POLICY ISSUE
INFORMATION

January 31, 2006 SECY-06-0019

FOR: The Commissioners

FROM: Luis A. Reyes
Executive Director for Operations

SUBJECT: SEMIANNUAL UPDATE OF THE STATUS OF NEW REACTOR LICENSING ACTIVITIES AND FUTURE PLANNING FOR NEW REACTORS

PURPOSE:

This paper informs the Commission of the staff's new reactor licensing activities and accomplishments since the issuance of SECY-05-0139, "Semiannual Update of the Status of New Reactor Licensing Activities and Future Planning for New Reactors," dated August 4, 2005. In addition, this paper discusses strategies being developed to prepare for the challenges associated with projected increased licensing activities in 2007 and beyond.

SUMMARY:

The U.S. Nuclear Regulatory Commission (NRC) staff is preparing for the review of new reactor license applications that are projected to be submitted during the Fiscal Years (FY) 2007 and FY 2008. Consistent with Commission direction, the staff is developing plans and strategies for all low and medium uncertainty activities. Fundamental among the strategies is a "design-centered approach" presented in this paper. The staff is developing the licensing infrastructure and resources necessary to review these applications. This includes identifying, hiring (or contracting), and training the project management, technical, and support staff to review the anticipated applications. The NRC staff is also developing plans for updating and maintaining

CONTACT: Steven D. Bloom, NRR/DNRL
301-415-1313

current and effective reactor guidance documents for staff and applicant use during the licensing of new sites and new reactors. The Office of Nuclear Reactor Regulation (NRR) staff is working with the regions to identify the organization to support implementation of the construction inspection program. A Commission paper describing the results of this effort will be sent to the Commission in the near future.

In addition, the NRC completed several key regulatory products including issuance of the final rule for the AP1000 design certification and drafting of a proposed rule revising Part 52 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 52).

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 to support new reactor licensing. The staff also committed to giving the Commission semiannual updates of the status of new reactor licensing activities.

The April 6, 2005, Commission meeting staff requirements memorandum (SRM), "Briefing on Status of New Site and Reactor Licensing," dated May 10, 2005, directed the staff to develop an integrated plan for updating licensing review guidance, such as NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (SRP).

Enclosure 1 provides detailed information on recent new reactor projects including supporting infrastructure development for new reactor licensing activities and recent combined license (COL), design certification (DC), early site permit (ESP), and pre-application activities. In addition, this enclosure discusses the plan and current status for updating of the licensing review guidance. It also describes interactions with stakeholders.

During the FY 2007 budget process, the Commission directed the staff to provide an implementation plan, with major milestones, that concisely describes how the staff intends to identify, hire, and train new staff with the necessary talent and expertise, and further, provide the infrastructure, including adequate office space that will be needed to support the review of multiple applications. Enclosure 2 provides the staff activities and plans in response to the Commission's direction.

DISCUSSION:

The NRC staff has completed a number of activities since the last status update paper and continues work on several key regulatory products in connection with new reactor licensing. Key activities, accomplishments, plans, and strategies are summarized below.

Key Activities and Accomplishments in New Reactors

AP1000 Design Certification

A supplement to the final safety evaluation report (FSER) for the AP1000 design was published on December 13, 2005, and the final rule was signed by the Secretary of the Commission on January 23, 2006. The final design certification rule was published in the *Federal Register* on January 27, 2006.

10 CFR Part 52 Rulemaking

The NRC staff forwarded to the Commission a revised proposed rule for 10 CFR Part 52, and conforming changes throughout Title 10.

Economic Simplified Boiling Water Reactor Design Certification

On August 24, 2005, General Electric (GE) submitted its application for the economic simplified boiling water reactor (ESBWR) DC under 10 CFR Part 52. By letter dated September 23, 2005, the NRC staff communicated the results of its acceptance review, which determined that portions of the application were not sufficient for the NRC staff to begin its review of those areas, and stating that the application would not be docketed until additional information was provided by GE. On October 24, 2005, GE responded to the staff's acceptance review letter and has made additional submittals providing information to address the specific issues identified by the staff. The staff performed an acceptance review of the additional information submitted by GE and has concluded that the ESBWR DC application, as amended and supplemented, was acceptable for docketing. By letter dated December 1, 2005, the staff informed GE of the acceptance review results. In addition, the staff stated that GE should assure that the open issue closure process is fully coordinated and standardized among the expected 2007 and 2008 ESBWR COL applications to minimize or eliminate re-review of open technical issues on each COL application. A notice was also published in the *Federal Register* on December 9, 2005, to announce docketing of the application.

Early Site Permit Activity

In accordance with the ESP project schedules, the staff issued a draft safety evaluation report (SER) and a draft environmental impact statement (EIS) for (1) the Dominion Nuclear North Anna, LLC (Dominion), ESP application for the North Anna site; (2) the Exelon Generation Company, LLC (Exelon), ESP application for the Clinton site; and (3) the System Energy Resources, Inc. (SERI), a subsidiary of Entergy Corporation, ESP application for the Grand Gulf site. The staff also issued the final SER for the Dominion ESP. In addition, on August 26, 2005, the NRC staff issued a supplemental draft SER for the Exelon ESP application, and on October 21, 2005, the final SER for the ESP application filed by SERI. On October 24, 2005, Dominion notified the NRC staff that it would be revising its North Anna ESP application. On November 2, 2005, the NRC staff issued a letter to Dominion and requested Dominion to inform the NRC staff of the date for submission of the revised application, and that the staff would make a determination on the potential impacts to the final EIS and the SER upon receipt of Dominion's revised submission. On January 13, 2006, Dominion submitted a stand-alone supplement to the North Anna ESP application. The staff is currently reviewing this

supplement. It is a substantial change to the normal cooling design which impacts many sections of the application. Therefore, the staff plans to reissue the draft EIS and issue a supplement to the final SER.

Multinational Design Approval Program (MDAP)

In a September 8, 2005, SRM, the Commission approved moving forward with Stage 1 of MDAP, where NRC and its counterparts in other countries interested in participating in the program will determine working arrangements for cooperation in DC reviews. Since that time a number of discussions have been held and letters of intent have been exchanged with respect to multinational participation in the evolutionary power reactor (EPR) design certification review. In the near future, NRC staff will meet with their counterparts in France and Finland to work out the areas of cooperation for review at both the pre-application and application stages.

Regulatory Treatment of Operational Programs in the COL Process

Commission paper SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Inspections, Tests, Analyses, and Acceptance Criteria," was issued on October 28, 2005. This paper states that if a COL applicant can fully describe all the operational programs and their implementation (all operational programs which are required by regulation and that the staff expects to review in a COL application)—with inspections to verify their implementation, with the exception of emergency planning—then the NRC would not require inspections, tests, analyses, and acceptance criteria (ITAAC). The staff proposed that a COL include license conditions associated with the timing of program implementation.

Advanced Reactor (Non-Light-Water Reactor) Activities

The NRC staff continues to engage in activities related to advanced reactor designs (i.e., non-light water reactor designs). These include the U.S. Department of Energy's (DOE's) next generation nuclear plant (NGNP) project, the pebble-bed modular reactor (PBMR) pre-application review, and high-temperature gas-cooled reactor (HTGR) knowledge management. PBMR (Pty) Ltd. continues to interact with the staff in pre-application review activities supporting the PBMR design, an HTGR design. These activities are discussed in Enclosure 1.

New Reactor Plans and Strategies

Since the last update, the number of expected COL applications for the period FY 2007 through FY 2009 has increased to a total of 11, and several of these applications will be for dual unit sites. Table 1 lists the NRC staff's anticipated activities for FY 2006 through FY 2008. The activities listed for FY 2008 reflect the NRC staff's best estimates for applications based on industry information.

Table 1 - FY 2006-2008 New Reactor Licensing Planned Activities

FY 2006	FY 2007	FY 2008
Complete 3 ESPs North Anna Clinton Grand Gulf		
Start Southern (Vogtle) ESP	Continue Southern ESP	Continue Southern ESP
DC pre-application activities for EPR, PBMR, ACR, and IRIS	DC pre-application activities for EPR, PBMR, ACR, and IRIS	DC pre-application activities for EPR, PBMR, ACR, and IRIS
Continue ESBWR DC	Continue ESBWR DC	Continue ESBWR DC
		Start EPR DC
		Start PBMR DC
Pre-application activities for 11 potential COL applicants	Pre-application activities for 11 potential COL applicants	Pre-application activities for 11 potential COL applicants
	Start Dominion (North Anna) COL	Continue Dominion COL
	Start South Carolina E&G COL	Continue SC E&G COL
		Start Duke COL
		Start NuStart 1 (Bellefonte) COL
		Start NuStart 2 (Grand Gulf) COL
		Start Southern (Vogtle) COL
		Start Constellation COL
		Start Progress Energy (Harris) COL
		Start Progress Energy (Florida) COL
		Start Entergy (River Bend) COL
Regulatory Infrastructure Development and Technical Development	Regulatory Infrastructure Development and Technical Development	Regulatory Infrastructure Development and Technical Development
Start NGNP interactions with DOE	Continue NGNP interactions with DOE	Submit Joint NGNP licensing strategy to Congress

* Evolutionary Power Reactor (EPR), pebble-bed modular reactor (PBMR), Advanced Canada Deuterium Uranium (CANDU) Reactor (ACR), and International Reactor Innovative and Secure (IRIS)
Next Generation Nuclear Plant (NGNP) Department of Energy (DOE)

Design-Centered Review Approach

During the recent reorganization of NRR, the Division of New Reactor Licensing (DNRL) was formed, which contains the New Reactor Licensing Branch (NRBA) and the New Reactor Infrastructure Planning Branch (NRPB). DNRL is the responsible project management organization for DC application reviews, ESP application reviews, COL application reviews, and

new reactor pre-application activities. DNRL manages the necessary regulatory infrastructure to support new reactor licensing activities, including rulemaking, interaction with stakeholders on issues pertaining to new reactors. DNRL is developing a comprehensive strategy to prepare the Agency to review new reactor licensing applications. Currently, NRC is faced with the challenge to develop an approach by mid FY 2007, which will allow the staff to review effectively 2 DCs, 1 ESP, and 11 COL applications. The staff intends to develop a "design-centered approach" for its DC and COL reviews. This approach will use, to the extent practicable, a "one issue-one review-one position" strategy in order to optimize the review effort and resources needed to perform these reviews; that is, the staff will conduct one technical review for each reactor design issue and use this one decision to support the DC and multiple COL applications. Clearly, the DC and COL applicants will need to achieve a consistent level of standardization.

Currently, the staff envisions that its proposed design-centered approach will focus its reviews of the three designs (AP1000, ESBWR, and EPR) by using standardization and coordination of approaches and applications; require complete and high-quality applications; increase the use of the DC rulemaking to codify issue closure; and, to a practical extent, by using single technical evaluations to support multiple COL applications. In addition, the staff is currently developing the process for implementing the design-centered review program and envisions that this approach will require a multi-layered project management team for each design, use dedicated technical review resources, and that the plans and schedules for controlling these reviews will be at a new level of detail and integration. The staff, as part of its design-centered efforts, is assessing the technical expertise and resources needed in FY 2007, FY 2008, and FY 2009 to support this approach. This developmental effort will be used to inform: the hiring process by identifying the necessary talent and expertise the program will need; training needs for new staff; office space and information technology support needs; and the FY 2008 budget proposal.

On December 13, 2005, NRC senior management held a public meeting with senior officials from potential COL applicants, who have formed a group called the New Plant Oversight Committee (NPOC). The participants discussed areas such as standardization of COL applications and the use of a design-centered process to standardize the licensing basis for the design-specific COL applications.

The staff has developed a resource and schedule model for new reactor activities and is using the model to develop FY 2008 budget proposals and potential FY 2007 budget supplemental requests. Preliminary estimates indicated that the design-centered approach can reduce staff resource needs by 40 percent as compared to the resources needed for conducting independent reviews of each application. The model will be used to optimize the review schedule by addressing critical path items early.

Regulatory Issue Summary on Staff Resource Allocations

Consistent with Commission direction, the staff will develop the new reactor licensing budgets to accommodate all low and medium uncertainty projects. However, as discussed previously in SECY-05-0139, the staff will give higher priority to DC activities that could culminate in the submission of one or more COL applications, consistent with current planning and budgetary assumptions. To effectively implement the FY 2008 design-centered review strategies, and resource allocation models for the COL applications, the staff will issue a regulatory issue

summary (RIS) to convey the following:

1. The staff will request that the industry identify a reference COL application for each of the standard designs (AP1000, ESBWR, or EPR). The reference COL application will identify the technical areas to be considered standard for a given design among all the COL applications which reference that design. The applicants that submit an application after the reference COL application, using the same design, will need to inform NRC if they are following the same standard application or identify areas that are different from the standard application. NRC staff expects to perform concurrent reviews of COL applications that are based on the reference COL application and this information will determine the schedule by which these applications will be reviewed. Various site-related aspects, such as security and emergency planning, will also affect the application review schedules. If a plant deviates from the standard design, the application will be considered a custom application, and the schedule and resources will be established on an application-by-application basis. The staff recognizes that other reactor designs are being developed and will consider these additional design-centered groups once there is a commitment to submit multiple COL applications using the design. The staff will also request that COL applicants establish firm schedules for submission of their applications.

2. In addition to the standardized approach discussed above, the staff is working with external stakeholders to develop a set of guidelines to define the expectations for interactions between the NRC and the applicants during the licensing process. The guidelines will provide a predictable and consistent method for acceptance and technical review of applications, and includes guidance for: pre-application interactions; quality and completeness; scheduling application reviews; and responses to requests for additional information.

Regulatory Infrastructure Development

The resources included in the NRC FY 2006 budget for infrastructure development are being used to hire and train staff, and update and revise the SRP and existing regulatory guides (RGs), as well as to develop a new COL application regulatory guide which follows the format of RG 1.70, “Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants.” This new RG will be applicable to all light-water reactor COL applications whether referencing a certified design, an ESP, both, or neither. This will be a consistent and efficient compilation of application guidance, and where appropriate, an endorsement vehicle for portions of Nuclear Energy Institute (NEI) 04-01, Revision D, “Draft Industry Guideline for Combined License Applicants Under 10 CFR Part 52.” Infrastructure development and knowledge management for high-temperature gas-cooled technologies are included in Enclosure 1 and hiring and training strategies are addressed in Enclosure 2.

On July 6, 2005, the staff provided the Commission SECY-05-0120, “Security Design Expectations for New Reactor Licensing Activities.” On September 9, 2005, the Commission issued an SRM approving the actions proposed in SECY-05-0120. One of the actions proposed was to conduct a rulemaking to require applicants to submit a security assessment and target set analysis. This rulemaking is expected to be completed by September 23, 2007. The rule will be completed to support COL applications under review at that time. Currently, NRR staff is coordinating with the Offices of Nuclear Security and Incident Response and

Nuclear Regulatory Research (RES) to develop the guidance for the security assessment and target set analysis.

In support of the new reactor licensing process, the staff continues to consult with the Department of Homeland Security (DHS) in matters relating to emergency planning and preparedness, including security-related matters. Specifically, pursuant to Section 657 of the Energy Policy Act of 2005, before issuing a license for a utilization facility, the NRC will consult with DHS concerning the potential vulnerabilities of the location of the proposed facility to terrorist attack.

COMMITMENTS:

Listed below are the actions or activities committed to by the staff in this paper.

1. The staff will develop a “design-centered approach” strategy to review DC and COL applications. In addition to developing this program, the staff is preparing a RIS to inform all potential applicants for combined licenses of this strategy.

2. The staff will provide the Commission with additional details regarding the planned implementation of MDAP Stage 1 and the scoping of MDAP Stage 2.

CONCLUSIONS:

New reactor licensing activities continue to be focused on reviewing applications for DCs and ESPs and on preparing for the review of multiple COL applications. The staff is developing the necessary strategies and plans to undertake these reviews. The staff is planning to accelerate the development of the technical infrastructure needed to complete these reviews and the regulatory infrastructure that will make the licensing process more efficient and effective. The NRC staff continues interacting with stakeholders to ensure openness in these activities and to ensure that any future planning reflects the most recent industry information about application submission schedules.

RESOURCES:

As part of planning for the anticipated number of COL and DC applications expected in FY 2008, NRC received additional funding in FY 2006 and requested an increase in the FY 2007 budget to acquire personnel and develop infrastructure in FY 2006 and in FY 2007.

NRR is currently hiring staff to meet the projected full-time equivalent (FTE) for FY 2007; however, FY 2006 FTE utilization will not be exceeded. The impact of the NRR staffing increases will be reflected in the budget adjustments for FY 2007 and FY 2008. As of mid-January 2006, NRR has hired 84 employees in both technical and support areas. The Office of Human Resources and NRR will be conducting a job task analysis to assess the increased training needs for new employees. These additional FTE are being used to update the regulatory infrastructure (e.g., SRP) to support the anticipated multiple, simultaneous new licensing reviews expected in FY 2008. RES is also currently hiring additional staff to support the planned FY 2007 new reactor FTE allocation approved by the Commission in August 2005.

Over the last several months, the expected number of new reactor licensing activities has

increased significantly. For example, the expected number of COL applications has increased from 4 to 11. Therefore, in order to be prepared, additional resources above those that are currently planned for it will be necessary in FY 2007 to accelerate efforts for technical

development and regulatory infrastructure. We will also be addressing the resource implications of this workload during the FY 2006 mid-year resource review process.

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 objection.

/RA/

Luis A. Reyes
Executive Director
for Operations

Enclosures:
1. Semiannual Update of the Status of New Reactor Licensing Activities—January 2006
2. Hiring and Training Strategies

development and regulatory infrastructure. We will also be addressing the resource implications of this workload during the FY 2006 mid-year resource review process.

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 objection.

/RA/

Luis A. Reyes
Executive Director
for Operations

Enclosures:
1. Semiannual Update of the Status of New Reactor Licensing Activities—January 2006
2. Hiring and Training Strategies

ADAMS ACCESSION NUMBER: ML053530315 WITS 200100018, WITS 200500138, and WITS 200500306

OFFICE	PM:NRBA	LA:NRBA	BC:NRBA	Tech Ed	D:DIRS
NAME	SBloom	PMagnanelli	LDudes	HChang	SRichards
DATE	01/27/06	01/19 /06	01/13/06	12/16/05	1/10/06

OFFICE	PMAS	D:DNRL	OCFO	RES	OIP
NAME	C Carpenter	DMatthews	LBarnett	JWiggins	JDunn-Lee (JJacobson for)
DATE	1/11/06	01/19 /06	1/12/06 w/comments	1/12/06 w/comments	1/11/06

OFFICE	STP	NSIR	ADM	OHR	OIS
NAME	JSchlueter	MWeber	KGreene	MEBeach	EBaker
DATE	1/9/06	1/10/06 w/comments	12/14/05	12/8/05	12/9/05

OFFICE	OGC/NLO	D:NRR	EDO		
NAME	MWoods	JDyer (GHolahan for)	LAReyes		
DATE	01/13/06	1/20/06	01/31/06		

OFFICIAL RECORD COPY

Semiannual Update of the Status of
New Reactor Licensing Activities

January 2006

INTRODUCTION

This enclosure to the January 2006 update of the status of new reactor licensing activities provides a history of the status of the advanced plant 1000 (AP1000) and the economic simplified boiling water reactor (ESBWR) design certification (DC) reviews, the combined license (COL) application interactions, the early site permit (ESP) reviews, pre-application 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, LLC (Westinghouse), submitted its application for final design approval (FDA) and standard DC for the AP1000 design. The U.S. Nuclear Regulatory Commission (NRC) staff issued the final safety evaluation report (FSER) and the FDA on September 13, 2004. The proposed DC rule was published in the *Federal Register* on April 18, 2005 (70 FR 20062). The period for submitting comments expired on July 5, 2005. NRC received four letters in response to the *Federal Register* notice, three from private citizens, and one from the Nuclear Energy Institute (NEI). A discussion of the comments is provided in the *Federal Register* notice. Subsequently, Westinghouse submitted changes to the AP1000 design information in Revision 15 to the design control document (DCD). The NRC staff evaluated these changes in a supplement to the FSER (NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," Supplement No. 1). The final rule was transmitted to the Commission by the Executive Director for Operations (EDO) on December 14, 2005 (SECY-05-0227, "Final Rule—AP1000 Design Certification"). On December 30, 2005, the Commission voted to approve the final DC rule for the AP1000 standard plant design and the final rule was signed by the Secretary of the Commission on January 23, 2006, after approval of the information collection requirements by the Office of Management and Budget.

AP1000 Milestone	Date
Issue FSER	September 13, 2004 (complete)
Issue FDA	September 13, 2004 (complete)
Issue FSER, Supplement No. 1	December 13, 2005 (complete)
Commission vote to approve final design certification rule	December 30, 2005 (complete)
Signed by Secretary of the Commission	January 23, 2006 (complete)

AP1000 Milestone	Date
Published in *Federal Register*	January 27, 2006 (complete)
Issue FDA, Revision 1	February 14, 2006 (target)

Economic Simplified Boiling Water Reactor (ESBWR)

General Electric Company's (GE's) ESBWR is a 4500-MWt (approx. 1550-MWe) reactor design that uses natural circulation for normal operation and has passive safety features. On April 18, 2002, GE requested a pre-application review of the ESBWR. Since that time, the NRC staff has completed its review of the application of the TRACG thermal-hydraulic code to ESBWR loss-of-coolant accidents (LOCAs) (Agencywide Documents Access and Management System Accession Number ML043000285). During the pre-application phase, the NRC staff also began the review of the application of the TRACG code to ESBWR anticipated operational occurences (AOOs) and the application of TRACG to ESBWR thermal-hydraulic stability analysis. The staff will brief the Advisory Committee on Reactor Safeguards (ACRS) thermal-hydraulic subcommittee in January 2006 regarding the application of TRACG for stability, and plans to issue a safety evaluation report regarding its review of TRACG for stability analysis in early Calendar Year (CY) 2006. The review of TRACG for AOOs and for anticipated transient without scram (ATWS), which is scheduled to be submitted in January 2006, and will be conducted as part of the DC review.

By letter dated August 24, 2005, GE submitted its application requesting standard DC for the ESBWR pursuant to Part 52 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 52). In accordance with 10 CFR 2.101(a)(2), the staff conducted a 30-day acceptance review of the application. In an acceptance review, the NRC staff determines whether the application is sufficiently complete to allow the staff to proceed with its detailed technical review. The staff communicated the results of its acceptance review to GE by letter dated September 23, 2005. As discussed in the letter, the staff determined that portions of the application were not sufficiently complete for the staff to begin its review of those areas, and that the application would not be formally accepted for docketing until additional information was provided by GE. The staff requested that GE respond within 30 days with their plans and schedule for responding to the issues identified in the letter.

By letter dated October 24, 2005, GE responded to the staff's acceptance review letter. In addition, between September 19 and October 28, 2005, GE made 15 submittals providing information to address the specific issues identified by the staff. The additional information included revised and supplemented DCD text and topical reports providing additional supporting details. In late CY 2005 and early CY 2006, GE plans to submit several additional topical reports to provide supporting details in the following areas: fuel design, instrumentation and controls, human factors engineering, flow induced vibration, and fission product removal.

The staff performed an acceptance review of the additional information submitted by GE, and the staff concluded that the ESBWR DC application, as amended and supplemented, was acceptable for docketing. By letter dated December 1, 2005, the staff informed GE of the acceptance review results. A notice was also published in the *Federal Register* on December 9, 2005, to announce docketing of the application.

At this time, the ESBWR DC review is progressing in all areas. Some key activities include public meetings with GE and interactions with GE to address requests for additional information. Also, during the week of November 14, 2005, the staff conducted an audit of the GE quality assurance (QA) program. The staff is evaluating the results of the inspection related to implementation of the GE QA program.

Anticipating GE's application for DC, the staff developed an ESBWR research plan summarizing the activities that will provide the tools, analyses, and data for code assessment in the areas of thermal hydraulics, severe accidents, and probabilistic risk assessment (PRA).

In the area of thermal-hydraulic analysis, the staff is using the TRACE code to perform independent confirmatory analysis of ESBWR accidents and transients. Activities include model development, TRACE code assessment against test data, and confirmatory calculations. Since TRACE models for containment phenomena are yet to be fully assessed and model improvements may be required, the MELCOR code will be used to supplement TRACE calculations. MELCOR has been assessed extensively against containment data relevant to the ESBWR design. The staff will perform confirmatory calculations for ESBWR LOCA and compare the results to GE's submitted TRACG analysis and a similar TRACE analysis to be performed by the staff. For severe accidents analysis, the staff will use the MELCOR code (which also has models for severe accidents).

COMBINED LICENSE (COL) PRE-APPLICATIONS

Three consortia have received U.S. Department of Energy (DOE) awards in response to a November 2003 solicitation of interest for participation in demonstration projects for licensing new nuclear plants.

The first consortium is led by Dominion Resources (Dominion), and now plans to utilize GE ESBWR technology. In mid-March 2004, this consortium submitted a proposal to DOE to demonstrate the NRC's process for licensing the construction and operation of new nuclear power plants. This submittal was based on the advanced Canada deuterium uranium (CANDU) reactor 700 (ACR-700) design at the North Anna site. On January 14, 2005, Dominion announced that it had broken its original alliance with Atomic Energy of Canada Ltd. Technologies, Inc. (AECL), opting instead for the GE ESBWR design. GE submitted its ESBWR DC application on August 24, 2005. Based on current information, the NRC staff has budgeted resources for the review of a possible Dominion COL application in Fiscal Year (FY) 2007.

The second consortium consists of the Tennessee Valley Authority, Toshiba, GE, Bechtel, United States Enrichment Corporation, 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 half of the $4.25 million cost of the study. The feasibility study was issued in August 2005, and it concluded that two ABWR nuclear plants can be constructed at the Bellefonte site on a 40-month schedule for each reactor.

On April 26, 2004, the third consortium, NuStart Energy Development, LLC (NuStart), submitted its proposal to DOE to demonstrate NRC's process for licensing the construction and operation of new nuclear power plants. On May 6, 2005, NuStart issued a press release stating that it had signed a cost-sharing agreement with DOE. On September 22, 2005, and in its letter dated November 17, 2005, NuStart announced the selection of its two sites and the associated reactor designs. The Bellefonte site will be a dual-unit site and will reference the Westinghouse AP1000 design, and the Grand Gulf site will be a single-unit site and will reference the GE ESBWR design and the Grand Gulf ESP, if granted. The first of these applications is scheduled to be submitted in late CY 2007 or early CY 2008.

On November 1, 2005, the NRC staff met with representatives of Progress Energy to discuss plans for COL applications. The licensee stated that they are considering submitting two COL applications for dual-unit sites for locations in the Carolinas and in Florida. The applications will reference the same reactor design technology, either AP1000, ESBWR, or evolutionary power reactor (EPR); and the sites being evaluated are existing sites and greenfield sites. On January 23, 2006, Progress Energy announced that the Harris Nuclear Plant site near New Hill, NC, had been selected as the site location for duel unit AP1000 plants. A Florida location has yet do be determined. The first application is scheduled to be submitted in the late CY 2007.

AREVA, parent company of Framatome-ANP (FANP), and Constellation Energy announced on September 15, 2005, the formation of UniStar Nuclear. This joint enterprise is intended to provide a single source for design, construction, and operation of new nuclear plants. UniStar Nuclear will market the EPR reactor design. AREVA and Constellation each own half of UniStar. Bechtel Corporation also supports the company, providing architect-engineer and construction expertise.

The NRC staff met with representatives of Constellation Energy and FANP on November 2, 2005, to discuss plans for COL applications. An application for certification of the EPR is planned at the end of 2007, with a COL application referencing the proposed EPR design certification following about 6 months later. An additional COL application is planned for 1 year later. UniStar's objective is deployment of at least four identical EPR reactors. Constellation is preparing a letter to NRC describing its plans. Constellation will announce the site for the first application in early 2006. Constellation representatives said that the most likely sites are Nine Mile Point and Calvert Cliffs. During a public meeting held on January 25, 2006, NuStart stated that they are targeting March 27, 2006, to start site characterization activities at Calvert Cliffs, one of several potential sites.

On November 6, 2005, the NRC staff met with representatives of Entergy Nuclear to discuss plans for their COL application. The licensee had previously announced the site, River Bend, and the technology as the ESBWR design. Entergy stated it is also working with NuStart, as well as Dominion, on the submission of the COL application for their Grand Gulf site. They will all reference the ESBWR design and submit, as much as possible, standardized COL applications.

The NRC staff met with representatives of South Carolina Electric and Gas on December 6, 2005, to discuss their plans for submission of a dual-unit COL application. The licensee stated that they are evaluating the AP1000, ESBWR, or EPR for their application. It also stated that it

is evaluating the V.C. Summer or Savannah River site, and will identify the reactor design and site at the end of 2005 or early 2006. The COL application is scheduled to be submitted during the 3rd calendar quarter 2007.

By letter dated October 25, 2005, Duke Energy informed the NRC staff that it was developing two COL applications, which will reference the AP1000 reactor technology. In its letter dated December 19, 2005, Duke stated that the site selection for these applications will be completed in early 2006 and that the applications will be submitted in late 2007 or early 2008.

As discussed below in the ESP section of this enclosure, by letter dated August 17, 2005, Southern Nuclear Operating Company (SNC) informed the NRC staff that it would be pursuing an ESP and COL for the Alvin W. Vogtle Electric Generating Plant site. On January 26, 2006, SNC announced that they had selected AP1000 as their reactor technology.

Table 1 lists the COL applications anticipated based on correspondence received from the potential applicants.

Table 1 - Potential Combined License Applications

Potential Applicant	Designs endorsed or under consideration	Sites under Consideration	Date
Southern Nuclear Operating Company	AP1000	Vogtle	8/2006: ESP 3/2008: COL
Constellation	EPR	Nine Mile Point and Calvert Cliffs, plus 2	6/2008 and 6/2009
Dominion	ESBWR	North Anna	9/2007
Duke	AP1000 (2)	TBD	Late 2007 or Early 2008
Progress Energy	AP1000	Harris (2) Florida (2)	Late 2007
NuStart Energy	AP1000 ESBWR	Bellefonte (2) Grand Gulf	4th Qtr 2007 4th Qtr 2007 or 1st Qtr 2008
Entergy	ESBWR	River Bend	Early 2008
South Carolina Electric and Gas	AP1000, ESBWR, or EPR	TBD (2)	3rd Qtr 2007

EARLY SITE PERMITS (ESPs)

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

With regard to the ongoing ESP proceedings, *Federal Register* notices of hearing and opportunity to petition for leave to intervene were published for all three ESP applications. Subsequently, petitions to intervene were received on all three ESP applications. For the Dominion application, the petitioners were Blue Ridge Environmental Defense League, Nuclear Information and Resource Service (NIRS), and Public Citizen. The same groups petitioned for leave 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 for leave to intervene in the SERI ESP application proceeding: NIRS, the Mississippi Chapter of the Sierra Club, Public Citizen, and National Association for the Advancement of Colored People Claiborne County, Mississippi Branch.

On March 22, 2004, the Chief Administrative Judge of the Atomic Safety and Licensing Board (ASLB) Panel established an ASLB for the proceedings. An initial prehearing conference was held June 21–23, 2004, for all three applications. On August 6, 2004, the ASLB issued rulings in each of the three proceedings, admitting one environmental contention in the Clinton proceeding and portions of two environmental contentions in the North Anna proceeding, and denying intervention in the Grand Gulf proceeding. Three separate ASLBs were then established in the three proceedings. The mandatory hearings are expected to begin in mid-2006. Each licensing board is working out the details of timing and conduct of the individual mandatory hearings.

On July 28, 2005, the ASLB denied a motion to amend the environmental contention in the Clinton proceeding and granted summary disposition of the contention. This resulted in termination of the contested portion of the Clinton proceeding. On August 12, 2005, the petitioners for the Clinton proceeding filed a petition for review of the ASLB's dismissal of the environmental contention. On December 12, 2005, the Commission denied the petition for review.

In its review of the three ESP applications, the NRC staff has identified several generic issues. Although the NRC staff had worked with stakeholders prior to ESP application submittals to identify and resolve possible review issues, additional issues surfaced during the detailed reviews of the applications because of the first-of-a-kind nature of these reviews.

On the safety side of the reviews, one issue that arose during review of the applications is associated with emergency plans. In a March 28, 2005, letter to NRC, NEI commented on the major features option of 10 CFR 52.17(b)(2)(i), stating that there is minimal value for an ESP

applicant to pursue this option under the existing regulatory guidance. NEI discussed the need to update the regulatory guidance on the requirement of 10 CFR 52.17(b)(1) for ESP applications to identify physical characteristics of the proposed site that could pose significant impediments to the development of emergency plans, and commented on the NRC staff's proposal that an ESP application can contain complete and integrated emergency plans with COL action items. This COL action item approach was discussed during a January 18, 2005, public meeting with NEI. The NRC staff's draft table of proposed COL action items was sent to NEI on April 14, 2005. These items were discussed with NEI during a public meeting on July 25, 2005. During that meeting, the participants discussed the possibility of having permit conditions and/or emergency planning inspections, tests, analyses, and acceptance criteria (EP ITAAC) associated with an ESP, rather than, or in addition to, COL action items. The use of EP ITAAC could provide finality. The NRC staff's draft table of proposed COL action items would become the proposed EP ITAAC. NRC staff will continue to work with the Department of Homeland Security (DHS) (formerly the Federal Emergency Management Agency [FEMA]), NEI, and other stakeholders, in order to more fully explore such an approach. Finally, in an October 18, 2005, letter, NRC responded to NEI's March 28, 2005, letter, and provided the NRC staff's position on the issues raised, including NEI's expectations and understandings regarding ESPs.

In consultation with DHS, the NRC staff completed its review of the major features of the emergency plans in the ESP applications for the North Anna, Clinton, and Grand Gulf ESP sites. The detailed findings are provided in the respective safety evaluations and will be reflected in the individual ESPs.

Another issue that arose during the review of the ESP applications is seismic analyses. Two of the three ESP applicants (Dominion and Exelon) initially submitted applications that contained a new "performance-based" methodology for determining the safe-shutdown earthquake ground motion for the site. The NRC staff had not previously reviewed this methodology and informed the applicants that using this method could delay completion of the NRC staff's seismic reviews for the ESP applications. Dominion subsequently decided to use the NRC staff-approved methodology in Regulatory Guide 1.165, "Identification and Characterization of Seismic Sources and Determination of Safe-Shutdown Earthquake Ground Motion," and revised its application accordingly. Exelon continued to use the new methodology. The NRC staff informed Exelon that this would likely delay issuance of the NRC staff's FSER by 3 months because the NRC staff would need to review the new methodology in addition to reviewing Exelon's implementation of that methodology for the Clinton ESP site. The NRC staff issued the draft safety evaluation report (DSER) with open items for Exelon in accordance with the current schedule, requiring a supplemental DSER. The staff issued the supplemental DSER on August 26, 2005, and this document summarizes the results of the NRC staff's review of the suitability of the proposed Exelon ESP site in terms of the site's seismology and geology.

On the environmental side of the reviews, the NRC staff established an integrated environmental review schedule for first-of-a-kind ESP applications concurrent with license renewal reviews, extended power uprate reviews, and other operating reactor licensing actions. This schedule assumed the ESP applicants would submit their applications on schedule and respond to information requests in a timely manner. The NRC staff sequenced the ESP applications reflecting applicants' fulfillment of schedule commitments and staggered the review schedules of the three ESP applications in an attempt to ensure that (1) experience from the

initial review would be incorporated into the subsequent reviews, (2) review consistency, and (3) effective resource utilization. Consequently, the Exelon and SERI ESP review schedules partly depended on the successful execution of the Dominion ESP application review. In fall 2004, the NRC staff further modified the schedules to accommodate delayed responses from Dominion, including revisions to the application, and resolution of a number of first-of-a-kind issues that the NRC staff encountered. To minimize the impact on Exelon and SERI reviews, the NRC staff reduced the schedule time between the reviews. The NRC staff published the draft environmental impact statement (EIS) for Dominion's application in December 2004, Exelon's in March 2005, and SERI's in April 2005.

The NRC staff's public outreach efforts on the draft EISs generated significant interest in the ESP process and led to large turnouts at public meetings. More than 300 people attended the public meeting on the draft EIS for the Dominion ESP application, and more than 1300 people provided approximately 7000 comments on the draft EIS. This level of stakeholder participation from people around the country and even foreign countries led the staff to determine that it could not complete the final EIS by the target date. This also led the staff to conclude that additional resources and time are needed to consider the public comments and to complete the Dominion environmental review. Similarly, the number of substantive public comments for the Exelon and SERI ESP draft EIS, although less than the amount received for Dominion, were significantly more than expected.

The actions taken to supplement resources on the Dominion review had a cascading effect on the review schedule for the Exelon and SERI ESP applications, as common issues were being resolved and key members of the environmental review teams were being used on multiple ESP applications. The NRC staff determined that it was unable to complete each EIS for the Exelon and SERI ESP applications by the original target date and on August 16, 2005, the staff issued all three applicants a letter revising NRC's review schedule for completion of the ESP reviews. The staff has implemented additional actions to mitigate schedule impacts. The staff has (1) developed a database of staff responses to generic issues in support of comment resolution for ESP environmental reviews; (2) moved license renewal work to a different contractor than the one presently supporting ESP reviews, to make additional contractor resources immediately available; and (3) adjusted the timing of and consolidated activities to perform more steps in parallel across project lines and reflect the actual level of stakeholder involvement.

On October 24, 2005, Dominion notified the NRC staff that it would revise its North Anna ESP application. In the letter, Dominion stated that it conducted additional evaluations to the cooling water alternatives for a potential third nuclear reactor at the North Anna site, and decided to modify the current approach to incorporate a closed-cycle cooling system thereby reducing the evaporative losses of Lake Anna. On November 2, 2005, the NRC staff issued a letter to Dominion and requested Dominion to inform us of the date for submission of the revised application. In the November 2, 2005, letter, the staff stated that it would make a determination on the potential impacts to the final EIS and the SER upon receipt of Dominion's revised submission. Based on Dominion's November 22, 2005, response letter and an independent assessment of the potential impacts to the final environmental impact statement (FEIS) conducted by the staff, the staff determined that it could not issue the FEIS on December 23, 2005, since the supplemental ESP application would not be submitted until January 13, 2006. The staff has decided that it will continue its review efforts on the North Anna FEIS to the extent

possible, but will stop work on all areas of the FEIS affected by the proposed modification. To prevent a cascading effect on the remaining ESP review schedules, the staff will now focus its review efforts on the Grand Gulf ESP and the Clinton ESP. On January 13, 2006, Dominion submitted a stand-alone supplement to the North Anna ESP application. The staff is currently reviewing this supplement. It is a substantial change to the normal cooling design which impacts many sections of the application. Therefore, the staff plans to reissue the draft EIS and issue a supplement to the final SER.

Major remaining schedule milestones for the NRC staff's review of the three applications are shown in the table following this paragraph. These dates reflect the previously discussed delays in completion of all three environmental reviews, changes in review priorities for the review of SERI and Exelon applications, delay in the completion of the safety review of the new seismic methodology for the Exelon application, and the delay due to North Anna's late revision to its application. The crossed-out dates are from the last update. In all cases, the mandatory hearing and Commission decision processes are assumed to require a total of 12 months after completion of the NRC staff's safety and environmental reviews.

ESP Milestone	Dominion (North Anna)	SERI (Grand Gulf)	Exelon (Clinton)
Draft environmental impact statement (EIS) issued to EPA	12/10/04 C	~~04/29/05 T~~ 04/21/05 C	~~03/04/05 T~~ 03/02/05 C
Draft safety evaluation report (SER) issued	12/20/04 C	04/07/05 C	02/10/05 C
Supplemental draft SER issued	NA	NA	08/26/05 C
Final SER issued	06/16/05 C	10/21/05 C	02/17/06 T ~~08/25/05~~
Final EIS issued to EPA/NRC Notice of Availability Issued	TBD ~~12/23/05 T~~ ~~08/12/05~~	04/14/06 T ~~12/23/05~~	07/28/06 T ~~10/21/05~~
C - Complete T - Target TBD - To be determined following re-submittal by Dominion			

Future ESPs

In a letter dated February 11, 2005, SNC stated that it was investigating the feasibility of preparing an ESP application for one of its sites. The letter further stated that although the final site had not been selected, SNC planned to submit an ESP application in summer 2006. SNC, along with Constellation Energy Group, has submitted proposals asking DOE for funds to evaluate an ESP application. In a letter dated August 17, 2005, SNC informed NRC that it has selected Alvin W. Vogtle Electric Generating Plant site near Waynesboro, Georgia, as the site to pursue an ESP and a COL. The NRC staff held a pre-application kick-off meeting with SNC on September 8, 2005, during which the staff shared with SNC lessons learned from the current

ESPs and SNC outlined its plans for an ESP. On September 13, 2005, the staff conducted a QA audit relating to subsurface investigation activities and received a tour of the ESP footprint. In addition, in March 2006, the staff is planning to conduct a local public outreach meeting.

PRE-APPLICATION ACTIVITIES

The resources and schedule for reviewing the potential applications for the EPR, pebble bed modular reactor (PBMR), international reactor innovative and secure (IRIS), advanced CANDU reactor (ACR), and Toshiba 4S ("Super Safe, Small, and Simple") designs, depend on the quality of the information provided and whether it is supported by sufficient testing and by research and development, where necessary. The NRC level of effort is also affected by whether policy issues need to be addressed, the extent of the applicant's test program, and how different the new designs are when compared to previously certified or licensed designs. Applications that do not adequately demonstrate how the design meets the regulatory requirements will not be docketed for review.

Evolutionary Power Reactor (EPR)

The EPR is a large pressurized water reactor of evolutionary design, with a design output of about 1600 MWe, designed by FANP. Design features include four 100 percent capacity trains of engineered safety features, a double-walled containment, and a "core catcher" for containment and cooling of core materials for severe accidents resulting in reactor vessel failure. The design does not rely on passive safety features. The first EPR is currently being constructed at the Olkiluoto site in Finland. FANP also hopes to build EPRs at the Flammanville site in France, and FANP has submitted a bid for EPR construction in China. FANP expects to apply for NRC certification of the EPR design in late CY 2007. Constellation Energy has stated it plans to reference the EPR design in a COL application in mid-CY 2008.

The NRC staff and FANP are nearing the end of Phase 1 of the EPR pre-application review, which consists of familiarizing NRC with the design and identification of topics to be discussed in more detail in Phase 2.

The staff has held two Phase 1 meetings with FANP over the past few months. A July 21, 2005, meeting discussed the EPR small-break loss-of-coolant accident (LOCA) and steam generator tube rupture mitigation strategy, containment design bases, seismic design, and PRA to determine if these topics should be addressed as part of the pre-application review. Participants agreed that additional discussion of these topics should be included in Phase 2.

On November 2, 2005, the NRC staff again met with FANP representatives. In this meeting, FANP outlined the safety analysis methods it plans to use to support the EPR design certification. In most cases, FANP will use codes and methods already approved by the NRC, demonstrating their applicability to the EPR design. FANP also described the EPR's severe accident features and its proposed approach for analyzing severe accidents.

The final Phase 1 meeting was held January 10, 2006, to discuss the scope of Phase 2 effort, including the products to be generated by NRC. In addition to the topics outlined above, Phase 2 will include NRC review of three topical reports on the critical heat flux correlation,

safety analysis code applicability, and severe accidents. NRC staff participating in Phase 2 will include staff from the Offices of Nuclear Reactor Regulation (NRR) and Nuclear Regulatory Research (RES).

At the January 10, 2006, meeting, FANP also discussed a proposal for early submittal of information during pre-application to facilitate early review, resolution of issues, and NRC approval. The types of information proposed for submittal include additional topical reports and early submittal of portions of the EPR design control document. It is hoped that this proposal would enhance the efficiency of the NRC's review of the DC application, and optimize NRC resource utilization. NRC and FANP expect to discuss criteria to identify topics where early review would be beneficial and incorporate those items in the Phase 2 effort.

The EPR design is expected to be the first design making use of the Multinational Design Approval Program, which is discussed in greater detail below. The NRC staff hopes to leverage the experience of its counterparts in Finland and France to inform the EPR review. Expected benefits are both an improvement in the efficiency of the review and, more importantly, greater confidence in the safety of the design resulting from better understanding of international experience.

Pebble Bed Modular Reactor (PBMR)

The PBMR is a helium-cooled high-temperature reactor. A full-scale demonstration plant is being planned for construction in the Republic of South Africa. NRC has entered into pre-application discussions with the company responsible for the design, construction, and operation of the reactor, Pebble Bed Modular Reactor Company, Ltd. (PBMR (Pty) Ltd.), based on its stated purpose to pursue a DC under 10 CFR Part 52. The company also has stated that it intends to eventually seek deployment of the PBMR in the United States.

The staff plans a phased approach for the pre-application discussions on the PBMR. Phase 1 of the plan is directed at planning for a pre-application process. Phase 2 is the pre-application process itself. Then, Phase 3 entails the actual submittal and review of the application for DC. The Phase 1 planning clarifies the scope, depth, and desired outcomes of technical issues. Discussions during Phase 2 provide part of the basis for preparing the design certification application (DCA). The discussions during the Phase 2 pre-application process will improve the technical quality and completeness of the DCA submitted in Phase 3. A high-quality submittal will enable an effective and efficient NRC staff review.

NRC has recently had three pre-application planning public meetings with PBMR (Pty) Ltd., the first on June 30, the second on September 21 and 22, and the last on December 12, 2005. The meeting summaries are available at ADAMS Accession Nos. ML052010504, ML052770593, and ML053630306, respectively. The discussions have clarified the technical topics that are expected to be the main focus of the pre-application discussions. During the pre-application phase, PBMR (Pty) Ltd. expects to submit detailed white papers on these topics, and support the submittals with familiarization sessions and topical workshops for NRC staff. PBMR (Pty) Ltd. requests that NRC staff document its conclusions on each focus area and identify any remaining issues for the DCA to address. PBMR (Pty) Ltd. projects in its most recent schedule that the pre-application phase will extend to the end of CY 2007. The DCA

submittal is scheduled for early in CY 2008. The staff is currently estimating the resource and schedule requirements necessary for conducting the PBMR pre-application review, and intends to provide the Commission with options for supporting the review.

To prepare for the PBMR pre-application process, the staff has initiated internal discussions among the various technical staff who would be involved in the detailed review of PBMR submittals. The staff expects to take advantage of the earlier efforts relative to the pre-application process that occurred in 2001 and 2002 directed at the PBMR concepts presented by Exelon Corporation. The recent discussions between the staff and pre-applicant have shown that the technical and regulatory challenges evident during the Exelon review continue to exist, and these challenges will need to be addressed during the PBMR review.

International Reactor Innovative and Secure (IRIS)

In an ongoing effort supporting the IRIS pre-application review, NRC staff met with Westinghouse on September 28, 2005, to discuss Westinghouse's response to NRC comments on the IRIS test program (WCAP-16392, "IRIS Test Plan") and WCAP-16318, "IRIS Small Break LOCA Phenomena Identification and Ranking Table (PIRT)," and to identify any additional tests needed for DC.

Westinghouse presented information on the history of issues related to the pre-application and their response to NRC comments on the IRIS test program. Westinghouse stated that the IRIS scaling analysis will be submitted in three parts, and Parts 1 and 2 have been submitted. Additionally, Westinghouse explained details of the projected schedule for the IRIS test program. Westinghouse described the projected schedule for the IRIS test program as follows: identify its ongoing testing performance and facilities, initiate its testing program by the end of 2005, and submit the design certification application by CY 2008.

Overall, Westinghouse's goal is to obtain certification of the IRIS design in the 2008–2010 timeframe, with DC review starting in CY 2008. Westinghouse stated they would like to have NRC's agreement that the IRIS test program is sufficiently comprehensive to support DC. Westinghouse stated that the major part of the testing will be funded by the IRIS consortium, and performed in Italy. The outcome of this meeting was presented to the IRIS consortium members in Italy by Westinghouse in October 2005.

Advanced CANDU Reactor

The NRC staff used a multi-phased approach for the ACR pre-application review. Two phases have been completed. Phase 1, which consisted of a series of familiarization meetings to give the staff an overview of the ACR design, was completed in July 2003. The Phase 2 review obtained more specific and detailed information about the ACR design. Phase 2 was completed in October 2004 with the issuance of the pre-application safety assessment report (PASAR) (ML042110074).

By letter dated February 16, 2005, AECL requested further pre-application interactions with the staff. AECL's goal for Phase 3 of the pre-application review is to resolve long-lead issues identified in PASAR prior to the submittal of an application for DC of the ACR design.

In support of Phase 3 of the pre-application review, on July 7, 2005, NRC staff hosted two meetings; a public meeting and a closed meeting with AECL to discuss topical reports, "Advanced CANDU Reactor (ACR-700) Pressure Tube Integrity," and "Codes, Standards and Acceptance Criteria For ACR-700 Reactor Coolant Pressure Boundary (RCPB) and On-Line Fueling Components and Systems;" to provide clarification on areas needed to facilitate staff review.

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

The ACR design also has features that make it significantly different from operating CANDU reactors. The ACR uses light water as the coolant in the fuel channels, whereas operating CANDU reactors use heavy water. The ACR is designed to have a negative void reactivity coefficient so that if boiling occurs in the fuel channels, the reactor power will decrease. The negative void coefficient for ACR will 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.

Small Liquid-Metal Reactor for Galena, Alaska

The city of Galena, Alaska, has stated it is evaluating the possibility of building a small liquid-metal reactor to provide electrical power to the community. The reactor design being evaluated is the Toshiba 4S, which has an output of about 10 MWe (approximately 30 MWt). The reactor has a compact core design, with steel-clad metal-alloy fuel. The core design does not require refueling over the 30-year lifetime of the plant. A three-loop configuration is used: a primary system (sodium cooled), an intermediate sodium loop between the radioactive primary system and the steam generators, and the water loop used to generate steam for the turbine. The basic layout is a "pool" configuration with the pumps and intermediate heat exchanger inside the primary vessel. Toshiba has not yet sent a letter to NRC requesting to commence pre-application review of the 4S.

In SECY-05-0121, "Request to Consider Developing a Formal Tribal Consultation Protocol," dated July 7, 2005, the staff requested Commission direction on the Yukon River Inter-Tribal Watershed Council's (YRITWC) request for tribal government consultation on a government-to-government basis in the potential licensing of a nuclear reactor in Galena, Alaska. The YRITWC also extended an invitation to NRC to attend an August 2005 Bi-Annual Summit in Yukon, Canada, hosted by the YRITWC and Tr'on Hwech'in First Nation. The Commission's August 4, 2005, staff requirements memorandum (SRM) approved (1) the staff's recommendation to engage in consultation with the appropriate native American tribal governments which may be affected by the potential application for licensing of a nuclear reactor to be sited in Galena, Alaska, (2) institution of a tribal consultation team, and (3) supporting attendance at the August 2005 YRITWC Summit in Yukon, Canada. The Commission further directed the staff to share its plans and resource requirements for development and implementation of a more defined consultation process should the staff determine that such a process ought to be considered for future activities.

NRC staff from the Office of State and Tribal Programs (STP) and the Office of the General Counsel (OGC) attended the August summit, which hosted approximately 200 attendees representing 47 indigenous tribes and first nations, as well as representatives from Federal, State, and city governments and industrial and not-for-profit organizations. The NRC staff provided information to attendees on NRC's organization, roles and responsibilities, and an overview of the licensing process and post-licensing regulatory oversight. The NRC staff also heard concerns expressed by tribal members regarding the potential licensing of a nuclear reactor to be sited in Galena, Alaska.

The NRC staff plans to institute a tribal consultation team with representatives from STP, OGC, NRR, RES, and Region IV to consult with the recently formed Consultation Protocol Tribal Working Group (CPTW) to further understand tribal consultation interest as it relates to the proposed Galena reactor.

REGULATORY INFRASTRUCTURE

This section provides a status of the 10 CFR Part 52 rulemaking, construction inspection program (CIP) Development, COL issues, and other regulatory guidance for both light-water reactor (LWR) and non-LWR technologies. The discussion on regulatory guidance conveys the status, approach, and plans for updating and maintaining current and effective reactor guidance documents for staff and applicant use during licensing of new sites and new reactors as requested in the April 6, 2005, Commission meeting SRM, "Briefing on Status of New Site and Reactor Licensing," dated May 10, 2005.

10 CFR Part 52 Update

On November 3, 2005, the staff forwarded SECY-05-0203, "Revised Proposed Rule to Update 10 CFR Part 52, 'Licenses, Certifications, and Approvals for Nuclear Power Plants'" to the Commission. In SECY-05-0203, the staff recommended that the Commission approve publication in the *Federal Register* of a revised proposed revisions to 10 CFR Part 52 and to requirements in related sections of the regulations in Title 10 Chapter 1 that would withdraw and supersede the Commission's July 3, 2003 (68 FR 40026), proposed rule on 10 CFR Part 52. The revised proposed rule contains a rewrite of 10 CFR Part 52, as well as changes throughout the Commission's regulations to enhance NRC's regulatory effectiveness and efficiency in implementing the licensing and approval processes in Part 52 and to clarify the applicability of various requirements to each of the regulatory processes in Part 52 (i.e., ESP, standard design approval, standard DC, COL, and manufacturing license). This rulemaking is based on lessons learned during DC and ESP reviews and on discussions with stakeholders on the review processes. Also, in accordance with Commission direction in the December 19, 2005, SRM, "Briefing on the Status New Reactor Issues" the staff will schedule a workshop with stakeholders on the Part 52 rulemaking.

Construction Inspection Program Development

Inspection Manual Chapters (IMC) 2503, “ITAAC Inspections,” and IMC 2504, “Non-ITAAC Inspections,” required for detailed guidance on implementation of the inspection program applicable to new construction, are under continuing development. The Construction Inspection Development Team has issued IMC 2501, “Nuclear Reactor Inspection Program Early Site Permit,” and IMC 2502, “Pre-Combined License Phase.”

The issuance of IMC 2503 is subject to completion of the methodology for ITAAC inspection sample selection. For this ongoing effort, the CIP team is convening an expert panel consisting of NRC staff personnel having construction inspection experience, licensing experience, and risk analysis experience. The expert panel will prioritize the ITAAC for a design as a means of concentrating on those ITAAC where inspection activities can provide the greatest benefit. The issuance of IMC 2504 is pending a final resolution of issues related to treatment of operational programs in COL applications and licenses.

The CIP team continues to work with industry stakeholders by communicating with NEI to understand their schedules for new construction, including the degree to which they anticipate using modular plant construction. The CIP is using these insights to develop and coordinate NRC’s inspection program schedules with the construction process for most efficient utilization of staff inspection resources. A Commission paper is planned for second quarter CY 2007 to fully describe the CIP and how it will be implemented.

Combined License Issues

<u>Regulatory Treatment of Operational Programs in the COL Process (formerly Programmatic ITAAC)</u>

SECY-05-0197, “Review of Operational Programs in a Combined License Application and Generic Emergency Inspections, Tests, Analyses, and Acceptance Criteria,” was issued on October 28, 2005. This paper addresses the direction given in the SRM for SECY-04-0032, “Programmatic Information Needed for Approval of a Combined License Without Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC),” dated May 14, 2004. The Commission had directed the NRC staff to complete its work on the information necessary for the COL application for each of the programs for which the NRC staff had previously assumed ITAAC would be required (e.g., fire protection, training, quality assurance during operation, fitness for duty, access authorization, radiation protection, physical security, licensed operator, and reportability) and present its results to the Commission.

The NRC staff concluded that a COL applicant can fully describe all the operational programs and their implementation, which are required by regulation and that the staff expects to review in a COL application and inspect to verify their implementation, with the exception of emergency planning. Therefore, if these programs and their implementation are fully described in a COL application, they will not require ITAAC. The staff proposed that a COL include license conditions associated with implementation. The staff also proposed to allow using the standard review update effort currently undertaken by the staff to identify any additional operational programs to those discussed in the paper. The paper also proposed to allow the use of the generic emergency planning ITAAC included in SECY-05-0197 as the minimum set of ITAAC for emergency planning included in a COL application.

Emergency Planning ITAAC

The development of EP ITAAC, including resolution of EP ITAAC-related issues with industry and other stakeholders, was completed in November 2004. The EP ITAAC are an important aspect of licensing reactors under the new 10 CFR Part 52 process and were originally proposed in SECY-95-090, "Emergency Planning Under 10 CFR Part 52," dated April 11, 1995. EP ITAAC consisted of a few preliminary illustrative EP ITAAC, modeled after the planning standards in NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." The EP ITAAC present a first-of-a-kind example of programmatic ITAAC under 10 CFR Part 52 and reflect the collective efforts of NRC and DHS staff, industry, and other stakeholders and various lessons learned from previous DC reviews. The EP ITAAC are generic and will be tailored by each COL applicant to its specific reactor design and emergency planning program requirements.

On September 15, 2004, NEI sent the NRC staff a letter on its latest proposal for the remaining outstanding issues associated with EP ITAAC. The NRC staff and NEI held a public meeting on November 9, 2004, to discuss NEI's proposed EP ITAAC. As indicated above, the remaining outstanding EP ITAAC issues were resolved, and NRC staff provided a written response to the NEI letter on June 15, 2005, including a proposed final table of generic EP ITAAC. The table has been incorporated into NEI's draft guidance document NEI 04-01, Revision D, "Draft Industry Guideline for Combined License Applicants Under 10 CFR Part 52," which the NRC staff is currently reviewing for possible endorsement. The staff is currently considering including the EP ITAAC in the updated Standard Review Plan (NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants").

Regulatory Guides

NRC is reviewing NEI 04-01, Revision D. This industry document applies to a base-case scenario of a COL application referencing a certified design and an ESP. None of the COL applications submitted in the 2007-2008 timeframe will consist of such a COL application. In addition, during pre-application meetings, COL applicants are requesting meetings with the NRC to determine what information needs to be included in a COL application. Therefore, the NRC has decided to develop a COL application regulatory guide (RG) based on RG 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants." This RG will be applicable to all light-water reactor COL applications submitted under 10 CFR Part 52, whether referencing a certified design, an ESP, both, or neither. The publication of this RG will provide application guidance in a consistent and efficient manner. Final publication of the RG will be dependent on issuance of the final rule.

The NRC staff continues to engage NEI on NEI 04-01. NRC submitted 252 comments on NEI 04-01, Revision D, in 5 separate letters issued between June and August 2005. The staff also held 7 public meetings on NEI 04-01 between February and December 2005. By letter dated October 5, 2005, NEI submitted Revision E of NEI 04-01 to the NRC for consideration. The submittal contained the NEI COL Task Force's response to the 252 NRC comments on Revision D. NRC plans to review the resolution of NRC comments by the NEI COL task force and provide feedback to NEI. NRC will use the COL application regulatory guide as a potential

endorsement vehicle for NEI 04-01 should NEI request endorsement of the document. The development of this new guide will be done in parallel with the Standard Review Plan (SRP) effort.

With respect to other RGs, the staff has used the SRP reprioritization effort to identify specific RGs to update to support new site and reactor licensing. The offices are working together to establish schedules that support new reactor licensing needs.

Standard Review Plans

Within the context of the SRP update plan described in SECY-04-0144, "Maintaining a Current and Effective Set of Reactor Guidance Documents," dated August 9, 2004 the staff will have issued five SRP sections as final and two for public comment by January 31, 2006. Fifteen sections are within the concurrence process. The SRP update program was being performed with limited resources spanning over 5 years. As directed in the April 6, 2005, Commission meeting SRM, the staff has developed an SRP update plan which includes accelerated efforts to update the SRP to support new site and reactor licensing anticipated late in 2007 and 2008, an SRP prioritization system, and a publicly available SRP update schedule.

There have been several challenges to the current effort. These include competing priorities, staff experience with performing updates in general, as well as, in the context of 10 CFR Part 52, and the recent NRR reorganization. To address this, the staff has undertaken several actions. The staff reprioritized the SRP section updates to support new reactors. The staff has requested additional resources in the NRC budget for the next 2 fiscal years to support infrastructure development. The additional resources for FY 2006 were recently approved in NRC's most recent appropriations bill. In addition, the staff is making procedural enhancements to incorporate lessons learned from ongoing update efforts, such as standardized language to expand applicability of the SRP to prospective Part 52 licensing activities. Lastly, given the NRR reorganization, the staff is organizing the SRP by function, with organizational responsibility maintained separately from the SRP, itself.

With respect to prioritization, the staff identified three categories:

<u>Category 1: High Priority</u> Those SRP sections including new or existing sections providing guidance related to new reactor licensing (e.g., Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria Design Certification"); sections addressing operational programs; sections with inconsistent technical guidance; and site-specific sections addressed in Review Standard (RS)-002, "Processing Applications for Early Site Permits." This category includes most of industry recommended sections on operational programs. The staff identified 20 percent of the SRP sections within this category.

<u>Category 2: Medium Priority</u> Those SRP sections largely focus on design-related sections used in previous design certification reviews or will be exercised as part of the ESBWR review. These updates will ensure that the most up-to-date review guidance is available and represent knowledge management transfer for next generation staff. The staff identified 65 percent of the SRP sections within this category.

Category 3: Low Priority Those SRP sections which do not need to be updated during the 2-year period of time because they have been recently updated or are of low safety significance for the new evolutionary designs. The staff identified 15 percent of the SRP sections within this category.

The staff expects to complete all of the Category 1 SRP sections updated by December 2007. Since the Category 2 sections represent knowledge transfer and have been previously used during the DC review process, the staff identified a goal of having 70 percent of Category 2 sections updated by December 2007. The balance of these sections will be scheduled for completion in 2008. It is important to note that certain Category 1 and 2 sections are dependent on related activities (e.g., the update of SRP Section 13.6, "Physical Security," is dependent on ongoing efforts to revise 10 CFR Part 73). For these sections the staff has identified those dependencies and is reviewing those schedules for opportunities to provide the SRP updates.

The staff has and will continue to solicit public feedback on the schedule. This has been done through several public meetings with NEI regarding COL issues. The staff solicited NEI's input into SRP sections of interest. Their response (ML052970261) was factored into the current prioritization scheme. The staff has posted and will maintain the SRP schedule on its Web page http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0800. In addition, the staff will issue all SRP updates which contain new staff positions for public comment.

In October 1999, NRC issued NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," which subsumed NUREG-0555, "Environmental Standard Review Plans for the Environmental Review of Construction Permit Applications for Nuclear Power Plants." Volumes 1 and 2 to NUREG-1555 (ESRP) were incorporated by reference into RS-002. Based on experience gained from the initial ESP application reviews, changes in the electric power markets (related to benefits assessments), and changes in statutes and regulations, the staff will update selected sections of the ESRP. The staff will correspondingly update RS-002 and develop procedural guidance for the review of a COL application. (See discussion below on Office Instructions.)

In addition to updating the relevant portions of the environmental SRP, the staff will initiate a series of activities to resolve certain generic issues. These were previously deferred because of higher priorities. These activities include the update of the 10 CFR Part 51, Tables S-3 and S-4, Rulemaking Number (RN#) 116, PRM-51-01, an effort that was deferred to redirect technical assistance resources to higher priority license renewal reviews. The 10 CFR Parts 50, 51, and 52, alternative site review rule, RN# 313, was deferred (1) due to budgetary constraints, (2) the need to review the initial ESPs, and (3) to take advantage of the experience gained from the alternative site evaluations performed on the initial ESP reviews. There is no schedule for completion of these activities, however, COL application reviews can occur using application-specific analyses. The staff plans to reflect the updates and overall experience gained with ESPs and COLs in NRC RGs 4.2, "Standard Format and Content of Environmental Reports," and 4.7, "Reactor Site Criteria."

Office Instructions

RS-002, "Processing Applications For Early Site Permits," is related to new site licensing. The staff used RS-002 for the review of three initial ESP application reviews. The staff is currently converting RS-002 into an office instruction (OI), which will also incorporate lessons learned from these reviews. However, the technical information contained in the attachments to the RS will be subsumed into the corresponding SRP section updates, as applicable. The OI will be a matrix of applicable SRP sections. The SRP updates and conversion of RS-002 will be coordinated to prevent potential inconsistencies within the technical review guidance.

The staff will also develop additional OIs to perform COL application reviews under 10 CFR Part 52. This procedural guidance will address the possible combinations of a COL application (i.e., a COL application referencing an ESP, a certified design, both, or neither). The OIs will be developed following the development of the draft standard format and content guide, and will include opportunities for standardization of functional area reviews.

As identified above, there will be several opportunities for stakeholder input into the staff efforts to update and develop regulatory guidance necessary to implement Part 52. In addition, in accordance with Commission direction in the December 19, 2005, SRM, the staff will schedule a workshop with stakeholders on these plans, in support of licensing new sites and new reactors under Part 52.

Advanced Reactor Steering Committee (ARSC)

The ARSC, a joint NRR/RES management team, continues to review research activities associated with advanced reactor pre-application reviews, DC reviews, and advanced reactor research infrastructure development. The steering committee, with the support of a technical advisory group (TAG), reviews research activities necessary to support DC reviews, including the Agency's independent assessments of new reactor designs and the development of the technical bases for regulatory requirements. The steering committee plans, and prioritizes research activities related to new reactor licensing activities; aligns research activities with regulatory mission and licensing products; and develops NRR/RES concurrence on policy matters related to new reactor designs and research that supports the independent assessment of those designs. Recent ARSC meetings have focused on the PBMR pre-application review. Additionally, both charters for the ARSC and TAG were recently revised and reissued to clarify their interfacing activities and responsibilities, and to document the lessons learned and good practices that have developed since their establishment.

Advance Notice of Proposed Rulemaking (ANPR)

The SRM for SECY-05-0130, "Policy Issues Related to New Plant Licensing and Status of the Technology-Neutral Framework for New Plant Licensing," dated September 15, 2005, directed the staff to consider ACRS comments in developing a subsequent notation vote paper addressing the policy issues of level of safety and integrated risk. In addition, the Commission directed the staff to expeditiously develop an Advance Notice of Proposed Rulemaking (ANPR) to consider the spectrum of issues relating to risk-informing the reactor requirements, and that the formal program to risk-inform Part 50, as well as other related risk-informed efforts, should be incorporated into this ANPR. The Commission also directed that safety, security, and preparedness be integrated throughout this effort. The staff's activities to develop this

regulatory structure for new reactor licensing, which includes development of the technology-neutral framework that is a major task in this program plan, is discussed in the ANPR. SECY-06-0007, "Staff Plan to Make a Risk-Informed and Performance-Based Revision to Part 50," dated January 9, 2006, provides the staff's recommended ANPR and program plan. It also provides the basis for the staff's recommendation on the two policy issues regarding the level of safety and integrated risk.

High-Temperature Gas-Cooled Reactor Knowledge Management

The NRC staff's high-temperature gas-cooled reactor (HTGR) knowledge management (KM) efforts involve maintaining and updating the NRC staff's cognizance of domestic and international developments in safety-related aspects of HTGR technology, ensuring that the HTGR analysis tools developed are documented and retrievable for future use by the NRC staff, and preserving and transferring the knowledge gained from the NRC staff's earlier efforts on HTGR technology. An HTGR KM plan has been developed and is being implemented. The near-term objective of the plan is to develop HTGR information sources. The plan includes capturing critical internal and external HTGR information and establishing the capability to make the appropriate information available to cognizant NRC staff when and where it may be needed. The initial effort involves identification of domestic and international HTGR experts; HTGR technology information sources, including analytical tools, experimental data, analysis results, and national and international groups; and external meetings focused on HTGR technical information exchange. These initial efforts also address HTGR information taxonomy development, and identification of NRC HTGR knowledge gaps.

An assessment report for Phase I activities was completed and the results of the assessment are being used by the Offices of Human Resources (HR) and Nuclear Material Safety and Safeguards (NMSS) as a guide for successfully implementing virtual communities of practice. Phase II of the HTGR KM projects includes development of training materials and application scenarios, expansion of the scope of the knowledge capture, and increased staff support for sharing knowledge in a virtual environment. Those activities directly support ongoing PBMR pre-application review, new employee training, and HTGR infrastructure planning.

As part of a larger agencywide KM project, RES has developed a Web portal http://nrc.tomoye.com where information can be shared to facilitate current work assignments and knowledge transfer between expert and journeyman staff. An online HTGR Community of Practice has been formed among NRC staff who are currently being trained to use NRC's Knowledge Center.

In addition, to support the development of information sources, the staff has attended several domestic and international meetings on gas-cooled reactor technology. The most recent meetings were for International Atomic Energy Agency Cooperative Research Projects 5 and 6 on "Evaluation of HTGR Performance" (CRP-5, September 5-9, 2005) and "Conservation and Application of HTGR Technology: Advances in HTGR Fuel Technology" (CRP-6, October 17-21, 2005). The continuing objectives of CRP-5 are to develop and evaluate code-to-experiment and code-to-code benchmarks for the neutronic and thermal-hydraulic analysis of pebble-bed and block-type HTGRs. Such benchmarks would be used to qualify and assess the staff's audit analysis codes and evaluate safety-related analysis issues for future high-temperature reactor licensing reviews. The objectives of CRP-6 are to document the results of ongoing and planned international research and development related to HTGR fuel

fabrication; fuel characterization and advanced quality control techniques; operational fuel performance monitoring techniques; planned and completed fuel irradiation testing; fuel accident condition testing; results and insights of code-to-code and code-to-data operational benchmark analyses and accident-condition benchmark analyses; spent fuel management; and national regulator safety perspectives related to HTGR fuel technology research and development activities.

Finally, the HTGR KM program has incorporated the October 2005 version of a new American Society for Testing and Materials (ASTM) Standard Specification for Nuclear Graphite, an effort that was instigated and supported by earlier NRC co-sponsored work at the Oak Ridge National Laboratory.

Human Factors Research

In April 2005, the NRC staff issued a technical letter report, “Insights into the Role of the Operator in Advanced Reactor Systems.” In it, the staff presented a program of future research on human factors in new reactors. The program will address the effects of automation on personnel performance, operations under degraded instrumentation and control and human-system interface conditions, staffing analysis methods and tools, advanced design and evaluation methods, and research facilities.

RES is studying the above issues, which will result in proposed review guidance for the licensing of the new technologies. Many of the issues and the related guidance will be reactor technology neutral, but RES is developing reactor-specific plans within the framework. Other issues and insights identified have been omitted from the currently planned work because of their relationship to safety versus efficiency, perceived priority, and facility or resource availability. RES is preparing a NUREG/CR that will incorporate enhancements to the plans identified through further research and consultation with the new reactor and human factors community. Omitted issues may need to be pursued later or by other entities (e.g., DOE, Electric Power Research Institute (EPRI), vendors, or the international community).

In a related effort, the NRC staff observes meetings of the EPRI/Utility Hybrid Human System Interface Working Group. This group meets periodically to evaluate the industry’s need for additional guidance and research in the area of digital system upgrades for present nuclear power plants (NPPs) and future advanced reactors. As a result of input from this group, EPRI published “Human Factors Guidance for Hybrid Control Room and Digital Human-System Interface Design and Modification,” November 2004. EPRI is continuing to update these guidelines to incorporate expanded issues such as design of control stations outside of the control room and more on personnel interaction with automation. These guidelines could also serve as a basis for future guidance for new reactors. The NRC staff is also reviewing NEI guidance for the industry on developing applications for new reactors, including guidance on human factors topics.

The Committee on the Safety of Nuclear Installations Special Experts Group on Human and Organizational Factors, in cooperation with the Organization for Economic Cooperation and Development Halden Reactor project is planning an international workshop in Halden, Norway, on “Future Control Station Designs and Human Performance Issues in Nuclear Power Plants,” May 8–10, 2006. RES staff will be participating in the workshop, which will help focus international research efforts in this area.

In July 2005, the NRC staff also published the final version of NUREG-1791, “Guidance for Assessing Exemption Requests From Nuclear Power Plant Licensed Operator Staffing Requirements Specified in 10 CFR 50.54(m),” after public comments were incorporated into the draft published in 2004 along with NUREG/CR-6838, “Technical Basis for Regulatory Guidance for Assessing Exemption Requests from Nuclear Power Plant Licensed Operator Staffing Requirements Specified in 10 CFR 50.54(m).”

Structural and Seismic Accomplishments

RES is sponsoring a research program at Brookhaven National Laboratory (BNL) to develop a technical basis for the safety evaluation of deeply embedded and/or buried (DEB) structures proposed for advanced reactor designs (e.g., PBMR, GTMHR). 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 GTMHR new reactor designs submitted to NRC for preliminary review, the entire reactor building and much of the steam 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. A final NUREG/CR report that describes BNL’s research is under staff review and is expected to be published by the end of March 2006.

To obtain data and gain knowledge from research performed outside the United States, RES concluded negotiations in early FY 2005 on a cooperative agreement with Japan Nuclear Energy Safety Organization (JNES) in the area of seismic engineering. The RES staff participated in a planning meeting with JNES in August 2005.

Codes and Standards Development

On June 8–9, September 26–27, and November 16–17, 2005, RES continued its participation in the quarterly meetings of the American Nuclear Society (ANS) 28 Subcommittee. The purpose of the ANS 28 Subcommittee is to prepare an ANS safety standard for modular HTGRs (i.e., “Nuclear Safety Criteria for the Design of Modular Helium-Cooled Reactor Plants”). The objective of the standard is to establish the nuclear safety criteria, functional performance, and design requirements of structures, systems, and components (SSCs) of modular gas reactor (MGR) plants consistent with established risk objectives. The NRC is participating on the subcommittee to provide input to the development of the standard in a way that maximizes its compatibility with the regulatory structure for new plant licensing proposed in NUREG 3-2005, “Regulatory Structure for New Plant Licensing, Part I: Technology-Neutral Framework.” A major focus of the most recent meetings was the development of risk-informed acceptance criteria and a risk-informed process for selecting events to be considered in the safety assessment of HTGR designs. The ANS 28 Subcommittee working group now expects the first complete draft of the safety standard to be completed during CY 2006.

The staff continued its participation at the annual meetings of the international nuclear graphite specialists. The sixth such meeting (INGSM-6) was held during September 18–21, 2005. The staff, as a member, also attended the American Society of Mechanical Engineers Boiler

and Pressure Vessel (ASME B&PV) Code Sec III, Project Team meeting on Graphite Core Components, during September 22–23, 2005. The objective of the project team is to write ASME design codes and standards for graphite moderators used in gas-cooled reactors.

With staff participation, an ASTM consensus material specification standard has been developed for near-isotropic and isotropic nuclear graphite. The standard was developed with the collaboration of representatives from Japan, China, the United Kingdom, Germany, the Netherlands, France, South Africa, and the United States. Participants included representatives of nuclear graphite manufacturers, reactor designers, reactor operators, and regulators. The standard is expected to be published in 2006 and will be used in the ASME design code for graphite moderators.

ADDITIONAL STAKEHOLDER INTERACTIONS

Department of Energy

DOE is initiating a rulemaking to implement Section 638 of the Energy Policy Act of 2005. This rulemaking will provide standby support (risk insurance) for certain nuclear power plant delays. NRC is assisting DOE in its rulemaking and participated in a workshop that DOE hosted on December 15, 2005.

The Energy Policy Act of 2005, Section 641 provides that the Secretary of DOE, shall establish a project know as the “Next Generation Nuclear Plant Project.” The NGNP Project consists of research, development design, construction, licensing and operation of a prototype plant, including a very high temperature reactor, that can be used to generate electricity and/or hydrogen. Section 644(a) of the Energy Policy Act of 2005 provides that the NRC shall have licensing and regulatory authority for any reactor authorized under Sections 641-645 of the Act. Under Section 644(b) of the Act, the Secretary of DOE and the Chairman of the NRC are required to develop and jointly submit a licensing strategy for the prototype nuclear reactor within 3 years of the date of the law’s enactment (August 7, 2008).

On November 30, 2005, staff representatives from the NRC and DOE held informal initial discussions on NGNP project plans and schedule, including development of a joint licensing strategy, coordination between NRC and DOE, future interactions and resources. The NRC staff is preparing an initial draft of a proposed NRC/DOE memorandum of understanding (MOU) for the development and documentation of the joint NGNP licensing strategy. The MOU will establish the framework for interactions between NRC and DOE for the development and documentation of the NGNP licensing strategy, NRC and DOE organizational responsibilities, interaction process and schedule, planned work products and funding.

Multinational Design Approval Program (MDAP)

The MDAP is intended to increase the degree of international cooperation in review of advanced reactor designs. In a September 8, 2005, staff requirements memorandum, the Commission approved moving forward with Stage 1 of the MDAP, where NRC and its counterparts in other countries interested in participating in the program will determine working arrangements for cooperation in DC reviews. The DC process described by 10 CFR Part 52 will remain the regulatory framework for these efforts, with participating regulatory authorities acting as expert consultants. The NRC staff will remain responsible for regulatory decisions

and recommendations concerning reactor design certifications, incorporating technical input from their foreign counterparts, as appropriate. A detailed evaluation of the input provided by the foreign regulators will be performed prior to the staff using the information in its design review.

The NRC Chairman discussed the MDAP at an International Atomic Energy Agency meeting in September 2005. Subsequently, NRC has contacted its regulatory counterparts in Finland and France, who have agreed to participate in Stage 1 of the program. The NRC and its counterparts have held a number of discussions and letters of intent have been exchanged. As discussed above, it is expected that the MDAP will be applied first to the EPR design. The NRC staff has begun working-level discussions with their foreign counterparts to identify subject areas for cooperation. The staff expects that these discussions will address both DC topics and other issues. In the near future, the NRC staff will be meeting with their counterparts in France and in Finland to work out the areas of cooperation for that review.

Hiring and Training Strategies

January 2006

INTRODUCTION

During the Fiscal Year (FY) 2007 budget process, the Commission directed the staff to provide an implementation plan with major milestones that concisely describes how the staff intends to identify, hire, and train new staff with the necessary talent and expertise and provide the infrastructure, including adequate office space, that will be needed to support the review of multiple applications. The largest increase in new staff will be in the Office of Nuclear Reactor Regulation (NRR). However, this growth for new reactor licensing activities has large impacts on several other offices. The Office of Human Resources (OHR), the Office of Administration (ADM), the Office of the General Counsel (OGC), the Office of Nuclear Regulatory Research (RES), the Office of Nuclear Security and Incident Response (NSIR), and the Office of Information Services (OIS) have vital roles in the success of new reactor licensing. This enclosure describes how the U.S. Nuclear Regulatory Commission (NRC) staff is working cooperatively to hire, train, and support new employees.

IDENTIFYING NECESSARY TALENT AND EXPERTISE

NRR has identified, for FY 2006, the positions and expertise needed for near-term activities and is working to identify the positions and expertise needed to meet the projected workload demands for new reactor licensing activities in FY 2007 and beyond. To address these staffing and hiring challenges and ensure continuous progress on staffing challenges, NRR managers and the Human Resources Services and Operations (HRSO) team leader, servicing NRR, meet twice per month in two office-level meetings: a monthly Human Capital meeting and a Hiring and Recruitment meeting. For example, management decided in the monthly Human Capital meeting to expand the upcoming class size from 14 to 28 participants for the NRR Nuclear Safety Professional Development Program (NSPDP). Additionally, the recently established New Reactor Infrastructure Planning Branch (NRPB) is performing an assessment of the new reactor licensing activities and the areas of expertise that are needed to meet the increased demand. The impact of the NRR staffing increases will be reflected in the budget adjustment proposals for FY 2007 and FY 2008.

RECRUITMENT AND HIRING PROCESS

To meet the demands of hiring new employees and to address the need for more experienced individuals, the staff identified the need to expand its recruitment activities and streamline the NRR hiring process. As a long standing practice, NRR actively participates in OHR-sponsored recruitment of NSPDP at targeted universities with a history of graduating technically strong, diverse candidates. NRR expanded its recruitment activities at professional society conferences and career fairs, including the Federal Asian Pacific American Council, the Society of Women Engineers, the Society of Hispanic Professional Engineers, the American Indian Science and Engineering Society, and the National Society of Black Engineers. OHR is working with NRR to expand advertising in trade journals and on Web sites to attract

professionals in specialized technical disciplines and in local newspapers around the country where technical engineers and scientists may be interested in re-locating due to job cutbacks in their areas. NRR, in partnership with OHR, continues to evaluate job markets and professional conferences in various geographical locations to determine if advertising or recruitment activities would attract candidates with the skills and knowledge needed by the Agency. Since August 2005, OHR has made arrangements to conduct special recruiting events, including the Service Academy Career Conference in San Diego, an open house at Savannah River, and the POWER-GEN international trade show.

In addition to improving the hiring process, the HRSO group in OHR is evaluating and improving recruitment strategies to attract highlyqualified candidates to the Agency. The staff has revised the generic open vacancy announcement for mid-career engineers and scientists to provide additional flexibilities to offer relocation and recruitment incentives. Additionally, the staff has streamlined the request and approval process for a standard incentive (i.e., a cash incentive for a pre-determined percentage of the offered salary). In the improved process, a standard template was created for the request for approval of an incentive and a possible 2-week hold on requests for the bi-monthly meeting was eliminated. The NRC staff is also creating the policy of offering referral awards. The referral award provides employees with a monetary “thank you” if candidates they refer to the Agency are hired. Finally, the NRC staff has requested direct hire authority for the Agency from the Office of Personnel Management (OPM) for any critical need area, which will improve our ability to quickly extend good candidates a job offer.

NRR will experience the largest growth in the Agency due to the new reactor licensing activities. In response to the need to hire a large number of new engineers, scientists, and other support staff, NRR created a hiring team in late August 2005. The team consists of two recent senior executive service candidate development program graduates, one senior level system employee, the human capital initiative advisor, and a dedicated NRR human resources expert. This NRR hiring team analyzed the hiring process to identify areas to improve the timeliness of the hiring process. As a result, the process was streamlined to decrease the amount of time to (1) evaluate and identify qualified candidates for interviewing, (2) schedule the interviews, (3) perform the reference checks, (4) perform the interviews, and (5) extend an offer. These efficiencies were realized by (1) using a member of the hiring team to serve as the rating official, (2) performing an early screening during the initial rating to match the branches skill needs with the candidates’ experience and education, (3) relying on designated human capital representatives for each division to act as the point of contact with the hiring team for coordinating the review of candidate application packages and making hiring decisions, and (4) using the NRR human resources expert to schedule the interviews, arrange travel, and perform the reference checks. These efficiencies have decreased the time between receiving eligible candidates from OHR and the NRC extending an offer. Additionally, by alleviating some of the hiring process activities from the supervisors and managers, such as performing the reference checks, the impact on their time has decreased. As of mid-January 2006, NRR has selected 84 employees in both technical and support areas. In order to accommodate the headquarters projected growth in staff, the staff is exploring various options to address the existing space shortage in the White Flint Complex. The status of the staff’s actions were addressed in a January 20, 2006, memorandum to the Commission. Provided below is a table with activities in the hiring plan for NRR employees.

Hiring Plan for NRR employees				
	Task	**Target Date**	**Status**	**Responsible group**
1	Create an NRR Hiring Team to lead the Office in recruitment and hiring	Jul 2005	completed	NRR/ PMAS
2	Analyze and streamline the hiring process	Aug 2005	completed	NRR Hiring Team
3	Designate managers to be division human capital representatives to coordinate the review of candidates and make hiring decisions	Jul & Oct. (re-org) 2005	completed	NRR management
4	Approve overhires for projected knowledge and skill needs	Jul 2005	completed and as-needed	NRR management
5	Create a tracking system and charts for tracking candidates in the hiring process	Sep 2005	completed; updates are on-going	NRR/ PMAS
6	Review the existing recruitment locations and identify events and locations for additional recruitment events	Sep 2005	initial review completed; on-going	NRR/PMAS
7	Identify NRR-specific needs using the existing vacancy announcement	Oct 2005	completed	OHR/HRSO & NRR/PMAS
8	Identify opportunities and create advertisements for targeted advertising in local newspapers as well as national publications, trade journals, etc.	Sep 2005	initial completed, on-going as needed	OHR/HRSO & NRR/PMAS
9	Create a generic vacancy for reactor-related engineering and scientific fields	Dec 2005	completed, closes Feb 6 2006, then periodically	OHR/HRSO & NRR/PMAS
10	Solicit and encourage the current staff to recruit and provide potential candidate information and recruitment locations to the Team through Office Director's "Have I Got News for You" and through managers and supervisors.	Jul 2005	completed	NRR/PMAS with NRR Communications Advisor

Hiring Plan for NRR employees				
	Task	**Target Date**	**Status**	**Responsible group**
11	Allow for an increase the next class of NSPDPs	Oct 2005	completed	NRR human capital (HC) management representatives
12	Evaluate and improve recruitment and hiring strategies, including: • revise the generic open vacancy announcement for mid-career engineers and scientists to provide additional flexibilities to offer relocation and recruitment incentives. • streamline the request and approval process for a standard incentive (i.e., a cash incentive for a pre-determined percentage of the offered salary) • create NRC policy for a referral award program • request to OPM for direct hire authority	 Sep 2005 Sep 2005 draft - Sep 2005 final - Feb 2006 Jan 2006	 completed completed completed in progress in progress	OHR/HRSO
13	Hold NRR monthly HC meetings to discuss staffing challenges	monthly	on-going	NRR HC management representatives & HRSO team leader
14	Hold NRR monthly hiring and recruitment meetings to discuss hiring issues and to supplement monthly HC meetings	monthly	on-going as needed	NRR HC management representatives & HRSO team leader

Finally, while NRR continues to focus on recruiting new staff as the principal vehicle for preparing for the challenges of the future, it also is utilizing other staffing options to bridge the gap while new employees are being brought on board. Most notably, dual compensation waivers or re-employed annuitants are being used when no other reasonable staffing option exists to accomplish mission critical tasks. Approximately ten individuals are currently being used for their unique or specialized skills in a variety of tasks such as development of a construction inspection program, inspection support, and safety culture, as well a significant

knowledge management/knowledge transfer activities such as completion of Standard Review Plan sections as well as mentoring and training of new staff.

TRAINING AND KNOWLEDGE MANAGEMENT/TRANSFER

The rapid integration and training of a large number of new employees into the Agency is a significant challenge but is essential for the Agency's and the employees' future success and productivity. To address this, the staff is utilizing and expanding the use of existing training tools, including mentoring, on-the-job-training, formal classroom and on-line training, and self-study activities. The training plan is provided below.

To assist new employees in their adjustment to the Agency, an "NRR New Employee Orientation and Training Guide" has been developed and is being implemented. This guide is designed to be a follow-on to the NRC New Employee Orientation to assist NRR employees in becoming familiar with the generic NRC employee processes and policies (e.g., ethics, Groupwise, Time & Labor) and regulatory processes and policies (e.g., allegations, licensing, risk assessment). The guide includes training courses, reading assignments and self-study activities. Additionally, new employees will be assigned a "docent" that will be a peer, typically from their branch, to assist the new employee in adjusting to the Agency. Additionally, position-specific training is expected to accompany the generic training in the "NRR New Employee Orientation and Training Guide." The staff is continuing to develop its qualification plans or other position-specific training. For example, the Division of Operating Reactor Licensing (DRL) has a qualification program for project engineers/managers.

Training the new employees will increase the need for courses held at the Technical Training Center (TTC) and Professional Development Center (PDC). The staff is beginning the process of job task analysis (JTA) and, based on the skill sets developed, the staff will examine pre-existing training to identify course work that either 1) provides the necessary training, 2) provides a degree of the necessary training and can be modified to meet a greater degree of the need(s) identified in the JTA, or 3) needs to be developed specifically to support the skill sets identified in the JTA. The staff is evaluating the best means to accomplish this activity, including using in-house staff, contracted staff, or a combination of these. The staff is also identifying the immediate needs for additional sessions of existing courses that will be in greater demand to support the training of new employees this year. Finally, when the PDC is moved to a new location, it will be equipped with training aids similar to the TTC. As a result, more courses can be offered at Headquarters. This will save on travel funds and time away from the office for participants.

Additionally, for succession planning and knowledge management in critical skills and knowledge areas, supervisors and managers have been provided a new tool. The staff created a new supervisor's tool in the Strategic Workforce Planning (SWP) system to assist in identifying skill gaps and managing succession planning and knowledge transfer. Using the skill categories and the needs assessment already existing in SWP, supervisors can view a Staff and Critical Skill Matrix. The Staff and Critical Skill Matrix is a table that displays the branch employee's level of expertise in each of the most critical skills identified by the branch chief. By identifying potential skill gaps, supervisors can make more informed decisions when assigning work, and can identify skill areas for individual employee development. Additionally, the staff revised the external training (training requested with Form 368) criteria to give priority

to areas that are identified skill gaps and have been identified by supervisors in SWP to be critical to fulfill our mission. Skill and knowledge areas that have been identified as a potential skill gap receive the highest priority (Priority 1) rating for external training.

Training Plan				
	Task	**Target Date**	**Status**	**Responsible Group**
1	Develop "NRR New Employee Orientation and Training Guide"	Dec 2005	completed	NRR/PMAS
2	Conduct a New Reactor Licensing Process seminar	Dec 2005	completed	NRR/DNRL
3	Identify training needs for new employees and to support new reactor licensing process	Feb 2006	on-going	OHR/HRTD & NRR/DNRL & NRR/PMAS
4	Assess existing training based on needs assessment	2 Qtr FY 2006		OHR/HRTD
5	Develop training or modify existing training	3 Qtr FY 2006		OHR/HRTD
6	Fill the administrative lead position for assisting new NRR employees, coordinating office seminars, and tracking the completion of new employee training	Feb 2006	solicitation issued	NRR/PMAS

INFRASTRUCTURE

The recent NRR reorganization was a major change in infrastructure. The reorganization was designed, in part, to prepare for and discharge the increase in the new reactor licensing workload and reduce a layer of executive management to allow an increase in the number of first-line supervisors. The organizational structure was created based on projected growth for FY 2006 and FY 2007 to prepare for the expected FY 2008 new reactor workload. The number of supervisory GG-15 positions was increased to achieve improved staff oversight at the first-line supervisory level.

As planning for new reactor licensing progresses, the staff is working to identify means to perform licensing activities more efficiently and effectively. For example, the staff identified the need for a better process for capturing e-mail records. The current process for identifying and capturing e-mail records is totally dependent upon staff actions. With the anticipated increase in the volume of e-mail records associated with new reactor license applications, the burden to identify and capture e-mail records could become quite resource intensive. OIS' systems development and records management staff are working with the NRR staff to identify NRR's requirements and explore options for capturing e-mail records using state-of-the-art software to determine the record value of e-mail messages and attachments and file them in their appropriate record keeping systems. The e-mail records management software will

preclude/minimize the need for staff involvement in determining the record value of e-mail and in moving identified records to their appropriate official repository, for example, the Agencywide Documents Access and Management System (ADAMS), for retention in accordance with established records disposition authorities. This initiative will require establishing rules that will enable the software to catalog and file records in their appropriate repositories. It will greatly improve the integrity of the documentation for the NRR new reactor license case files and will greatly increase the number and percentage of e-mail records that are captured and preserved as official Agency records. This application will be piloted with the NRR new reactor license activities during the FY 2006/2007 time frame and later will be expanded as an enterprise-wide application.

SUMMARY

The NRC staff is working closely together to aggressively meet the demand required for the recruitment, hiring, training, and support of new engineers, scientists, and other support staff. Recruitment efforts have expanded to target experienced professionals, as well as expanding the NSPDP for next year. Additional recruitment incentives and hiring strategies are being pursued and offered. Efficiencies in the hiring process have been identified and are in place to decrease the time for the hiring process and the burden on the supervisors. The staff continues to assess the need for additional positions for engineers, scientists, and support staff necessary to support new reactor licensing activities. The NRC Orientation Training and “NRR New Employee Orientation and Training Guide” will assist employees in adjusting to Agency policies and procedures in a timely manner. A job task analysis is being conducted to assess the increased training needs for new employees. NRR is currently hiring staff to meet the projected full-time equivalent (FTE) for FY 2007: however, FY 2006 FTE utilization will not be exceeded. The impact of the NRR staffing increases will be reflected in the budget adjustments for FY 2007 and FY 2008. As of mid-January 2006, NRR has selected 84 employees in both technical and support areas. The staff is dedicated to working together to meet the challenge of recruiting, hiring, training and integrating new employees into the Agency with the necessary infrastructure to support our activities.