Shah, NMSS [<b>Viewgraphs</b>]</li><li>2. Division of High-Level Waste Repository Safety — Interim Staff Guidance HLWRS-ISG-01, Review Methodology for Seismically Initiated Event Sequences, provided by Mysore Nataraja and Mahendra Shah, NMSS [<b>Handout</b>]</li></ol>
<b>3</b>	<b><u>Results from the Liquid Radioactive Release Lessons Learned Task Force</u></b> <ol style="list-style-type: none"><li>3. Liquid Radioactive Release Lessons Learned Task Force, presented by Stuart Richards and Timothy Frye, NRR [<b>Viewgraphs</b>]</li></ol>
<b>6-14</b>	<b><u>ACNW Working Group on Decommissioning Lessons Learned</u></b> <ol style="list-style-type: none"><li>4. Reactor Decommissioning Program Lessons Learned, presented by Ralph Anderson, Nuclear Energy Institute, and Sean Bushart, Electric Power Research Institute [<b>Viewgraphs</b>]</li><li>5. Lessons Learned in the Decommissioning of Fuel Cycle Facilities, presented by Jeff Lux, Fuel Cycle Facilities Forum [<b>Viewgraphs</b>]</li><li>6. Lessons Learned from DOE and Other Site Decommissioning, presented by Lawrence Boing, Argonne National Laboratory [<b>Viewgraphs</b>]</li><li>7. U.S. Army Corps of Engineers' D&amp;D Experiences, Hans Honerlah, U.S. Army Corps of Engineers [<b>Viewgraphs</b>]</li><li>8. Decommissioning Lessons Learned a State's Perspective, presented by Thomas Conley, , Kansas Department of Health and Environment, Board Member Organization of Agreement States [<b>Viewgraphs</b>]</li><li>9. Update on Decommissioning Lessons Learned, presented by Rafael Rodriguez, FSME [<b>Viewgraphs</b>]</li></ol>



## MEETING HANDOUTS (CONT'D)

<u>AGENDA ITEM NO.</u>	<u>DOCUMENTS</u>
6-14 (cont'd)	<p>10. Guidance Development for 10 CFR 20.1406, presented by William Ott, RES <b>[Viewgraphs]</b></p> <p>11. Update on Proposed Rulemaking, Additional Requirements for Subsurface Monitoring, presented by J. C. Shepherd, T.L. Fredrichs, et. al</p> <p>12. Spent Nuclear Reactor Fuel Reprocessing, Historical Review and Forward Look, presented by Raymond Wymer, ACNW Consultant <b>[Viewgraphs]</b></p>
10	<p><b><u>Dose Effect Relationships and Estimation of the Carcinogenic Effects of Low Doses of Ionizing Radiation</u></b></p> <p>13. Collective Dose and ALARA-to-Zero Are Scientifically Invalid for Radiation Protection and Extreme Premises Are Not “Conservative” — They are Simply Wrong, presented by Theodore Rockwell &amp; James Muckerheide, Radiation Science &amp; Health, Inc. <b>[Viewgraphs and Handouts]</b></p>
20	<p><b><u>Proposed Revision to Regulatory Guide 1.112, Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Reactors</u></b></p> <p>14. Update and Status of RG 1.112, “Calculation of Release of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors,” presented by Stephanie Bush-Goddard, RES <b>[Viewgraphs]</b></p>
21	<p><b><u>Proposed Revision to Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations to License Termination — Effluent Streams and the Environment</u></b></p> <p>15. RG-4.15, DG-4010, “Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations to License Termination)—Effluent Streams and the Environment,” presented by William Ott, RES</p> <p>16. Draft Regulatory Guide DG-4010, November 2006 <b>[Handout]</b></p>

## MEETING NOTEBOOK CONTENTS

<u>TAB</u> <u>NUMBER (S)</u>	<u>DOCUMENTS</u>
	Agenda, 174 <sup>th</sup> ACNW Meeting, November 13-16, 2006, dated November 8, 2006 ( <b>Revised</b> )
	Color Code — 174 <sup>th</sup> ACNW Meeting, dated November 2, 2006
6-14	<b><u>ACNW Working Group on Decommissioning Lessons Learned</u></b> <ol style="list-style-type: none"><li>1. Revised Draft Prospectus, Advisory Committee on Nuclear Waste Working Group Meeting on Lessons Learned in Decommissioning, November 14, 2006</li></ol>
16	<b><u>Dose Effect Relationships and Estimation of the Carcinogenic Effects of Low Doses of Ionizing Radiation</u></b> <ol style="list-style-type: none"><li>2. Status Report</li></ol>
17	<b><u>White Paper on Potential Advanced Fuel Cycles</u></b> <ol style="list-style-type: none"><li>3. Proposed Schedule</li><li>4. Status Report</li></ol>
20	<b><u>Proposed Revision to Regulatory Guide 1.112, Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Reactors</u></b> <ol style="list-style-type: none"><li>10. Status Report</li></ol>
21	<b><u>Proposed Revision to Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations to License Termination — Effluent Streams and the Environment</u></b> <ol style="list-style-type: none"><li>11. Status Report</li></ol>