

March 4, 2002

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

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

SUBJECT: STATUS UPDATE ON POWER UPRATE REVIEWS

PURPOSE:

SECY-01-0124, "Power Uprate Application Reviews," dated July 9, 2001, provided a status report on power uprate amendments. Since then, the staff has undertaken and completed several activities associated with power uprates. This memorandum summarizes the staff's accomplishments and provides an update on the status of power uprate applications to keep the Commission informed of ongoing activities in this area. This memorandum also discusses the staff's plans for addressing two issues raised by the Advisory Committee on Reactor Safeguards (ACRS) as a result of the reviews of the extended power uprates (EPUs) for the Duane Arnold Energy Center (DAEC) and the Dresden and Quad Cities Nuclear Power Stations. The issues are the adequacy of the staff's documentation of its reviews in the associated safety evaluations (SEs) and the need for a Standard Review Plan (SRP) section for power uprates. The staff will continue to keep the Commission informed of the status of power uprate reviews by providing updates to the Chairman's Tasking Memorandum (CTM), Director's Highlights, and other means. The staff will also provide updates on power uprates to the Commission semiannually, as directed in a staff requirements memorandum dated February 8, 2002.

BACKGROUND

Power uprates can be classified in three categories: (1) measurement uncertainty recapture (MUR) power uprates, (2) stretch power uprates, and (3) EPUs. MUR power uprates are less than 2 percent and are achieved by implementing enhanced techniques for calculating reactor power. This involves the use of state-of-the-art feedwater flow measurement devices that reduce the degree of uncertainty associated with feedwater flow measurement and in turn provide for a more accurate calculation of power. Stretch power uprates are typically on the order of 7 percent and usually involve changes to instrumentation setpoints. Stretch power uprates do not generally involve major plant modifications. In some limited cases where plant

CONTACT: Mohammed A. Shuaibi, NRR
(301) 415-2859

equipment was operated near capacity prior to the power uprate, more substantial changes may be required. EPU's are usually greater than stretch power uprates and have been submitted for increases as high as 20 percent. EPU's usually require significant modifications to major balance-of-plant equipment such as the high pressure turbines, condensate pumps and motors, main generators, and/or transformers.

ACCOMPLISHMENTS:

Since 1977, the staff has completed reviews of 72 power uprate applications, resulting in a combined increase of approximately 9800 megawatts thermal (MWt) or 3250 megawatts electric (MWe) in the power levels at the affected plants. This increase is about the same as the power from three nuclear power plant units. In calendar year 2001, the staff completed reviews of 22 power uprate applications, resulting in a combined increase of over 3300 MWt or about 1100 MWe (see Table 1, "Power Uprates Approved in 2001" (Attachment 1)).

The staff has completed improvement efforts related to the application and review processes for MUR power uprates. The staff evaluated the application and review processes and concluded that (1) the efforts being expended by the staff for reviewing MUR power uprate applications are too high for the small risk associated with these uprates and (2) guidance on the staff's information needs for reviewing MUR power uprate applications could improve the staff's effectiveness and efficiency in performing technical reviews. The staff developed draft guidance to address these findings and held a public workshop on August 23, 2001, with interested stakeholders. The staff issued a summary of the public workshop on September 21, 2001. The staff finalized the guidance and issued it via Regulatory Issue Summary (RIS) 2002-03, "Guidance on the Content of Measurement Uncertainty Recapture Power Uprate Applications," dated January 31, 2002. During its review of applications that will be submitted in accordance with the RIS guidance, the staff expects that the need for requests for additional information will be minimized and the reviews will be more effective and efficient.

The staff developed and launched an internet Web site for power uprates for use by internal and external stakeholders. The Web site provides the status of present and future power uprate applications and describes the staff's information needs for conducting timely power uprate reviews. The web site also has a link to the template SEs used by the staff for reviewing EPU's (i.e., the Monticello power uprate SE for boiling-water reactor (BWR) plants and the Farley power uprate SE for pressurized-water reactor (PWR) plants). The staff implemented the use of the Monticello and Farley SEs as templates to address findings made by the Maine Yankee Lessons Learned Task Force. The Web site provides a convenient way of keeping stakeholders informed of activities related to power uprates. The web site has been temporarily removed from the external server as part of the Agency's response to the events of September 11, 2001. The staff plans to release the site to the public as part of the phased implementation of the NRC Web redesign initiative.

The staff completed its review of the first-of-a-kind EPU applications for DAEC, Dresden, and Quad Cities. These reviews required extensive technical review and the completion of these reviews is a major accomplishment for the staff. These applications represented the largest increases in power level sought via a power uprate amendment to date. The staff's reviews of these applications were completed within 1 year of the dates of their submission, consistent with the Agency's performance goals and the Commission's expressed expectation that these applications be processed as high-priority licensing actions.

The staff met with Westinghouse Electric Company representatives on July 26, 2001, to discuss the company's past experience and future plans related to power uprates. During this meeting, the Westinghouse representatives indicated that EPU's of 10 to 20 percent were being considered for PWR plants. Such uprates would require significant balance-of-plant modifications similar to those implemented at BWR plants for large EPU's.

The staff has kept the Commission informed of the status of power uprate reviews by monthly updates to the CTM, Director's Highlights, and other means. The staff has applied the Planning, Budgeting, and Performance Management process to ensure that sufficient resources are available to perform power uprate reviews in a way that best serves the Agency's performance goals, which includes preventing unnecessary delays in licensees' plans. The staff has also adopted enhanced management oversight by assigning a Senior Executive Service manager to be responsible for all aspects of the power uprate licensing process. The staff has developed and implemented a communication plan to inform external stakeholders of the completion of each EPU application review. The staff has informed external stakeholders about power uprates via RISs, ACRS public briefings, public workshops, *Federal Register* notices, and press releases.

ONGOING ACTIVITIES:

The staff is currently reviewing 12 power uprate applications (7 MUR power uprates, 1 stretch power uprate, and 4 EPU's) (see Table 2, "Power Uprate Applications Currently Under Staff Review" (Attachment 2)). The staff is also reviewing two General Electric Nuclear Energy (GENE) topical reports: one for MUR power uprates and one for EPU's. The staff has assigned these reviews a high priority and sufficient resources are allocated to complete these reviews in accordance with established schedules. Based on a survey the staff conducted in January 2002, the staff expects to receive 38 power uprate applications in the next 5 years -- 23 for MUR power uprates and 14 for EPU's. One licensee did not provide a magnitude for the expected uprate (see Table 3, "Expected Power Uprate Applications" (Attachment 3)). In addition to the power uprates reported in response to the survey, the staff expects significant interest by PWR licensees in large power uprates as a result of the ongoing work by PWR vendors.

The staff is evaluating the application and review processes for EPU's to identify areas for improvement. The staff will hold a lessons learned public workshop on March 19, 2002, to discuss lessons learned from the recently completed EPU reviews. The workshop will include lessons learned from the ongoing reviews of EPU applications for the Clinton, ANO-2, and Brunswick plants, and the GENE topical report for EPU's. Following the workshop, the staff will explore options for implementing improvements (e.g., issuing a lessons learned report or developing additional guidance for EPU's).

CHALLENGES:

Documentation of Reviews

As a result of reviewing the EPU applications for DAEC, Dresden, and Quad Cities, the ACRS has raised concerns related to the staff's documentation of the reviews in the associated SEs. In a separate matter, the Office of the Inspector General (OIG) conducted an audit of the Office of Nuclear Reactor Regulation's (NRR's) SE process and concluded that while the quality of the

staff's technical reviews has been adequate, the staff did not always clearly document all of the steps in its decisionmaking process. The ACRS and OIG comments are also consistent with the results of self-assessments performed by the staff that identified documentation as an area for improvement. The issues raised by the ACRS and OIG are primarily associated with the documentation of the staff's reviews rather than the thoroughness or technical adequacy of the reviews.

The staff considers the documentation of reviews one of its most important activities since the documentation provides the technical, safety, and legal bases for accepting a proposed licensing action. The staff acknowledges that the documentation of its review efforts can be enhanced to better reflect the staff's review. In the response to the OIG audit, the staff committed to a long-term broad review of agency documentation practices, including those related to SEs. The staff will modify office-level guidance documents where necessary to clarify requirements and expectations and ensure that the staff's decisionmaking process is appropriately documented. To the extent that staff review efforts may provide insights on ways to enhance processes throughout the agency, those will be addressed by each office. In addition to the above actions, the staff will also address the quality of SEs as part of the NRR Integrated Quality Plan.

As an interim measure, NRR initially provided its staff with a worksheet for use during the review of license amendment applications. The worksheet and associated guidance were then incorporated into NRR Office Instruction LIC-101, "License Amendment Review Procedures." In addition, NRR will expand the worksheet to include comment sections for the various steps outlined in the worksheet to indicate what actions were taken at specific steps in the license amendment process.

In the area of power uprates, the staff is currently reviewing a GENE topical report for EPU's which, if approved, is expected to significantly affect the scope and depth of the staff's review in certain areas and is also likely to affect the content of the associated documentation. The staff is scheduled to complete its review of this topical report in February 2002, and present its findings to the ACRS Subcommittee in March 2002 and the Full Committee in April 2002. The staff will ensure that changes in the guidance for the documentation of reviews are consistent with the staff's actions on this topical report. Pending the outcome of the staff's effort to improve the quality of SEs, the staff will continue to use the existing NRR guidance. However, any improvements that will enhance the staff's documentation of its reviews will be adopted as they are identified.

Power Uprate Review Guidance

The ACRS has recommended to the Commission and the staff that the staff should develop an SRP section for power uprates. The ACRS has stated that although the depth and breadth of the staff's review of the Dresden and Quad Cities EPU's was adequate, development of an SRP section for power uprates would help ensure adequate review of future power uprate applications. The ACRS further stated that the SRP section would also clarify the acceptance criteria for power uprates. The Commission has directed the staff to review the ACRS recommendation and inform the Commission of the results of the staff's review. The staff has previously described its review process for EPU's and explained why it believed that an SRP for power uprates was not needed. However, as a result of the ACRS recommendation, the staff is reconsidering its position on this matter. The staff will evaluate process improvements that

could be gained by developing an SRP section for power uprates and/or improving the template SEs for power uprates. The staff will consider the costs and benefits of these options with respect to the Agency's four performance goals (maintaining safety, increasing public confidence, improving staff effectiveness and efficiency, and reducing unnecessary regulatory burden). The staff will continue to keep the Commission informed of progress on this matter.

Attachments: 1. Table 1 - Power Uprates Approved in 2001
2. Table 2 - Power Uprate Applications Currently Under Staff Review
3. Table 3 - Expected Power Uprate Applications

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OGC
OCA
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| Non-Public | BSheron | MShuaibi |
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| NAME | MShuaibi* | RBouling* | PKleene | WReckley* | SBajwa* | JZwolinski | BSheron* | SCollins* | WTravers |
| DATE | 02/26/02 | 02/26/02 | 01/24/02 | 02/02/02 | 02/26/02 | 01/25/02 | 02/11/02 | 02/12/02 | 03/04/02 |

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TABLE 1 - Power Uprates Approved in 2001

| NO. | PLANT | % UPRATE | MWt | APPROVED | TYPE ¹ |
|-----|-----------------|----------|-----|----------|-------------------|
| 1 | Watts Bar | 1.4 | 48 | 1/19/01 | MU |
| 2 | Byron 1 | 5 | 170 | 5/4/01 | S |
| 3 | Byron 2 | 5 | 170 | 5/4/01 | S |
| 4 | Braidwood 1 | 5 | 170 | 5/4/01 | S |
| 5 | Braidwood 2 | 5 | 170 | 5/4/01 | S |
| 6 | Salem 1 | 1.4 | 48 | 5/25/01 | MU |
| 7 | Salem 2 | 1.4 | 48 | 5/25/01 | MU |
| 8 | San Onofre 2 | 1.4 | 48 | 7/6/01 | MU |
| 9 | San Onofre 3 | 1.4 | 48 | 7/6/01 | MU |
| 10 | Susquehanna 1 | 1.4 | 48 | 7/6/01 | MU |
| 11 | Susquehanna 2 | 1.4 | 48 | 7/6/01 | MU |
| 12 | Hope Creek | 1.4 | 46 | 7/30/01 | MU |
| 13 | Beaver Valley 1 | 1.4 | 37 | 9/24/01 | MU |
| 14 | Beaver Valley 2 | 1.4 | 37 | 9/24/01 | MU |
| 15 | Shearon Harris | 4.5 | 138 | 10/12/01 | S |
| 16 | Comanche Peak 1 | 1.4 | 47 | 10/12/01 | MU |
| 17 | Comanche Peak 2 | 0.4 | 13 | 10/12/01 | MU |
| 18 | Duane Arnold | 15.3 | 248 | 11/6/01 | E |
| 19 | Dresden 2 | 17 | 430 | 12/21/01 | E |
| 20 | Dresden 3 | 17 | 430 | 12/21/01 | E |
| 21 | Quad Cities 1 | 17.8 | 446 | 12/21/01 | E |
| 22 | Quad Cities 2 | 17.8 | 446 | 12/21/01 | E |

¹ TYPE -- S = Stretch; E = Extended; MU = Measurement Uncertainty Recapture

TABLE 2 - Power Uprate Applications Currently Under Staff Review

| NO | PLANT | % UPRATE | MWt | SUBMITTAL DATE | PROJECTED COMPLETION DATE | TYPE ¹ |
|----|---------------|----------|-----|----------------|---------------------------|-------------------|
| 1 | ANO2 | 7.5 | 211 | 12/19/00 | April 2002 | E |
| 2 | Clinton | 20 | 580 | 6/18/01 | March 2002 | E |
| 3 | Brunswick 1 | 15 | 371 | 8/09/01 | June 2002 | E |
| 4 | Brunswick 2 | 15 | 371 | 8/09/01 | June 2002 | E |
| 5 | South Texas 1 | 1.4 | 53 | 8/22/01 | March 2002 | MU |
| 6 | South Texas 2 | 1.4 | 53 | 8/22/01 | March 2002 | MU |
| 7 | Waterford 3 | 1.4 | 51 | 9/21/01 | March 2002 | MU |
| 8 | Davis-Besse | 1.63 | 45 | 10/12/01 | April 2002 | MU |
| 9 | Sequoyah 1 | 1.3 | 44 | 11/15/01 | April 2002 | MU |
| 10 | Sequoyah 2 | 1.3 | 44 | 11/15/01 | April 2002 | MU |
| 11 | Palo Verde 2 | 2.9 | 114 | 12/21/01 | December 2002 | S |
| 12 | Grand Gulf | 1.7 | 65 | 1/31/02 | TBD | MU |

¹ TYPE -- S = Stretch; E = Extended; MU = Measurement Uncertainty Recapture

TABLE 3 - Expected Power Uprate Applications¹

| NO | PLANT | % UPRATE | APPROXIMATE SUBMITTAL DATE | TYPE ² |
|----|-----------------|----------|------------------------------|-------------------|
| 1 | Palisades | 1.4 | April 2002 | MU |
| 2 | Pilgrim | 1.5 | April 2002 | MU |
| 3 | Point Beach 1 | 1.4 | April 2002 | MU |
| 4 | Point Beach 2 | 1.4 | April 2002 | MU |
| 5 | River Bend | 1.7 | April 2002 | MU |
| 6 | Browns Ferry 2 | 15 | Summer 2002 | E |
| 7 | Browns Ferry 3 | 15 | Summer 2002 | E |
| 8 | Davis-Besse | 7 | October 2002 | E |
| 9 | Beaver Valley 1 | 8 | 4 th Quarter 2002 | E |
| 10 | Beaver Valley 2 | 8 | 4 th Quarter 2002 | E |
| 11 | Waterford 3 | 8 | June 2003 | E |
| 12 | North Anna 1 | 1 | within 2 years | MU |
| 13 | North Anna 2 | 1 | within 2 years | MU |
| 14 | Surry 1 | 1 | within 2 years | MU |
| 15 | Surry 2 | 1 | within 2 years | MU |
| 16 | Grand Gulf | 12 | CY 2004 | E |
| 17 | Fort Calhoun | 20 | 2006 | E |

¹The staff believes that applications for at least 21 units in addition to those identified in this table will be submitted for power uprates within the next 5 years (6 of the additional applications will be of the extended type and 14 will be of the measure uncertainty recapture type [1 licensee did not report the size of the expected uprate]). However, specific information related to those applications has not been disclosed. In addition, licensees are considering 8 additional power uprates. These are still being studied by the licensees and no decisions have been made. Licensees reported that 55 units will not be requesting power uprates. Licensees did not provide responses for 4 units. In addition to the power uprates reported in this table, the staff expects significant interest by PWR licensees in large power uprates as a result of the ongoing work by PWR vendors.

² TYPE -- S = Stretch; E = Extended; MU = Measurement Uncertainty Recapture