

POLICY ISSUE (Information)

June 24, 2004

SECY-04-0104

FOR: The Commissioners

FROM: Luis A. Reyes
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SUBJECT: STATUS REPORT ON POWER UPRATES

PURPOSE:

To provide the Commission an update on the status of power uprate activities. This memorandum summarizes the staff's accomplishments and challenges since the last update in SECY-03-0190, dated November 3, 2003. The staff will continue to keep the Commission informed of the status of power uprate activities by providing annual status reports and by other means as appropriate. This status report is generated in response to a staff requirements memorandum dated February 8, 2002.

SUMMARY:

Since the last status update, the staff has made progress in reviews of plant-specific power uprates, stayed abreast of operating experience with potential effects on power uprate reviews, continued to monitor performance related to the effectiveness and efficiency measures established for power uprate reviews, and continued to look for ways to improve the power uprate process. Details of the staff's progress are provided in this Commission paper and the attachments. In summary, the staff has:

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- approved two plant-specific power uprates¹
- issued final Review Standard (RS)-001, "Review Standard for Extended Power Uprates" on December 24, 2003
- conducted additional inspections of Exelon Generating Company, LLC's (Exelon's), evaluations of the causes and subsequent repairs of the steam dryer damage at Quad Cities Unit 2
- issued a commitment acknowledgment letter on April 20, 2004, regarding Exelon's commitments for long-term extended power uprate (EPU) operation at the Dresden and Quad Cities units
- continued to engage General Electric Nuclear Energy (GENE) and the Boiling Water Reactor Owners Group regarding steam dryer damage and flow-induced vibration issues
- issued Supplement 2 to Information Notice 2002-026, "Additional Flow-Induced Vibration Failures after a Recent Power Uprate"
- met with Westinghouse on April 22, 2004, to discuss ongoing issues related to the Advanced Measurement and Analysis Group (AMAG) ultrasonic flow meters
- issued an acceptance review letter for the Vermont Yankee Nuclear Power Station (Vermont Yankee) EPU application on February 20, 2004
- issued a letter to the Vermont Public Service Board on May 4, 2004, noting that the Nuclear Regulatory Commission (NRC) would perform a pilot engineering assessment inspection at Vermont Yankee
- engaged external stakeholders, including Congressional delegates and their staff, through public meetings and correspondence regarding the Vermont Yankee EPU application and the need for an independent safety assessment (ISA) at Vermont Yankee
- presented information to the full committee of the Advisory Committee on Reactor Safeguards (ACRS) on unanticipated effects of power uprates, and the ACRS Subcommittee on Thermal-Hydraulic Phenomena on potential adverse flow effects from power uprates
- presented power uprate reports at the 2004 NRC Regulatory Information Conference, the International Conference of Nuclear Engineering (ICONE), and at an American Nuclear Society (ANS) meeting

BACKGROUND:

Power uprates are categorized based on the magnitude of the power increase and the methods used to achieve the increase. Measurement uncertainty recapture (MUR) power uprates result in power level increases that are less than 2 percent and are achieved by implementing enhanced techniques for calculating reactor power. Stretch power uprates typically result in power level increases that are up to 7 percent and generally do not involve major plant modifications. EPUs result in power level increases that are greater than stretch power uprates

¹Subsequent to the staff's approval of one of the power uprates which was an MUR power uprate for Fort Calhoun, the staff approved an exigent license amendment request to return Fort Calhoun's maximum licensed operating power level back to the pre-MUR power level.

and usually require significant modifications to major plant equipment. The NRC has approved EPU's for increases as high as 20 percent.

The staff provided its last update in SECY-03-0190, dated November 3, 2003. This memorandum summarizes the staff's accomplishments and challenges since the last update. The staff will continue to keep the Commission informed of the status of power uprate activities by providing annual status reports and by other means as appropriate. This status report is generated in response to a staff requirements memorandum dated February 8, 2002.

DISCUSSION:

Power Uprate Applications

Approved Power Uprates

This status update covers power uprates approved since November 3, 2003 (Attachment 1). During this period, the staff approved power uprates for two nuclear power plant units, resulting in a combined increase of 99 megawatts thermal (MWt) or about 35 megawatts electric (MWe). This brings the total number of power uprates approved since 1977 to 101, resulting in a combined increase of approximately 12513 MWt or 4173 MWe to the Nation's electric generating capacity. The staff approved an MUR power uprate for Fort Calhoun on January 16, 2004, which authorized an increase in the licensed thermal power limit to 1524 MWt. The Omaha Public Power District was subsequently informed by Westinghouse that potential instrument inaccuracies in the AMAG ultrasonic flow meter would not allow implementation of the MUR power uprate at Fort Calhoun. As a result, on May 7, 2004, prior to implementation of the MUR power uprate, the Omaha Public Power District submitted an exigent license amendment request to return Fort Calhoun's licensed thermal power limit to 1500 MWt, the pre-MUR level. On May 14, 2004, the staff approved this license amendment request, returning the licensed maximum power level at Fort Calhoun to 1500 MWt.

Ongoing Reviews of Power Uprates

The staff is currently reviewing power uprates for five nuclear power plant units. These include one MUR power uprate, two stretch power uprates, and two EPU's (Attachment 2). If approved, these power uprates would result in a combined increase of an additional 907 MWt or 325 MWe to the Nation's electric generating capacity. As in the past, the staff has given the review of these power uprates a high priority.

Expected Power Uprates

In January 2004, the staff conducted a survey of all licensees to obtain information regarding their plans for submitting power uprates over the next 5 years (Attachment 3). Based on this survey and information obtained since the survey, licensees plan to request power uprates for

24 nuclear power plant units over the next 5 years. If approved, these power uprates would result in an increase of about 5018 MWt or about 1692 MWe. Based on the results of the January 2004 survey and the models the staff developed for reviewing power uprates, approximately 29 full-time equivalent staff will be used for reviewing the power uprates expected over the next 5 years. These resources are budgeted and the staff does not anticipate any need for additional resources for power uprate reviews.

Vermont Yankee Extended Power Uprate Review

In a letter dated December 15, 2003, the NRC notified Entergy Nuclear Operations, Inc. (Entergy), that its EPU application for Vermont Yankee lacked sufficient information in several areas needed to allow the NRC staff to complete a detailed review of the application. These areas included: (1) applicability of analyses in GENE's Constant Pressure Power Uprate (CPPU) Licensing Topical Report to Vermont Yankee, (2) insufficient information for the NRC staff to arrive at an adequate safety conclusion based on the template safety evaluation in RS-001, and (3) steam dryer integrity analysis. Entergy submitted additional information to the NRC on January 31, 2004. The staff evaluated the additional information and responded to Entergy on February 20, 2004, noting that Entergy had provided the necessary information to allow the staff to proceed with the detailed technical review. The staff's review of this amendment request is expected to be completed by January 31, 2005.

Operating Experience Related to Power Uprates

Attachment 4 to this memorandum provides details regarding power uprate operating experience issues.

Review Standard for EPUs

Issuance of RS-001

RS-001 was issued in December 2003. RS-001 is a first-of-a-kind document that provides a comprehensive process and technical guidance for EPU reviews by the NRC staff and provides useful information to licensees for EPU applications. The development of RS-001 was a significant process improvement effort and involved all divisions within the Office of Nuclear Reactor Regulation (NRR). The final RS fully addressed the public comments received on the draft RS and was endorsed by the ACRS as an "excellent review standard." In previous memoranda to the Commission, the staff stated that it would seek endorsement from the Committee to Review Generic Requirements (CRGR) of the final version of RS-001. Following dialogue with the staff, the CRGR Chairman determined that formal review by the CRGR was not required.

The staff is currently using RS-001 for the review of the proposed 20-percent EPU for Vermont Yankee and the proposed 8-percent EPU for the Waterford Steam Electric Station.

The staff will closely monitor these ongoing EPU reviews to identify any issues with the use of RS-001.

Assessment of Past Requests for Additional Information

During the development of draft RS-001, the staff reviewed requests for additional information (RAIs) issued during the reviews of recently approved EPUs to ensure that RS-001 addressed the issues identified as a result of the staff's reviews of those EPUs. The staff is preparing a summary of this review and plans to make it available to internal and external stakeholders. The staff believes that making the results of this summary available to licensees could aid them in preparing high quality applications. In SECY-03-0190, the staff committed to complete the assessment of past RAIs by the end of 2003. Due to ongoing activities related to the Vermont Yankee EPU and steam dryer cracking and flow-induced vibration issues, this assessment has not been completed. The staff plans to complete this task by the end of 2004.

Staff Performance vs. Established Goals

Established Goals

Maintaining safety remains the staff's highest priority when conducting power uprate reviews and the staff intends to take the time necessary to ensure that safety is maintained. The staff has established performance goals of 6 months and 960 staff hours for completing the review of a MUR power uprate application, 9 months and 1800 staff hours for completing the review of a stretch power uprate application, and 12 months and 3900 staff hours for completing the review of an EPU application. The staff will ensure that the goal to maintain safety is not compromised in order to meet these timeliness and resource expenditure goals.

The timeliness and resource expenditure goals are predicated on licensees' submittals being consistent with established guidelines; licensees not including other non-power uprate related requests in their submittals; licensees' submittals not resulting in substantive RAIs; and licensees responding to RAIs within established schedules. In establishing the above goals, the staff recognized that in some cases, licensees' plans for implementing power uprates are more flexible than the numerical timeliness goals described above. As a result, the staff may meet its timeliness goals by either completing the reviews according to the numerical goals or by completing the reviews in time to support licensees' implementation schedules, whichever is longer. This flexibility allows the staff to better utilize its resources in a way to support other high priority activities.

Staff Performance

One of the two power uprates the staff approved during the period covered by this status report was for a MUR power uprate. It was completed within the staff's established timeliness goal of 6 months and the established goal of 960 staff review hours. The staff also approved a

6-percent power uprate for Kewaunee during this period. The review was completed within the staff's established timeliness goal of 9 months. However, the review required over 2600 staff review hours to complete due to the following reasons: (1) some necessary technical analyses were not provided in the original application, (2) some technical information lacked sufficient detail to support the requested changes and resulted in the staff issuing multiple RAIs, and (3) late in the review of this application, the staff identified areas where additional information was needed resulting in further delays and a reduction in efficiency.

The staff will continue to closely monitor power uprate reviews and keep the Commission informed of instances where the performance goals are not met.

Interaction With Internal and External Stakeholders

ACRS Briefings on Potential Adverse Flow Effects from Power Uprates

NRR management briefed the full committee of the ACRS on March 5, 2004, regarding unanticipated effects of power uprates. The staff briefed the ACRS Subcommittee on Thermal-Hydraulic Phenomena on May 7, 2004, on potential adverse flow effects from power uprates and the Office of Nuclear Regulatory Research's (RES's) plan to assess potential adverse flow effects during boiling-water reactor power uprates. RES is developing computational fluid dynamics and finite element analysis models to perform thermal hydraulic and structural analyses of the steam dryer cracking issue. The ACRS challenged the staff regarding the staff's understanding of the causes and the adequacy of repairs of steam dryer cracking at plants that have implemented EPUs. The ACRS also expressed concern about the lack of risk analyses regarding the dryer cracking at these plants. The staff is evaluating the ACRS comments.

Vermont Yankee Power Uprate Stakeholder Issues

Based on the substantial amount of public interest and correspondence associated with the Vermont Yankee EPU review from various public officials, public interest groups, and other stakeholders, the staff established a communications team and developed a communication plan for Vermont Yankee. Additionally, NRR has temporarily established a new project section that is developing and coordinating communications for all of the various Vermont Yankee issues.

On January 15, 2004, the NRC staff held a conference call with senior staff members for Vermont Senators Jeffords and Leahy in response to their constituents' requests for an ISA inspection of Vermont Yankee (similar to the Maine Yankee inspection). The NRC staff also discussed the EPU review process and the status of the NRC's review of the Vermont Yankee EPU application. Following this call, the NRC received a letter from Senator Leahy's office requesting an overview of the NRC's review process for the Vermont Yankee EPU application.

The staff sent a response describing its EPU review process in a letter dated February 20, 2004.

The Vermont State Senate passed a resolution in March 2004 requesting that the NRC perform an independent engineering assessment at Vermont Yankee. The NRC also received a letter from the Vermont Public Service Board on March 15, 2004, requesting that the NRC perform an independent engineering inspection at Vermont Yankee to support the ongoing NRC review of the Vermont Yankee EPU application. The NRC issued its response on May 4, 2004, noting that the NRC would perform a pilot engineering inspection at the site and was willing to meet with the Vermont Public Service Board. On March 29, 2004, in response to a February 27, 2004, letter from Senators Jeffords and Leahy, the NRC stated that it will hold a public meeting in Vernon, Vermont, near Vermont Yankee, to discuss the status of the agency's review of Entergy's EPU request for Vermont Yankee.

Additionally, certain stakeholders have raised a concern regarding the adequacy of Entergy's analyses supporting its EPU amendment request. The staff is preparing responses to stakeholder letters and evaluating the concern during the EPU review.

Vermont Yankee Power Uprate Public Meeting

On March 31, 2004, the NRC held a public meeting in Vernon, Vermont, near Vermont Yankee, to discuss the status of the agency's review of Entergy's EPU request for Vermont Yankee. More than 500 people attended this meeting, including several State and local public officials from Vermont, Massachusetts, and New Hampshire, as well as representatives of Senators Leahy and Jeffords. Many people at this meeting voiced concerns about the power uprate process and expressed their desire for an independent engineering inspection at Vermont Yankee to support the proposed EPU.

Power Uprate Presentation at the 2004 NRC Regulatory Information Conference

NRC management presented a report on power uprates and other licensing actions during a panel session of the 2004 Regulatory Information Conference. The presentation included details about RS-001 and information on several technical challenges that the staff has been addressing related to power uprates. These challenges include steam dryer cracking and flow-induced vibration issues at plants that have implemented EPUs, interpretations of GENE EPU topical reports, and issues with the AMAG ultrasonic feedwater flow meter measurement systems.

International Activities

The staff is continuing dialogue with international regulatory counterparts related to power uprates and technical challenges. The staff is scheduled to visit Switzerland and Sweden in June 2004 to discuss the NRC's Power Uprate Program and gather information regarding developments and lessons learned with international power uprate programs. The staff provided input on power uprates for the 2004 U.S. National Report for the Convention on Nuclear Safety. This input included a description of the NRC's Power Uprate Program and details of staff activities related to operating experience issues from plants that have implemented power uprates.

Power Uprate Presentation at the American Nuclear Society International Winter Meeting

The staff made a presentation on the NRC's Power Uprate Program during a 2-day workshop at the 2003 ANS International Winter Meeting in November 2003. The workshop covered several power uprate topics, including an NRC staff presentation on the regulatory aspects of power uprates. The audience at the workshop included domestic and foreign representatives of utilities interested in power uprates.

Presentation at the 12th International Conference on Nuclear Engineering

On April 28, 2004, the staff presented a report on power uprates during a panel session at the 12th ICONE. The staff's presentation included information regarding final RS-001, methods that licensees can follow for improving NRC reviews of power uprates, and technical challenges resulting from power uprates.

Challenges

The staff continues to face challenges with technical issues including the Quad Cities steam dryer failures, various flow-induced vibration issues at Quad Cities and Dresden, and ultrasonic flow meter reading abnormalities at Byron, Braidwood, and Fort Calhoun. Based on these challenges, the staff is evaluating the need for modifying its guidance for future reviews of power uprates, and the potential need to revisit prior reviews of power uprates. The staff is monitoring operating experience related to power uprates to ensure that review guidance is updated and focused on reactor safety. The staff also continues to monitor its performance related to power uprate reviews to identify areas for further improvement.

Due to extensive public interest and correspondence from various public officials, public interest groups, and other stakeholders, the staff continues to be challenged with activities related to the Vermont Yankee EPU review. As noted above, to meet these challenges, the staff has dedicated resources for these issues.

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- Attachments:
1. Table 1 - Power Uprates Approved Since November 3, 2003
 2. Table 2 - Power Uprate Applications Currently Under Staff Review
 3. Table 3 - Expected Power Uprate Applications
 4. Operating Experience Related to Power Uprates

TABLE 1 - Power Uprates Approved Since November 3, 2003

NO.	PLANT	% UPRATE	MEGAWATTS THERMAL	APPLICATION DATE	APPROVAL DATE	TYPE ¹
1	Fort Calhoun*	1.6	24	7/18/2003	1/16/2004	MUR
2	Kewaunee	6.0	99	5/22/2003	2/27/2004	S

Power uprates approved since November 3, 2003, have added an additional 99 megawatts thermal or approximately 35 megawatts electric to the Nation's electric generating capacity.

*Due to an exigent license amendment approved by the staff on May 14, 2004, Fort Calhoun's authorized licensed power level was returned to the pre-MUR level.

¹ TYPE -- S = Stretch; MUR = Measurement Uncertainty Recapture

TABLE 2 - Power Uprate Applications Currently Under Staff Review

NO.	PLANT	% UPRATE	MEGAWATTS THERMAL	SUBMITTAL DATE	PROJECTED COMPLETION DATE	TYPE ¹
1	Palisades	1.4	35	6/3/2003	June 2004	MUR
2	Vermont Yankee	20	319	9/10/2003	January 2005	EPU
3	Waterford 3	8	275	11/13/2003	January 2005	EPU
4	Indian Point 2	3.3	102	1/29/2004	October 2004	S
5	Seabrook	5.2	176	3/17/2004	TBD*	S

Power uprates currently under review could add an additional 907 megawatts thermal or 325 megawatts electric to the Nation's electric generating capacity if approved.

*Seabrook's projected completion date is still being determined.

¹ TYPE -- EPU = Extended Power Uprate; S = Stretch; MUR = Measurement Uncertainty Recapture

TABLE 3 - Expected Power Uprate Applications

Fiscal Year	Total Power Uprates Expected	MUR Power Uprates	Stretch Power Uprates	EPU's	Megawatts Thermal	Megawatts Electric
2004	12	2	3	7	3538	1196
2005	4	3	0	1	362	121
2006	5	3	0	2	426	142
2007	2	0	1	1	333	111
2008	1	0	0	1	365	122
TOTAL	24	8	4	12	5018	1692

MUR = Measurement Uncertainty Recapture; EPU = Extended Power Uprate

OPERATING EXPERIENCE RELATED TO POWER UPRATES

Damage of Steam Dryers and Other Plant Components at Quad Cities and Dresden

Exelon Generating Company, LLC (Exelon), has discovered cracks in the steam dryer on three separate occasions at Quad Cities Unit 2 since the unit has operated at EPU power levels. Exelon also found cracks in the steam dryers at Dresden Units 2 and 3 and Quad Cities Unit 1. Flow-induced vibration contributed to failures of feedwater sampling probes at Dresden Units 2 and 3 and inoperability of an electromatic relief valve at Quad Cities Unit 1. Loose parts in the reactor coolant system have been generated from pieces of cracked steam dryers and flow-induced vibration damaged feedwater probes. The staff has determined that these issues do not pose an immediate safety concern given the current operating conditions at Quad Cities and Dresden. However, steam dryers and other internal main steam and feedwater components must maintain structural integrity to avoid generating loose parts that could impact safety system or reactor plant operation.

Since 2002, steam dryer cracking and flow-induced vibration damage on components and supports for the main steam and feedwater lines have been observed at Dresden and Quad Cities following implementation of extended power uprates (EPUs). In June 2002, approximately 3 months following implementation of a 17.8-percent EPU, Quad Cities Unit 2 experienced an increase in the moisture content of the steam flowing to the turbine. In July 2002, the licensee shut down Quad Cities, Unit 2, for inspection and identified cracks in the steam dryer. The licensee repaired the steam dryer, and returned the unit to power operation at the EPU power level. The steam dryer is not a safety-related component, but is required to maintain its structural integrity. Approximately 10 months following restart of Quad Cities, Unit 2 from the outage to repair the steam dryer, the plant experienced a similar increase in the moisture content of the steam. The licensee shut down the plant for inspection of the steam dryer and identified cracks in several locations of the steam dryer.

On November 12, 2003, Quad Cities Unit 1 was shut down to perform inspections and repairs of the steam dryer. The unit had been operating at a reduced power level since November 3, 2003, due to indications of higher-than-normal moisture carryover in the reactor steam. On November 13, 2003, the steam dryer was found damaged during inspections following reactor disassembly. The damage occurred in the ½ inch-thick upper dryer hood cover plate. The cover plate had cracks approximately 51 inches in total length and a 6 inch by 9 inch portion of the plate broke off from the steam dryer. Exelon conducted extensive inspections in an effort to locate the lost steam dryer piece(s). The piece(s) were not recovered; however, Exelon has found indications on a recirculation pump impeller. Based on these indications, the material is most likely in the bottom of the reactor vessel. The licensee conducted a loose part analysis to determine potential effects on plant systems and concluded that it was safe to operate the plant with the loose part in the vessel. The staff reviewed the licensee's loose part analysis and agreed with the licensee. Repairs and modifications, similar to those completed on the Quad Cities Unit 2 steam dryer earlier in 2003, were also completed on Unit 1.

Also during the November 2003 Quad Cities Unit 1 outage, Exelon discovered that the pilot vent line on a main steam line electromatic relief valve was sheared off from the pilot assembly and the solenoid actuator for the valve was significantly damaged. Flow-induced vibration on the main steam line during EPU operating conditions contributed to this damage. Exelon replaced the damaged solenoid actuator and rewelded the pilot vent line to the pilot assembly on the relief valve prior to restarting the unit.

During the fall 2003 refueling outage at Dresden Unit 2, Exelon found cracking on the steam dryer, but it was not through-wall. There were no indications of higher-than-expected moisture carryover in the reactor steam at Dresden Unit 2 during the previous operating cycle. Repairs and modifications, similar to those performed on the dryers at Quad Cities Units 1 and 2, were completed on the steam dryer at Dresden Unit 2 during this recent refueling outage. Additionally, Exelon found three holes in a feedwater sparger and an isokinetic feedwater sampling probe in the sparger at Dresden Unit 2. Exelon believed that the probe apparently caused the damage to the sparger. Exelon determined that the probe failed due to mechanical, high-cycle fatigue induced by flow vibrations during the previous operating cycle. A feedwater sampling probe also failed at Dresden Unit 3 following EPU operation. This probe was never found. The staff issued Information Notice (IN) 2004-06, "Loss of Feedwater Isokinetic Sampling Probes at Dresden Units 2 and 3, on March 26, 2004, to inform licensees about this issue.

On February 24, 2004, Quad Cities Unit 2 was shut down for a scheduled refueling outage and for inspections of the steam dryer. After approximately 6 months of operation at EPU conditions, Exelon identified several new cracks on the steam dryer at Quad Cities Unit 2, including cracking on areas of the steam dryer that were modified to address previous problems identified with the steam dryer. Exelon repaired the steam dryer and developed a plan to attempt to identify the mechanism that has been causing unacceptable steam dryer loads and steam dryer cracking. On March 28, 2004, Exelon returned Quad Cities Unit 2 to operation at the pre-EPU power level and will hold the unit at this power level except to conduct testing at EPU conditions, for brief periods of time, to establish the steam dryer loads with respect to flow rates and to identify any operating limitations. Exelon has held Quad Cities 1 to pre-EPU power levels since returning the unit to operation following the November 2003 outage and plans to continue to operate the unit at pre-EPU levels until the results of the tests at Quad Cities 2 are evaluated. Based on longer EPU operation and less observed steam dryer damage at the Dresden units, in comparison to the Quad Cities units, Exelon believes that sufficient basis exists to continue to operate Dresden Units 2 and 3 at EPU power levels. Exelon plans to inspect the steam dryers at the Quad Cities and Dresden units at the next applicable refueling outages.

On April 2, 2004, Exelon committed to the Nuclear Regulatory Commission (NRC) to maintain both Quad Cities units at pre-EPU power levels, except for testing of the flow effects on the Quad Cities units. The NRC sent Exelon a commitment acknowledgment letter on April 20, 2004, documenting Exelon's commitments and the NRC's assessment of those commitments. In the April 20, 2004, letter, the NRC staff noted concerns with Exelon's plans to justify long-term EPU operation of the Quad Cities units and Exelon's summary basis for continued long-term EPU operation of the Dresden units. On May 12, 2004, Exelon provided an update to its commitments regarding EPU operation of the Quad Cities and Dresden units. In particular, Exelon will not exceed pre-EPU levels at the Quad Cities units until demonstrating

to the NRC staff that EPU operation is justified. Exelon also provided additional information for support of the continued EPU operation of the Dresden units.

The staff is closely monitoring industry's generic response to the failures. General Electric Nuclear Energy (GENE) issued Services Information Letter (SIL) No. 644, "BWR/3 Steam Dryer Failure," on August 21, 2002, to inform its customers of the first steam dryer failure and SIL No. 644, Supplement 1, "BWR Steam Dryer Integrity," on September 5, 2003, to inform its customers of the second steam dryer failure. Both of these documents provided recommendations for monitoring steam dryer performance to ensure that steam dryer degradation is promptly identified. The staff issued IN 2002-026, "Failure of Steam Dryer Cover Plate after a Recent Power Uprate," on September 11, 2002, to inform licensees of the first failure and Supplement 1 to IN 2002-026, "Additional Failure of Steam Dryer after a Recent Power Uprate," on July 21, 2003, to inform licensees of the second failure. On January 9, 2004, the staff issued Supplement 2 to IN 2002-026, "Additional Flow-Induced Vibration Failures after a Recent Power Uprate," to inform licensees of the failure of the steam dryer and other plant components at Quad Cities, Unit 1. In addition, the staff has provided comments to the Boiling Water Reactor Owners Group (BWROG) on the technical evaluation and recommendations contained in SIL No. 644.

The staff held meetings with the BWROG and GENE on February 3 and March 4, 2004, to discuss industry's actions related to resolution of BWR steam dryer integrity and other EPU concerns. On May 7, 2004, the BWROG provided the results from its EPU survey and the Institute of Nuclear Power Operations database review. The staff is considering its regulatory options based on the industry's response, including the ongoing activities noted above.

Abnormalities in Ultrasonic Flow Meter Instrumentation Readings

On August 28, 2003, Exelon informed the staff that it was reducing the operating power of Byron Units 1 and 2 by 32 megawatts thermal (MWe) and 22 MWe, respectively. The decision was made following analysis of feedwater flow data derived from the Westinghouse/AMAG "CROSSFLOW" ultrasonic flow meters (AMAG UFM) used at Byron and Braidwood. The AMAG UFM were used to adjust the feedwater flow rate indications from the venturi meters to compensate for possible venturi fouling during an operating cycle. Exelon reported that there were unexpected, small differences in power level indications while using the AMAG UFM. On September 1, 2003, the power at Braidwood Unit 2 was reduced due to problems with the AMAG UFM.

Westinghouse issued Technical Bulletin (TB) 03-6 on September 5, 2003, to inform its customers of the abnormalities experienced at the Byron and Braidwood plants. TB 03-6 also provided recommendations for plants to monitor their instrumentation to promptly identify any such abnormalities at their plants. Westinghouse issued a Nuclear Safety Advisory Letter (NSAL)-03-12 on December 5, 2003, describing this issue and providing recommendations to licensees using the AMAG system.

On February 6, 2004, a tracer test of the feedwater flow rates was conducted at Byron to obtain an accurate measure of the feedwater flow and compare this measurement with the AMAG UFM. The test results indicated that there were differences in flow measurements between the AMAG UFM reading and the tracer test results. On February 12, 2004, Westinghouse issued TB-04-4, which provided information regarding recent AMAG UFM system performance issues

including the results of the tracer test. Braidwood and Byron are no longer using the AMAG UFM system to measure feedwater flow.

The NRC staff met with Westinghouse on April 22, 2004, to discuss ongoing activities related to the AMAG UFM systems. Westinghouse has implemented an action plan to perform scale model testing and obtain industry performance data. Additionally, the Westinghouse Owners Group (WOG) has notified the NRC that it is adopting the AMAG issue as an industry initiative. The WOG is soliciting industry support and will take over the Westinghouse action plan.

The staff continues to follow this issue for any implications for plants that have implemented MUR power uprates. There are 12 nuclear reactor units in the United States that have received staff approval for MUR power uprates based on the use of the AMAG UFM system.

An MUR power uprate for Fort Calhoun was authorized on January 16, 2004, which allowed an increase in the licensed thermal power limit to 1524 MWt. The licensee was subsequently informed by Westinghouse that potential instrument inaccuracies in the AMAG UFM would not allow implementation of the MUR power uprate at Fort Calhoun. As a result, on May 7, 2004, prior to implementation of the MUR power uprate, the licensee submitted an exigent license amendment request to return Fort Calhoun's licensed thermal power limit to 1500 MWt, the pre-MUR level. On May 14, 2004, the staff approved this license amendment request, returning the licensed maximum power level at Fort Calhoun to 1500 MWt.

Currently, the issues identified with the AMAG UFM systems at Byron, Braidwood, and Fort Calhoun have not been shown to be a problem at nuclear units that have implemented MUR power uprates using the AMAG UFM system.