

**POLICY ISSUE**  
(Information)

SECY-04-0117

July 9, 2004

FOR: The Commissioners

FROM: Luis A. Reyes  
Executive Director for Operations /RA/

SUBJECT: SEMIANNUAL UPDATE OF THE STATUS OF NEW REACTOR LICENSING  
ACTIVITIES

PURPOSE:

This paper informs the Commission of the staff's new reactor licensing activities since the issuance of SECY-04-0001, "Semiannual Update of the Status of New Reactor Licensing Activities," dated January 2, 2004.

BACKGROUND:

In SECY-01-0188, "Future Licensing and Inspection Readiness Assessment," dated October 12, 2001, the staff assessed its technical, licensing, and inspection capabilities, and described enhancements supporting new reactor licensing. The staff also committed to provide the Commission with semiannual updates of the status of new reactor licensing activities. Four updates have been provided so far: SECY-02-0076, dated May 8, 2002; SECY-03-0005, dated

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January 8, 2003; SECY-03-0113, dated July 7, 2003; and SECY-04-0001, dated January 2, 2004.

The attachment to this paper describes recent design certification review activities, early site permit (ESP) review activities, preapplication activities for new reactor designs, and supporting infrastructure development. Interactions with stakeholders, including international and inter-governmental activities, are also discussed.

#### DISCUSSION:

The staff continues to focus its efforts on the completion of the Westinghouse Advanced Plant 1000 (AP1000) design certification review and the review of the ESP applications filed by Dominion Nuclear North Anna, LLC (Dominion), for the North Anna ESP site, Exelon Generation Company, LLC (Exelon), for the Clinton ESP site and System Energy Resources, Inc. (SERI), a subsidiary of Entergy Corporation, for the Grand Gulf ESP site. The staff is progressing toward completion of the preapplication reviews for the General Electric (GE) Economic and Simplified Boiling-Water Reactor (ESBWR) and the Atomic Energy of Canada, Limited (AECL) Technologies Inc. Advanced CANDU Reactor 700 (ACR-700). The staff is addressing regulatory infrastructure issues to support these reviews. As resources allow, the staff is also working on long-lead-time infrastructure issues that will facilitate the review of non-light-water-reactors (non-LWRs). Brief summaries of key new reactor licensing activities since issuance of SECY-04-0001 are provided below.

#### AP1000 Design Certification

The draft safety evaluation report (DSER) was issued on June 16, 2003, with 174 open items. All of the DSER open items are now considered to be resolved. No additional information is needed by the Nuclear Regulatory Commission (NRC) staff to complete the final safety evaluation report (FSER). The staff remains on schedule to issue the FSER by September 13, 2004.

#### Combined License (COL)

Three consortia have submitted proposals to the Department of Energy (DOE) in response to a November 2003 solicitation of interest for participation in new nuclear plant licensing demonstration projects. The first consortium consists of Dominion Resources, AECL Technologies Inc., Hitachi America, and Bechtel. This consortium submitted a proposal to DOE in mid-March 2004 based on the ACR-700 design at the North Anna site. A COL application for the facility may be submitted as soon as mid-CY 2006. Based on current information, the staff plans to budget resources for the review of a possible COL application in FY 2007.

The second consortium consists of the Tennessee Valley Authority (TVA), Toshiba, GE, Bechtel, United States Enrichment Corporation (USEC), and Global Nuclear Fuel-Americas LLC. This consortium submitted a proposal to DOE on April 23, 2004, to conduct a detailed study of the potential construction of a two-unit GE-Toshiba-designed Advanced Boiling Water Reactor (ABWR) nuclear plant at the Bellefonte site. On May 23, 2004, DOE announced that it will fund one-half of the cost associated with the study, which will total \$4.25 million over the next 10 months. Following completion of the study in April 2005, TVA will make a decision whether to file a COL application.

The third consortium, known as NuStart Energy Development LLC, consists of nine energy companies and two nuclear reactor vendors. The energy companies are Constellation Generation Group, Duke Energy, Electricité de France (EDF) International North America, Entergy Nuclear, Exelon Generation, Florida Power & Light Co., Southern Company, Progress Energy, and TVA. The nuclear reactor vendors are Westinghouse and General Electric. The consortium submitted a proposal to DOE on April 26, 2004, and is considering Westinghouse's AP1000 design and GE's ESBWR design. The Bellefonte site is one of several sites being evaluated by the consortium. The current projection for a possible COL application to the NRC is the 2008 time frame, with regulatory approval of the COL desired late in 2010 or in 2011.

### Early Site Permits

The staff is reviewing ESP applications from three applicants: Dominion Nuclear North Anna, LLC (Dominion), for the North Anna ESP site; Exelon Generation Company, LLC (Exelon), for the Clinton ESP site; and System Energy Resources, Inc. (SERI), a subsidiary of Entergy Corporation, for the Grand Gulf ESP site. Mandatory hearings associated with each of these applications are underway.

### Construction Inspection Program (CIP)

The construction inspection framework was issued on May 11, 2004, as NUREG-1789, "10 CFR Part 52 Construction Inspection Framework." The CIP team continued its efforts to ensure staff readiness to conduct inspections by updating the agency's Strategic Workforce Planning (SWP) survey. The CIP team worked with the Office of Human Resources (HR) to incorporate a series of knowledge and skill statements into the SWP survey specifically related to construction. Interactions with the Office of Nuclear Regulatory Research (RES) and the Office of Nuclear Materials Safety and Safeguards (NMSS) have been aimed at using the experience and expertise of those offices to improve the development of the CIP. The CIP team has contacted the U.S. Navy and the Federal Aviation Administration (FAA) with the specific purpose of learning from their implementation of similar inspection activities.

### Regulatory Infrastructure

The staff has proposed a rulemaking to revise 10 CFR Part 52 based on lessons learned during the previous design certification reviews and on discussions with nuclear industry representatives about the ESP and COL review processes. The proposed rule was published for comment in the *Federal Register* on July 3, 2003 (68 FR 40025). The staff received eight comment letters. Due to the nature of these comments and the extent of changes necessary to address them, the staff expects to forward a revised proposed rule package to the Commission later this year, rather than a final rule.

In the previous semiannual status update (SECY-04-0001), the staff informed the Commission that it had begun interactions with stakeholders to resolve generic COL issues prior to the receipt of the first COL application. A set of 23 generic issues has been identified for discussion. The staff plans to address these issues to facilitate the preparation and review of future COL applications. Two of the 23 issues involve inspections, tests, analyses and acceptance criteria (ITAAC). As discussed in the attachment, the staff is working with stakeholders to identify acceptable emergency planning ITAAC. The staff is also working to

respond to the Commission's direction in a May 14, 2004, staff requirements memorandum (SRM) on programmatic ITAAC.

On May 3, 2004, the staff issued Review Standard (RS) 002, "Processing Applications for Early Site Permits," which consolidates existing ESP review guidance, updates the guidance to reflect the ESP licensing process, and identifies the scope of the ESP review.

The staff is also preparing to review non-LWR designs by addressing certain policy and technical issues. SECY-03-0047, "Policy Issues Related to Licensing Non-Light-Water Reactor Designs," dated March 28, 2003, identified seven policy issues for Commission consideration. In a SRM dated June 26, 2003, the Commission approved the staff's recommendation on four of the issues, requested additional information on two other issues and did not approve the staff's recommendation on one issue. The staff is preparing a response to the Commission on the status of the two issues requiring additional information. Further, as directed by the Commission, the staff is continuing its interactions with external stakeholders on the issues identified in SECY-03-0047.

#### CONCLUSIONS:

New reactor licensing activities are focused on the review of applications for design certification and ESPs and preparation for a COL application. The staff continues to develop the technical infrastructure needed to complete these reviews and the regulatory infrastructure that will make the licensing process more efficient and effective in the future. The staff will also continue to reach out to all stakeholders to build public confidence in these activities.

#### RESOURCES:

Agency resources assigned to new reactor licensing activities have risen sharply over the past few years and are expected to continue to increase in FY 2005-2006. To develop budget estimates for FY 2005-2006, we considered information and experience gained in preapplication reviews, along with application schedule information provided by prospective applicants. As new information becomes available, the staff continues to implement the planning, budgeting, and performance management (PBPM) process to update budget estimates and prioritize work.

Activities leading to a COL have the highest priority for new reactor licensing resources. The staff expects to focus its efforts on certifying the AP1000 design, completing the ESP reviews, reviewing the ACR-700 and ESBWR designs, and reviewing COL applications if they are received. The staff will give lower priority to other design certification and preapplication activities that are not expected to be referenced in potential COL applications. These lower priority reviews may not receive resources commensurate with their visibility or the desires of some prospective applicants. Projects that might be affected include the International Reactor Innovative and Secure (IRIS) and Pebble Bed Modular Reactor (PBMR) designs and other reactor designs which may pursue preapplication interactions with the NRC.

The Commissioners

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COORDINATION:

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

*/RA/*

Luis A. Reyes  
Executive Director  
for Operations

Attachment: Semiannual Update of the Status of  
New Reactor Licensing Activities

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

**/RA/**

Luis A. Reyes  
Executive Director  
for Operations

Attachment: Semiannual Update of the Status of  
New Reactor Licensing Activities

ADAMS ACCESSION NUMBER: ML041190618

OFFICE	PM:RNRP	SC:RNRP	Tech Ed	BC:IIPB
NAME	ACubbage	LDudes (JSebosky for)	PKleene	SRichards
DATE	05/10/04	05/10/04	05/05/04	05/17/04
OFFICE	PMAS	PD:RNRP	D:DRIP	RES
NAME	MCase	JLyons	DMatthews (FGillespie for)	JCraig
DATE	06/08/04	05/28/04	05/28/04	06/14/04
OFFICE	OIP	OCFO	OGC	D:NRR
NAME	EBaker	JFunches	RWeisman	JDyer-B. Sheron for:
DATE	06/07/04	06/09/04	06/17/04	06/18/04
OFFICE	DEDRP	EDO		
NAME	EMerschhoff	LAReyes		
DATE	07/09/04	07/09/04		

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# Semiannual Update of the Status of New Reactor Licensing Activities

June 2004

## INTRODUCTION

This attachment to the June 2004 update of the status of new reactor licensing activities summarizes the status of the Advanced Plant 1000 (AP1000) design certification review, early site permit (ESP) reviews, preapplication activities for other reactor plant designs, regulatory infrastructure development, and stakeholder interactions.

## DESIGN CERTIFICATION

### **Advanced Plant 1000 (AP1000)**

On March 28, 2002, Westinghouse Electric Company (Westinghouse) submitted its application for final design approval and standard design certification for the AP1000 design. The Nuclear Regulatory Commission (NRC) staff issued its design certification review schedule on July 12, 2002, establishing the milestones and target dates for the review.

On June 16, 2003, the AP1000 draft safety evaluation report (DSER) was issued with 174 open items. All of the DSER open items are now considered to be resolved. No additional information is needed by the Nuclear Regulatory Commission (NRC) staff to write the final safety evaluation report (FSER). The staff remains on schedule to issue the FSER by September 13, 2004. A letter to Westinghouse dated December 2, 2003, reaffirmed that the FSER would be issued by September 13, 2004. By letter dated March 24, 2004, the staff provided Westinghouse a reconfirmation of the AP1000 design certification review schedule. The issuance date of the final design approval (FDA) was moved up by 6 weeks to September 13, 2004, so that the FDA would be issued concurrent with the FSER. In addition, it may be possible to complete the final design certification rule up to five months earlier than the scheduled date of December 2005. These schedule improvements are contingent on timely submittal of the final AP1000 design control document (DCD). The staff committed to provide the final schedule for the remainder of the design certification process when the FSER is issued. The milestones and their target due dates are listed below.

<u>AP1000 Milestone</u>	<u>Target Date</u>
Issue initial requests for additional information (RAIs), not including security and safeguards issues	September 30, 2002 (complete)
Westinghouse response to the RAIs	December 2, 2002 (complete)
Staff informs Westinghouse of RAI status	February 28, 2003 (complete)
Issue draft safety evaluation report	June 16, 2003 (complete)

AP1000 Milestone	Target Date
Westinghouse to provide responses to all open items, and the NRC staff to determine whether these responses are acceptable	March 31, 2004 (April 29, 2004 actual)
Westinghouse submits revision 11 of the AP1000 design control document	May 31, 2004 (May 19, 2004 actual)
Issue final safety evaluation report	September 13, 2004
Issue final design approval	September 13, 2004
Complete design certification rulemaking	December 2005

The staff is continually assessing resources needed to support the AP1000 design certification. Thus far, the resource estimates have been consistent with the estimates given in SECY-01-0188, "Future Licensing and Inspection Readiness Assessment," dated October 12, 2001.

Adjustments to the resource requirements are made using the staff's planning, budgeting, and performance management (PBPM) process, with consideration of other agency needs and priorities.

### **COMBINED LICENSE (COL)**

Three consortia have submitted proposals to the Department of Energy (DOE) in response to a November 2003 solicitation of interest for participation in new nuclear plant licensing demonstration projects. The first consortium consists of Dominion Resources, Atomic Energy of Canada, Limited (AECL) Technologies Inc., Hitachi America, and Bechtel. This consortium submitted a proposal to DOE in mid-March 2004 based on the Advanced CANDU Reactor 700 (ACR-700) design at the North Anna site. A COL application for this facility may be submitted as soon as mid-CY 2006. Based on the current information, the staff plans to budget resources for the review of a possible COL application in FY 2007.

The second consortium consists of the Tennessee Valley Authority (TVA), Toshiba, General Electric (GE), Bechtel, United States Enrichment Corporation (USEC), and Global Nuclear Fuel-Americas LLC. This consortium submitted a proposal to DOE on April 23, 2004, to conduct a detailed study of the potential construction of a two-unit GE-Toshiba-designed Advanced Boiling Water Reactor (ABWR) nuclear plant at the Bellefonte site. On May 23, 2004, DOE announced that it will fund one-half of the cost associated with the study, which will total \$4.25 million over the next 10 months. Following completion of the study in April 2005, TVA will make a decision whether to file a COL application.

The third consortium, known as NuStart Energy Development LLC, consists of nine energy companies and two nuclear reactor vendors. The energy companies are Constellation Generation Group, Duke Energy, Electricité de France (EDF) International North America, Entergy Nuclear, Exelon Generation, Florida Power & Light Co., Southern Company, Progress Energy, and TVA. The nuclear reactor vendors are Westinghouse and General Electric. The



consortium submitted a proposal to DOE on April 26, 2004, and is considering Westinghouse's AP1000 design and GE's Economic and Simplified Boiling Water Reactor (ESBWR) design. The consortium plans to develop COL proposals for each design, and plans to select a site 12 to 14 months after the DOE award selections are announced. The Bellefonte site is one of several sites being considered by the consortium. The current projection for a potential COL application to the NRC is the 2008 timeframe, with regulatory approval of the COL desired late in 2010 or 2011.

### **EARLY SITE PERMITS (ESPs)**

The staff received ESP applications in September and October 2003 from Dominion Nuclear North Anna, LLC (Dominion), for the North Anna ESP site; Exelon Generation Company, LLC (Exelon), for the Clinton ESP site; and System Energy Resources, Inc. (SERI), a subsidiary of Entergy Corporation, for the Grand Gulf ESP site. All three applications were accepted for docketing in late 2003, and the staff's safety and environmental reviews of the applications are in progress. The staff held environmental scoping meetings at all three sites. In addition, the staff has conducted quality assurance inspections and environmental and safety audits at all three sites as part of its review of the applications.

In regard to the mandatory ESP hearings, *Federal Register* notices of hearing and opportunity to petition for leave to intervene were published for all three applications. Subsequently, petitions to intervene were received on all three applications. With respect to the Dominion application, the petitioners are the Blue Ridge Environmental Defense League, the Nuclear Information and Resource Service (NIRS), and Public Citizen. The same groups petitioned to intervene in connection with the Exelon ESP application, along with two other groups, the Environmental Law and Policy Center and the Nuclear Energy Information Service. Four organizations petitioned to intervene in the SERI ESP application proceeding: the National Association for the Advancement of Colored People, Claiborne County, Mississippi Branch; NIRS; Public Citizen; and the Mississippi Chapter of the Sierra Club.

On March 22, 2004, the Chief Administrative Judge of the Atomic Safety and Licensing Board Panel established an Atomic Safety and Licensing Board (ASLB) for each of the proceedings (each with the same members). An initial prehearing conference has been scheduled by the ASLB for June 21-23, 2004, for all three applications. Note that on March 2, 2004, the Commission granted the applicants' request that these proceedings be conducted in accordance with the recently revised Rules of Practice (10 CFR Part 2).

Major remaining schedule milestones for the three applications are shown in the table below. In all cases, the mandatory hearing and Commission decision processes are assumed to require a total of 12 months after completion of the staff's reviews.

ESP Milestone	Dominion North Anna	Exelon Clinton	SERI Grand Gulf
Deadline for filing hearing contentions	5/3/04 (complete)	5/3/04 (complete)	5/3/04 (complete)

ESP Milestone	Dominion North Anna	Exelon Clinton	SERI Grand Gulf
Environmental requests for additional information (RAIs) sent to applicant	3/12/04 (complete)	5/14/04 (complete)	7/2/04
Safety/emergency planning RAIs sent to applicant	6/3/04 (complete)	7/27/04	9/21/04
Draft environmental impact statement (EIS) issued to EPA	10/14/04	12/27/04	2/25/05
Draft safety evaluation report (SER) issued	12/20/04	2/10/05	4/7/05
Final SER and EIS issued	6/16/05	8/25/05	10/21/05

### **PREAPPLICATION ACTIVITIES**

Upcoming applications to certify the ACR-700 and ESBWR reactor designs will require considerably more resources than the nearly completed AP1000 review. The three reactor design certifications completed in the 1990s (ABWR, System 80+, and AP600) required anywhere from about 65 to 120 full-time equivalent (FTE) per design for the staff's technical reviews over a period of about 9 years. About \$5.5 million were expended on contractor efforts, including testing required for the AP600 review. The AP1000 review has taken significant advantage of the previous AP600 effort, with resource expenditures in line with the estimates given in SECY-01-0188, which were 30 FTE and \$1.5 million. Similar precedents do not exist for the ACR-700 or ESBWR, so a higher level of effort (as compared to AP1000) is anticipated for these reviews.

The most significant factor affecting resources and schedules for the ACR-700 and ESBWR applications is the quality of the applicant's submittal, and whether it is supported by sufficient testing and by research and development where necessary. The level of effort required is also affected by the nature and significance of the differences in these designs compared to previously certified or licensed designs, the extent of the applicant's test program, and whether policy issues need to be addressed. Applications which do not adequately demonstrate how the design meets regulatory requirements will take more time and effort to review.

The staff is taking steps early in the planning process to ensure that personnel with necessary skills are available to review the applications when they are received, and to promote a consistent understanding of schedules and priorities for these reviews. Planning for the upcoming applications is emphasizing early and thorough identification of issues. Efforts also include development of tools to maintain detailed status information on the hundreds of questions and issues expected to arise in the course of the reviews. Tools are being developed to assist technical staff to compose safety evaluation report input, that will result in a more consistent document. These improvements will contribute to accomplishing the agency's goal of efficient, effective, realistic, and timely reviews.

### **Economic and Simplified Boiling-Water Reactor (ESBWR)**

The General Electric ESBWR is a 1390 MWe reactor using natural circulation for normal operation with passive safety features. This design is based on the certified advanced boiling-water reactor (ABWR) and the simplified boiling-water reactor (SBWR) designs, which the staff started to review in the early 1990s. On April 18, 2002, GE requested a pre-application review of the ESBWR and proposed that the preapplication review be conducted in two phases. During Phase 1, GE and the staff discussed the scope, schedule, and resource estimate for the preapplication review. Phase 2 of the preapplication review is currently underway and includes assessment of the technology basis for passive safety systems and the analysis methodology for transients and accidents.

In support of the preapplication review, GE submitted topical reports regarding the ESBWR test and analysis program description, the ESBWR test program, the SBWR test program, the qualification of the TRACG computer code analysis method, the application of the TRACG code to the ESBWR design, ESBWR scaling, and the ESBWR design description. The staff plans to issue a safety evaluation addressing the application of the TRACG computer code for ESBWR loss-of-coolant accident (LOCA) analyses in July 2004. GE plans to submit additional information in mid-CY 2004 in support of the ESBWR preapplication review, including the application of TRACG for ESBWR anticipated transients without scram (ATWS) and for stability, and topical reports related to severe accident analyses and probabilistic risk assessment (PRA) methods. It is anticipated that GE will submit a design certification application for the ESBWR design in mid-CY 2005.

The staff continues to develop infrastructure to support a future design certification application. These activities include the development of methods, tools, and data to be used for independent safety assessments or confirmatory calculations. The staff has initiated programs to add modeling capabilities to NRC's thermal-hydraulic system analysis code TRACE. Modeling capabilities are important to assess the safety features of the ESBWR design, including the tight coupling between the reactor vessel and the containment under certain accident scenarios. The coupled TRACE and CONTAIN (NRC's containment analysis code) codes will be the primary analytic tools used to perform confirmatory analyses of the ESBWR integral response to off-normal conditions. The staff is using the coupled TRACE/CONTAIN code system for independent calculations in its TRACG code review.

### **Advanced CANDU Reactor 700 (ACR-700)**

The ACR-700 is an advanced CANDU (Canada Deuterium Uranium) design that utilizes horizontal fuel channels passing through a heavy-water moderator tank. As with other CANDU designs, the ACR-700 is designed to be refueled during power operation. Other features of the reactor system, coolant pumps, U-tube steam generators, and pressurizer are similar to pressurized water reactor (PWR) designs in the United States.

The ACR-700 will have features that make it significantly different from operating CANDU reactors. The ACR-700 utilizes light water as coolant within the fuel channels, whereas operating CANDU reactors utilize heavy water. The ACR-700 will be designed to have a negative void reactivity coefficient so that if boiling occurs within the fuel channels, the reactor power will decrease. The negative void coefficient for ACR-700 would be achieved by using

slightly enriched uranium in the fuel and neutron-absorbing dysprosium elements in the fuel assemblies. Natural uranium fuel is used in operating CANDU reactors. The reactor core will be smaller than operating CANDU reactors with fewer fuel channels.

AECL Technologies Inc. provided its suggested plan for NRC's preapplication review of the ACR-700 in a letter dated September 26, 2002, and an amended plan on December 18, 2002. The December 18, 2002, letter expanded the scope of the preapplication review as originally identified in the September 26, 2002, plan.

The ACR-700 preapplication review is being conducted in two phases. Phase 1 was a series of familiarization meetings designed to provide the staff with a general overview of the ACR-700 design. Phase 1 of the ACR-700 preapplication review has been completed and the ACR-700 preapplication review is currently in Phase 2. The objective of Phase 2 is to provide more information about the ACR-700 design to facilitate the staff's review of 12 focus topics, and to provide feedback to AECL Technologies Inc. prior to their application for standard design certification.

In addition, given limited NRC resources, AECL Technologies Inc. has requested that priority be given to the following key focus topics during Phase 2 of the preapplication review:

- Focus Topic #1 - Class 1 pressure boundary design
- Focus Topic #3 - Computer codes and validation adequacy
- Focus Topic #8 - On-power fueling
- Focus Topic #9 - Confirmation of negative void reactivity

The phase 2 technical meetings with AECL Technologies Inc. on the on-power fueling, Class 1 pressure boundary design and pressure tubes, PRA methodology, and design basis accident and severe accidents have been conducted and requests for additional information (RAIs) have been developed for these focus topics. Results of the preapplication review, including responses to RAIs, will be documented in a report to AECL Technologies Inc. The report will highlight significant issues or safety problems, based on the staff's preliminary review of the design, that could affect the ability of the ACR-700 to receive design certification. Completion of the ACR-700 preapplication review is expected by September 30, 2004, in anticipation of AECL Technologies Inc.'s plan to submit a design certification application on March 31, 2005, and a possible COL application for the North Anna site in mid-CY 2006.

The staff briefed the future plant subcommittee of the Advisory Committee for Reactor Safeguards (ACRS) on January 13, 2004, to provide information on the preapplication review scope for the ACR-700 design and to present a design overview of the ACR-700. The presentation included the staff's approach, plans, and schedule for the preapplication review of the key focus topics.

The Office of Nuclear Regulatory Research (RES) led a series of Phenomena Identification and Ranking Table (PIRT) panel meetings in February 2004, on ACR-700 thermal-hydraulics, neutronics, and severe accident issues. The objective of the PIRT process is to identify potentially important safety issues and to provide the technical basis for resolution of such issues as they apply to the ACR-700 design. The PIRTs will form the basis for subsequent activities and will be used to provide guidance to assess the adequacy of the experimental data base, the code modeling, and the code validation and assessment.

In addition, RES is developing a comprehensive research plan to support the review of the ACR-700 design certification application. The structure of the plan will be similar to that presented in SECY-03-0059, "NRC's Advanced Reactor Research Program." The research activities contained in this plan will be reviewed by the Advanced Reactor Steering Committee and the Advanced Reactor Technical Advisory Group (TAG).

The staff met with representatives of the Canadian Nuclear Safety Commission (CNSC), on March 2, 2004, to discuss the details of the ACR-700 quality assurance (QA) program implementation review plan. QA review planning is part of ongoing international collaboration with CNSC on the review of the ACR-700 design. The agenda included discussions on the review objectives, the definitions of "safety-related" in Canada and in the U.S., systems and processes controlled by the International Organization for Standardization (ISO), and a discussion on the documents needed by CNSC and NRC prior to the QA review. Other topics discussed included Part 21 ("Reporting of Defects and Noncompliance"), commercial-grade dedication, and QA issues associated with research that is conducted in another country in support of a design certification.

During the week of March 15-19, 2004, the staff met with CNSC to discuss significant regulatory differences between the Canadian regulatory QA standard and the U.S. requirements, and the approach for reviewing the ACR-700 QA program. The staff also met with AECL Technologies Inc. to discuss the QA controls applied to the design and testing of the ACR-700. Other activities included fact-finding visits to the Stern Laboratory, the Chalk River National Laboratories, and the Sheridan Park AECL facilities in Ottawa, Canada.

The ongoing collaboration with CNSC is expected to facilitate the staff's review of the computer codes and analysis tools used in the ACR-700 safety analysis and the adequacy of their validation to support the upcoming ACR-700 design certification review. On April 23, 2004, the staff participated in a meeting with CNSC to discuss the details of CNSC's independent analysis to confirm the nature of the coolant void reactivity for the ACR-700 design. The CNSC and NRC staff agreed to collaborate on future nuclear analysis efforts to evaluate the coolant void reactivity and other inherent feedback characteristics of the ACR-700 core design.

### **International Reactor Innovative and Secure (IRIS)**

On July 11, 2002, Westinghouse requested the preapplication review of the IRIS design. IRIS is a 1000 MWt integral light-water reactor with all reactor coolant piping and heat transport systems located inside the reactor vessel. The IRIS integral vessel is larger than a traditional PWR pressure vessel, but the size of the IRIS containment is a fraction of the size of corresponding loop reactors.

The first in a series of technical meetings regarding preapplication review of the IRIS design was held on April 15, 2004. Westinghouse described two objectives for the preapplication review. The first objective is NRC agreement on the scope of the IRIS testing program, which will be the focus of NRC discussions with Westinghouse over the next several months. The meeting was focused on providing background and conducting introductory discussions with the staff supporting this objective.

Westinghouse's second preapplication review objective is NRC agreement on a procedure to approve the design with no emergency response planning requirements. Westinghouse noted that this objective is consistent with Department of Energy objectives for Generation IV reactor designs. The interest in eliminating emergency response requirements comes from international partners in the IRIS project. The staff informed Westinghouse that certifying a design with no emergency response requirements involves a Commission policy decision. Westinghouse plans to submit information addressing this topic in spring 2005. The staff will keep the Commission informed as additional information on this topic is received, identifying policy issues and proposed solutions as necessary.

Westinghouse presently plans to request certification of the IRIS design in early 2006. Minimal resources have been budgeted for the preapplication review, however, the staff is not currently budgeted to review the design certification application.

### **Framatome ANP Activities including SWR 1000**

The SWR1000 is a 1253 MWe boiling-water reactor incorporating passive safety features. There have been no formal interactions between Framatome ANP and the NRC staff regarding the SWR 1000 for the past several months. While Framatome ANP stated in an April 5, 2004, letter that they were continuing to plan for submittal of materials supporting the SWR 1000 preapplication review, the company is presently focused on fulfilling its contract to build a European Pressurized Reactor (EPR) at the Olkiluoto site in Finland. Framatome ANP is also considering pursuing preapplication review of other reactor designs, such as the EPR or a gas-cooled design.

### **Gas Turbine Modular Helium Reactor (GT-MHR)**

The General Atomics Company (GA) GT-MHR design is an approximately 300 MWt helium reactor design based on high-temperature gas-cooled reactor (HTGR) technology. The GT-MHR design uses helium to cool the ceramic-coated fuel particles contained in fuel compacts inserted in graphite fuel elements.

There have been no formal interactions between GA and the NRC staff regarding the GT-MHR in the last 12 months. GA indicated to the staff that they planned to terminate GT-MHR preapplication review interactions with the NRC and refocus their gas reactor design and development effort on the Very High Temperature Reactor (VHTR) project. NRC expects to be formally notified soon of GA's decision to terminate GT-MHR preapplication interaction activities.

## **Pebble Bed Modular Reactor (PBMR)**

The PBMR is a 110 MWe modular high-temperature helium-cooled reactor. By letter dated February 18, 2004, PBMR Pty., LTD, notified the NRC that it intends to apply for design certification of the PBMR once the detailed design for a PBMR demonstration plant to be built in South Africa is sufficiently completed. In order to make the staff's design certification application review process efficient and effective, PBMR Pty. has requested that discussions be initiated with the NRC to plan the scope and content of a PBMR preapplication review. PBMR Pty. indicates that preapplication review planning could begin in the second quarter of CY 2004. Staff technical reviews of selected topics could begin in early CY 2005. PBMR Pty. envisions preapplication review activities lasting 1.5 to 2 years before a formal design certification application would be filed. PBMR Pty. has indicated that the testing program for the PBMR demonstration plant would be used to support PBMR design certification review activities.

RES has informed PBMR Pty. that NRC resources are not currently available for infrastructure development, or for reviewing HTGR reactor designs. Available resources are being allocated to reactor designs that have the potential for being granted a COL in the near term. However, RES in coordination with the Office of Nuclear Reactor Regulation (NRR) and other agency offices, are planning to meet with PBMR Pty, and other industry representatives interested in pursuing HTGR reactor designs, to discuss their initiatives and plans for submitting a COL application. Following that meeting, the staff plans to inform the Commission on the prospects of a COL application(s), and seek Commission guidance on whether to proceed or delay planning for preapplication or design certification reviews of HTGR designs.

## **REGULATORY INFRASTRUCTURE**

### **10 CFR Part 52 Update**

The staff has proposed rulemaking to revise 10 CFR Part 52 based on lessons learned during the previous design certification reviews and on discussions with nuclear industry representatives about the ESP and COL review processes. The proposed rule was published for comment in the *Federal Register* on July 3, 2003 (68 FR 40025). The staff received eight comment letters on the proposed rule and is in the process of preparing a revised rule package.

One of the comments relates to how the regulations identify the applicability of requirements in 10 CFR Part 50, and other parts, to the 10 CFR Part 52 licensing processes. In the proposed rule, the staff attempted to address this applicability issue by adding Section 52.5 which identifies 10 CFR Part 50 provisions that the staff believed were applicable to the licensing processes in 10 CFR Part 52. Commenters have pointed out that some of these provisions are not applicable to all of the 10 CFR Part 52 licensing processes. In addition, some subparts in 10 CFR Part 52 contain very broad applicability statements such as, "Applications filed under this subpart [for design certifications] will be reviewed according to the applicable standards set out in 10 CFR Part 50 and its appendices and 10 CFR Part 100 as they apply to applications for construction permits for nuclear power plants." After considering comments on this issue, the staff concluded that, in order to ensure that all necessary changes related to the applicability of requirements outside of 10 CFR Part 52 were captured accurately, it needed to do a top to bottom review of 10 CFR to identify all provisions where conforming language needs to be

added to clarify applicability to 10 CFR Part 52. The staff believes that the resulting revised rule package will provide needed clarification on the applicability of the relevant technical and administrative requirements to each of the 10 CFR Part 52 licensing processes. However, the staff was concerned that external stakeholders would not have the opportunity to review and comment on the staff's proposals if they were published as a final rule. Therefore, the staff has recommended that the revised 10 Part 52 rulemaking package be published as a proposed rule, again, to ensure all interested stakeholders have the opportunity to comment on the applicability of technical and administrative requirements to each of the 10 CFR Part 52 licensing processes. Consequently, the staff expects to forward a proposed rule package to the Commission later this year, rather than a final rule package. Additional resources required to support this effort will be reviewed by the staff through implementation of the PBPM process.

### **Construction Inspection Program (CIP) Development**

The CIP team, composed of staff from the NRR and each of the four regions, completed the development of the construction inspection framework. The framework describes the organization and philosophy for the inspection activities to be conducted during licensing and construction of plants under 10 CFR Part 52. The CIP framework is the result of more than 6 months of interaction with internal and external stakeholders. The construction inspection framework was issued on May 11, 2004, as NUREG-1789, "10 CFR Part 52 Construction Inspection Framework." Over the next 6 months, the team will develop three Inspection Manual Chapters, the first tier of documents that will provide specific guidance for implementing the framework of the CIP described in NUREG-1789.

The CIP team continued its efforts to ensure staff readiness to conduct inspections by updating the agency's Strategic Workforce Planning (SWP) survey. The CIP team worked with the Office of Human Resources (HR) to incorporate a series of knowledge and skill statements into the SWP survey specifically related to construction. When implemented, the updated survey will help to identify any construction experience, whether or not it was specifically related to the construction of a commercial nuclear power plant. The information being gathered through the survey will be used to identify any gaps in the construction knowledge and skills of inspectors and to develop the scope of any training that may be needed to prepare the inspection staff to conduct construction inspection activities. The team has already identified the need to provide training to the technical staff who will be developing, revising, and updating the construction inspection guidance. The training will ensure that individuals tasked with authoring construction inspection guidance are well versed in the requirements of Part 52 licensing and the role and importance of ensuring the successful completion of inspections, tests, analyses, and acceptance criteria (ITAAC) by a licensee.

The team has initiated interactions with RES and the Office of Nuclear Materials Safety and Safeguards (NMSS). The team is working with RES to develop guidance for selecting construction inspection samples. When complete, the sampling selection methodology will be incorporated into the framework NUREG as an appendix. Discussions with NMSS are aimed at understanding the lessons learned from inspections associated with the preapplication review of the proposed repository at Yucca Mountain in areas such as training and qualifying inspectors and the transition from the preapplication to the application phase.



Other Federal agencies, including the U.S. Navy and the Federal Aviation Administration (FAA), have been contacted with the specific purpose of learning from their implementation of similar inspection activities. The team has asked the Navy for information about the oversight roles and responsibilities of naval reactor inspectors during fabrication, especially when modular construction is being used. Additionally, the team has requested an opportunity to observe large scale fabrication of naval vessels where modular construction techniques are being used. Interactions with the FAA are focused on understanding the FAA's surveillance and oversight of the manufacture of airplane parts by foreign suppliers. The lessons learned from these interactions will be used in the development of NRC procedures for the inspection of licensee quality assurance and corrective action programs during construction.

The NRC continues to evaluate the need to expand its oversight of nuclear component suppliers if new plant construction becomes a reality. Expanded oversight will be necessary to deal with the nuclear component suppliers that are new to the industry, some of whom will be foreign-based. It is also anticipated that new designs will use modular construction. The staff believes that these new suppliers engaged in modular construction activities will need to be inspected to ensure that the components are designed and fabricated to 10 CFR Part 50, Appendix B QA requirements. The NRC staff continues to interact with the Nuclear Procurement Issues Committee (NUPIC), which provides oversight of nuclear industry suppliers, to discuss the Committee's possible role in the oversight of foreign as well as domestic suppliers to new nuclear plant construction.

Our regulatory counterparts in other countries continue to provide insights about construction activities which the team evaluates for incorporation into the CIP. For example, before a recent NRC staff visit to Taiwan, the team provided the staff with specific areas of interest, including any experience and outcomes related to the selection of oversight individuals and scheduling of oversight activities.

### **ESP Review Standard**

As discussed in the previous update, the NRC staff has developed a review standard for ESP applications to provide guidance to the NRC staff on the process and criteria for reviewing an ESP application. The standard, designated Review Standard (RS) 002, "Processing Applications for Early Site Permits," consolidates existing guidance, updates the guidance to reflect the ESP licensing process, and identifies the scope of the ESP review. The standard also informs stakeholders regarding the information the staff expects to be provided in an ESP application.

The draft review standard was released for interim use and public comment in December 2002. Two additional sections, addressing QA and accident analysis, were released on April 11, 2003. The staff has responded to all comments received on the document and has placed the comments and staff responses on the NRC's new reactor licensing Web page.

The staff has also incorporated comment responses into the draft RS-002 as appropriate. In accordance with Commission direction in the staff requirements memorandum (SRM) for SECY-02-0199, "Denial of Petition for Rulemaking To Use Information From Prior Licensing Actions as Resolved Information for Early Site Permit and Combined License Applications," the staff submitted RS-002 to the Commission in December 2003 via SECY-03-0227. On March 15, 2004, the Commission issued the SRM for SECY-03-0227. The SRM approved issuance of RS-002, subject to certain required changes, such as updating the document to reflect the new 10 CFR Part 2. The document was revised in accordance with the SRM and was issued on May 3, 2004.

The staff has also developed an interim staff guidance (ISG) process for review of ESP applications, similar to the one already developed for license renewal. The ESP ISG process will be used to develop and issue interim guidance as necessary during reviews of ESP applications. The process should reduce the frequency of revisions to RS-002 while ensuring timely guidance is available to the staff. As appropriate, approved ISGs would be captured in a future revision to RS-002. On December 3, 2003, the staff requested by letter that stakeholders comment on the draft ISG process instruction. The Nuclear Energy Institute (NEI) provided a set of comments, which the staff considered in development of the final process instruction. The process instruction was issued for staff and stakeholder use on April 20, 2004.

### **Combined License (COL) Issues**

In the previous semiannual status update (SECY-04-0001), the staff informed the Commission that it had begun interactions with stakeholders to resolve generic COL issues prior to the receipt of the first COL application. A set of 23 generic issues has been identified for discussion. Some of the generic issues will be resolved by the CIP framework document and the 10 CFR Part 52 rulemaking. The status of interactions on some of the other COL generic issues is discussed below.

#### Programmatic ITAAC

SECY 04-0032, "Programmatic Information Needed for Approval of a Combined License Without Inspections, Tests, Analyses and Acceptance Criteria (ITAAC)," was issued on February 26, 2004. The paper requested the Commission's approval of a staff proposal regarding the level of programmatic information needed for approval of a COL without ITAAC for any particular program. This SECY paper responded to the Commission's direction in a September 11, 2002, SRM regarding SECY-02-0067, "Inspections, Tests, Analyses and Acceptance Criteria (ITAAC) for Operational Programs (Programmatic ITAAC)." In SECY-04-0032, the staff proposed to categorize 15 operational programs into five different categories depending on whether or not programmatic ITAAC are associated with the program, and what the basis was for having or not having ITAAC. Two of the categories have programmatic ITAAC, and three of the categories do not. The paper also provided an example of the information needed at the COL stage in order to issue a COL without ITAAC. The example included final safety analysis report (FSAR)-level information and procedures directly related to implementation of the fire protection program.

In a May 14, 2004, SRM, the Commission approved the staff's proposed categorization of programs, but disapproved the remainder of the staff's proposal including the staff recommendation concerning procedure-level information. In the SRM, the Commission directed the staff to reflect the Commission's decision on this issue in the Statements of Consideration of the final Part 52 amended rule. The Commission also directed the staff to complete its work on the information necessary for the COL application for each of the programs for which the staff had previously assumed ITAAC would be necessary by December 31, 2005, and present its results to the Commission.

### Emergency Planning (EP) ITAAC

On January 29, 2004, the staff provided a letter to NEI with draft proposed emergency planning ITAAC to initiate discussion with industry and public stakeholders. The NRC staff, in consultation with the Department of Homeland Security/Federal Emergency Management Agency (DHS/FEMA), crafted the EP ITAAC, which address 15 of the 16 EP planning standards in 10 CFR 50.47(b) and NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." (The excluded planning standard, in section 50.47(b)(13), pertains to the development of general plans for recovery and reentry, and was determined not to be applicable to EP ITAAC.)

The staff issued a *Federal Register* notice on March 10, 2004 (69 FR 11464), seeking public comment on the draft EP ITAAC and announcing an April 27, 2004, public workshop to discuss the issue. The April 27, 2004, EP ITAAC workshop was transcribed and facilitated. The workshop addressed four areas for which the staff requested feedback: (1) EP issues that should be resolved before the COL is issued, (2) State and local government participation, (3) concurrent EP ITAAC review, and (4) the nature of EP ITAAC for existing sites. NEI also presented a proposal on how to risk-inform the development of EP ITAAC. The comment period for the *Federal Register* notice ended on May 27, 2004. The staff is continuing to discuss EP ITAAC with stakeholders. The main issues that have been identified are the role of risk information in the development of EP ITAAC and whether it is appropriate to have ITAAC associated with offsite actions. The staff expects to review the comments and to develop a SECY paper during the summer of 2004 and is targeting providing the Commission with a SECY paper in the fall of 2004.

### COL Application Guidance

In a January 12, 2004, letter, NEI stated that it has begun development of guidance for preparing COL applications and requested the staff to provide feedback in five areas. NEI expects to complete Revision 0 of NEI 04-01, "COL Application Guidance," in December 2004. The staff provided feedback in the five areas that NEI requested during a public meeting on January 29, 2004. The staff expects to meet with NEI this year to discuss the development of NEI 04-01. In 2005, NEI expects to address NRC comments, incorporate additional COL application and process guidance, and seek NRC endorsement of NEI 04-01, Revision 1. NEI expects that the process for obtaining NRC endorsement of NEI 04-01 will be similar to that which led to NRC's endorsement of NEI 95-10, "Industry Guideline for Implementing License Renewal," in Regulatory Guide (RG) 1.188. NEI believes that such a schedule will support preparation and submittal of a COL application in the 2006-2007 timeframe.

The staff has budgeted resources to support these COL generic review activities. The resources may need to be revised depending on the timing and the scope of the work involved.

### **Advanced Reactor Steering Committee (ARSC)**

The ARSC, a joint RES and NRR management team, continues to review activities associated with advanced reactor preapplication reviews, design certification reviews, and advanced reactor research infrastructure development. The steering committee, with the support of the TAG reviews research activities necessary to support design certification reviews, including the agency's independent assessments of new reactor designs and the formulation of the technical bases for applicable regulatory requirements. Recent ARSC meetings have focused on the staff's plans to address non-light-water reactor (non-LWR) policy issues and potential policy issues related to the ACR-700 preapplication review. In addition, recent TAG meetings have focused on independent accident analysis capability for the ACR-700.

### **Non-LWR Policy Issues**

SECY-03-0047, "Policy Issues Related to Licensing Non-Light-Water Reactor Designs," dated March 28, 2003, identified seven policy issues for Commission consideration. Some of these issues are also relevant to the licensing of future LWR designs. In an SRM dated June 26, 2003, the Commission:

- (1) approved the staff's recommendation on four of the issues
  - Issue 2: the development of a policy statement or description on defense-in-depth for nuclear power plants
  - 
  - Issue 4: the use of a probabilistic approach in the identification of events to be considered in the design, for the safety classification of structures, systems, and components (SSCs), and to replace the single failure criterion
  - 
  - Issue 5: the use of scenario-specific source terms in licensing decisions
  - 
  - Issue 7: no change to the emergency preparedness requirements
- (2) requested additional information on two other issues
  - Issue 1: staff should provide further details on the options for, and associated impacts of, requiring that modular reactor designs account for the integrated risk posed by multiple reactors
  - Issue 6: staff should pursue the development of containment functional performance standards and then submit options
- (3) disapproved Issue 3, the staff's recommendation to proactively participate in development of and endorsing international codes and standards where such codes and standards have been identified by applicants or preapplicants for use in their submittals or by staff as needed to fill gaps on the NRC's non-LWR infrastructure.

The staff is preparing a response to the Commission on the status of the two issues requiring additional information. Further, as directed by the Commission, the staff is continuing its interactions with external stakeholders on the issues identified in SECY-03-0047.

The SECY-03-0047 discussion on the integrated risk for modular reactors (i.e., the cumulative effect on risk to the population around a site of adding a large number of small reactors to produce power equivalent to the power of a large reactor) notes that the three ESP applications describe the possible construction and operation of multiple small reactors at existing sites.

### **Advanced Reactor Framework Development**

The staff is developing a framework for a regulatory structure for future plant licensing. Development of this framework was discussed in SECY-03-0059, "NRC's Advanced Reactor Research Program," dated April 18, 2003. In addition, in SECY-03-0047, the staff noted that the issues (except for the issue on International Codes and Standards) are being addressed through this framework. The framework is intended to provide the technical basis for improving the effectiveness and efficiency of future plant licensing in the longer term (beyond the advanced designs currently in the preapplication stage).

The framework is intended to be technology-neutral, risk-informed and performance-based. The framework anchors the regulatory structure to high level safety goals and provides the guidelines and criteria to define the content of technology-neutral requirements. These technology-neutral requirements would serve as the technical basis for formulation of technology-neutral regulations. Another aspect of the framework is guidance for implementing the technology-neutral framework in conjunction with the technology-neutral requirements on a technology-specific basis. This guidance is intended to be used to generate technology-specific RGs for specific candidate reactor designs. This will be accomplished by translating the high level, technology-neutral regulations into technology-specific guidance.

### **High-Temperature Gas-Cooled Reactor (HTGR)**

On October 30, 2003, a PIRT panel completed the identification of phenomena important to the failure and fission product transport of coated fuel particles and fuel elements used in HTGRs. The panel identified and defined factors associated with design and manufacture, as well as phenomena associated with plant operations and postulated accidents, including heatup, reactivity insertion, and air and water ingress accidents. The final report is complete and was sent to international HTGR fuel technology experts for comment. Publication of the PIRT report as a NUREG/CR is expected by the end of this fiscal year.

The PIRT report can be used by the staff to (1) identify key attributes of gas-cooled reactor fuel manufacture which may need regulatory oversight, (2) provide a reference for the review of vendor fuel qualification test plans, (3) provide insights for TRISO fuel safety margin test plans, (4) assist in defining data needed to develop HTGR fuel performance and fission product transport models, (5) support the development of NRC's independent reactor fuel performance code and fission product transport models, (6) support the development of NRC's independent models for mechanistic source term calculations, and (7) provide insights for the review of applicant fuel safety analyses.

Additionally, a review and evaluation of the current American Society of Mechanical Engineers (ASME) Code and Code cases for applicability to HTGR metallic components was completed and published in NUREG/CR-6816 in June 2003. A review of existing information on metal component behavior in HTGR environments was conducted and the results were published in NUREG/CR-6824 in July 2003. An experimental apparatus was designed to supply simulated HTGR coolant with controlled levels of impurities to creep and fatigue test chambers. This experimental coolant loop was assembled, and initial creep tests of alloys Inconel 617 and Incoloy 800H at temperatures between 750 °C and 950 °C (1380 °F to 1740 °F) were completed on March 31, 2004.

Staff and contractor effort also developed a draft materials specification standard for nuclear-grade graphite. The draft was revised by the American Society for Testing Materials (ASTM) committee, and there will be a ballot version for the June 2004 ASTM committee meeting. Efforts are also underway with ASME to develop a code that incorporates the best available methods and design criteria for graphite. In February 2004, ASME formed a Special Working Group to develop codes and standards for nuclear-grade graphite. However, the NRC's budget for this work was eliminated for 2004, and further results anticipated from the materials testing program and improvements to the Code may not be available to assist the staff in evaluating the integrity and failure modes of components used in HTGR designs by licensees.

### **Instrumentation and Control**

A review of lessons learned from the design, construction, and licensing of advanced digital instrumentation, control, and protections systems used in foreign evolutionary reactor designs was completed in March 2004. In this review, the staff evaluated areas where revisions to the current regulatory guidance may be needed. A research program for development of new risk models for advanced digital instrumentation and control and reactor protection systems is the next phase of this work. This research program would support possible inclusion of the new models in risk-informed licensing. This research is intended to provide reliability and availability models for advanced digital safety systems expected to be used in new reactor designs. Due to resource limitations this research will not begin before FY 2005.

### **Structural and Seismic Accomplishments**

The staff is sponsoring a research program at Brookhaven National Laboratory (BNL) to develop a technical basis to support the safety evaluation of deeply embedded and/or buried (DEB) structures proposed for advanced reactor designs (e.g., PBMR, GT-MHR). The overall objective of this research is to investigate the applicability of existing seismic soil-structure interaction (SSI) computer codes to DEB structures and to recommend any necessary modifications to the computer codes. For the PBMR and GT-MHR new reactor designs submitted to the NRC for preliminary review, the entire reactor building and a significant portion of the gas turbine generator building will be partially or completely embedded below grade. SSI effects and passive earth pressures for these types of deeply embedded structures will have a significant influence on the predicted seismic response of the plant structure and components. Research performed by foreign research and development (R&D) organizations and regulators will also be reviewed for applicability and to determine gaps where additional research is needed.

On February 16-20, 2004, meetings were held between NRC, its contractor, and several Japanese organizations (i.e., Japan Nuclear Energy Safety (JNES), Nuclear Power Engineering Corporation (NUPEC), Tokyo University, Tokyo Electric Power Corporation (TEPCO), Kajima Corporation, and Tokyo Gas). The purpose of these meetings was to exchange information and to gather Japanese data on the seismic performance of deeply embedded or buried structures to develop the technical basis for the safety evaluation of deeply embedded/buried structures that have been proposed for some advanced reactor designs. The NRC staff will analyze information collected during the trip and follow up on a proposal to join an international collaborative test program planned by JNES.

### **Organizational Structure**

In March 2004, the Regulatory Effectiveness Assessment and Human Factors Branch in RES was reorganized and renamed the Advanced Reactor and Regulatory Effectiveness Branch (ARREB). RES staff involved in new reactors activities were consolidated into a New Reactors Section in ARREB. This reorganization focuses RES's new reactor efforts, and provides a point of contact within RES for new reactor activities. ARREB coordinates research applicable to current reactors and advanced reactors. It will lead the preapplication review for non-LWRs, and will support NRR in the design certification review and the preapplication review of advanced light-water reactor designs.

### **ADDITIONAL STAKEHOLDER INTERACTIONS**

#### **International Cooperation**

In addition to the international cooperation efforts with the CNSC as described in the ACR-700 section of this paper, the staff continues to seek opportunities to interact with and, where appropriate, initiate cooperative programs with other agencies and organizations. Such organizations include the Japan Atomic Energy Research Institute (JAERI), and the National Nuclear Safety Administration (NNSA), the regulatory authority of the People's Republic of China, in the area of HTGR technology.

The NRC has completed a revised cooperative research agreement with NNSA, designating the Institute of Nuclear Energy Technology (INET) as the representative on HTGR Technology exchange with NRC. The agreement with NNSA is scheduled to be signed in the summer of 2004, and includes the HTR-10 (high temperature gas-cooled test reactor) reactor safety experiments. In addition, a bilateral meeting with NNSA is scheduled in July on the design certification process.

NRC is also supporting meetings sponsored by the International Atomic Energy Agency (IAEA), including various Coordinated Research Projects dealing with advances in fuel technology for HTGR and the effects of near-field earthquakes on nuclear facilities.

## **Department of Energy**

On March 24, 2004, the staff met with representatives of DOE's Office of Nuclear Energy, Science, and Technology to discuss nuclear energy research, development, and demonstration activities. During this meeting, DOE briefed the NRC staff on the "Department of Energy/Nuclear Power Industry Strategic Plan for Light Water Reactor Research and Development," released in February 2004. DOE co-developed the strategic plan with the nuclear power industry to establish a framework that would allow both parties to plan the nuclear energy research and development agenda considered essential to achieving national energy goals. The strategic plan addresses both the near-term deployment of new plants and research and development for existing plants, such as advanced generation technologies, technologies for long-term operation, security, and high-burnup fuel.

DOE also briefed the NRC staff on the status of its COL solicitation, several research focus topics, and the status of their assessment of the constructability of new reactors. Regarding COL solicitation, DOE has indicated that it expected to make additional award selections later this year.