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U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Dresden Nuclear Power Station, Units 2 and 3  
Facility Operating License Nos. DPR-19 and DPR-25  
NRC Docket Nos. 50-237 and 50-249

Subject: Commitments and Plans Related to Extended Power Uprate Operation

- References:
1. Letter from J. A. Benjamin (Exelon Generation Company, LLC) to U. S. NRC, "Commitments and Information Related to Extended Power Uprate," dated April 2, 2004
  2. Letter from K. R. Jury (Exelon Generation Company, LLC) to U. S. NRC, "Commitments and Plans Related to Extended Power Uprate Operation," dated May 12, 2004

In Reference 1, Exelon Generation Company, LLC (EGC) provided the basis for continued operation of Dresden Nuclear Power Station (DNPS), Units 2 and 3, at extended power uprate (EPU) conditions in light of the EPU related issues identified in early 2004 at Quad Cities Nuclear Power Station (QCNPS). In Reference 2, regulatory commitments were made regarding the steam dryers at DNPS. The purpose of this letter is to update our basis and commitments for operation of DNPS Units 2 and 3 at EPU conditions.

On October 26, 2004, DNPS Unit 3 was shutdown for a scheduled refueling outage. The scope of the refueling outage included inspections of the steam dryer, in accordance with the recommendations described in General Electric (GE) Service Information Letter (SIL) 644, "BWR Steam Dryer Integrity," Supplement 1. The inspection scope of the SIL was expanded to include the areas previously inspected on the QCNPS Unit 2 steam dryer during the Spring 2004 refueling outage. In addition, the outage scope included pre-planned modifications for the steam dryer to make design improvements and improve the structural capacity of the outer hood. The inspections identified cracking that was evaluated and either repaired or determined to be acceptable for additional service.

As a result of the inspection findings on DNPS Unit 3, EGC performed a preemptive inspection of the Unit 2 steam dryer in areas where loose parts could be generated or where the structural

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integrity of the dryer could be threatened. EGC also installed the same steam dryer modifications on Unit 2 that were applied to Unit 3. The Unit 2 steam dryer inspections identified one indication. The crack occurred in an area of the steam dryer previously modified in November 2003 (i.e., the cover plate to dryer support ring weld). This area was also found cracked during the current Unit 3 dryer inspection. The cracked area was evaluated and repaired.

Overall, the severity and magnitude of cracking identified on the DNPS steam dryers during the Fall 2004 outages was less significant than that previously identified at QCNPS. EGC discussed the inspection results and associated dispositions of the indications with the NRC in conference calls on November 17 and November 30, 2004, and during the meeting on December 2, 2004, at DNPS.

EGC evaluated the DNPS steam dryers and concluded that the dryers are acceptable for continuous operation at EPU conditions. The following provides the bases for our conclusions.

### **Bases for EPU Operation**

There are several factors that collectively form the bases for continued EPU operation at DNPS. Inspections and analyses continue to support that DNPS dryer loads are less than at QCNPS. Following lengthy periods of EPU operation, significantly less steam dryer damage has been seen at DNPS than at QCNPS. The causal factors of the weld cracking on both DNPS units are understood and addressed by the 2004 modifications and repairs, which improve overall outer hood structural capacity. Although the continuing occurrence of limited cracking of steam dryers is expected, evaluations demonstrate that the modified DNPS steam dryers are capable of maintaining their structural integrity during operation above the pre-EPU level.

The main steam line vibration levels at DNPS are less than at QCNPS. Safety/Relief Valve (S/RV) vibrations on the DNPS units are a factor of 10 lower than at QCNPS Unit 2, and about a third lower than the S/RV vibrations at QCNPS Unit 1. The lower vibration levels suggest that the acoustic loading is less at DNPS than at QCNPS. Consistent with the expected impact of the lower vibration levels, the findings from previous DNPS and QCNPS inspections demonstrate that there has been less steam dryer damage at DNPS than at QCNPS. Therefore, steam dryer loads at DNPS are considered to be bounded by those at QCNPS.

Although validation of the acoustic circuit model is not yet complete, the acoustic circuit analysis has been evaluated by two independent methods and appears to be a valid approach for predicting dryer loads. The first method involved taking QCNPS Unit 2 main steam line and instrument reference leg pressure data to generate dryer load definitions used in time history finite element analysis (FEA) of the dryer at pre-EPU and EPU power levels. The predicted dryer stresses for each case correlated well with the pre-EPU and EPU dryer performance. The second method compared scale model test measurements against acoustic circuit analysis predictions. This validation also provided a good correlation. Based on acoustic circuit analysis, DNPS steam dryer loads are less than either QCNPS unit.

The highest stresses in the outer hood of the steam dryer are predicted by a general 1-psi static FEA to have been reduced by a factor of approximately 2.5 times through the steam dryer modifications. Stresses were evaluated using a criterion based on previous dryer performance and are less than those stresses found acceptable in the past. The criterion was developed to account for uncertainties in stress intensities determined by the shell finite element model (FEM), fabrication and weld quality, and load uncertainty. In addition, the steam dryer

modifications have been designed to minimize stress concentrations in fatigue sensitive locations.

EGC has developed a Startup and Power Ascension Monitoring Plan to maintain ongoing assurance of acceptable steam dryer performance and integrity during EPU operation. As part of this plan, DNPS has steam dryer performance monitoring in place for moisture carryover and key reactor parameters, as recommended by GE SIL 644, Revision 1. The monitoring criteria allow for identifying steam dryer structural degradation. EGC will evaluate the monitored parameters and take appropriate actions as necessary. If assurance of steam dryer structural integrity cannot be confirmed, positive action will be taken to reduce reactor power, up to and including reactor shutdown.

Therefore, the steam dryer repairs and modifications and results of these evaluations, combined with the actions committed to in this letter, collectively form the basis for operation of both DNPS units at EPU conditions.

### **Startup and Power Ascension Monitoring Plan**

The startup and power ascension monitoring plan provides for monitoring, recording, and evaluating key reactor and main steam system operating parameters to determine the effectiveness of repairs made to the DNPS steam dryers. Specifically, reactor pressure and water level, steam flow/feed flow mismatch, main steam line flows, main steam line strain gauge readings, main steam line pressure readings, and moisture carryover readings will be collected for evaluation.

The monitoring plan requires recording operating parameters at discrete power levels, with data collected simultaneously from the main steam line strain gauges and pressure transducers. Moisture carryover will be sampled after a minimum of 1 hour of operation at full EPU power. Other key reactor parameters will be monitored in accordance with GE SIL 644, Revision 1.

During operation above pre-EPU licensed thermal power, data collection points are established following each increase in reactor power of 100 MWth ( $\pm$  ~25 MWth). Pressure and strain gauge data will not be collected when the plant is changing power. Recently installed monitoring equipment can collect data at a sufficient sampling rate to alleviate the need for additional data collection points during power ascension. In addition, DNPS conducted an extensive monitoring and testing program for plant systems during the initial power ascension to EPU power levels. Therefore, the current monitoring plan does not require that reactor power be held for significant periods of time to allow for monitoring and data collection.

EGC will evaluate the data collected (such as from strain gauges and pressure transducers) to verify that the steam dryer performance predicted by the acoustic circuit analysis remains valid. EGC will also evaluate steam, feedwater, and reactor parameters (such as moisture carryover) to confirm steam dryer integrity. If assurance of steam dryer structural integrity cannot be confirmed, positive action will be taken to reduce reactor power, up to and including reactor shutdown.

### **Ongoing Analytical Work and Planned NRC Interactions**

As a result of the steam dryer cracking at QCNPS, EGC implemented a plan to quantify the steam dryer loads at both DNPS and QCNPS. Details of this plan have been previously discussed with the NRC. As more operating experience is gained and the analytical work

progresses, the precision of the steam dryer loads as input into the FEA improves. The data collected from the additional instrumentation installed at DNPS, and the instrumented QCNPS Unit 1 steam dryer, will increase our understanding of steam dryer loads and stresses.

In Attachment 2 of Reference 1, EGC submitted a summary of the technical basis for continued operation of DNPS Units 2 and 3 at EPU levels. In Attachment 1 of Reference 2, EGC submitted the quantitative input to the technical assessment of the loadings of the DNPS steam dryers. The reports included in Attachment 1 were the result of evaluations performed in December 2003 by Continuum Dynamics Incorporated (CDI). The models used for those evaluations have subsequently been revised as part of the ongoing steam dryer loading investigation. In addition, main steam line pressure data was also collected at both DNPS units and evaluated using the improved acoustic circuit model. The current analysis supports the prediction that the DNPS loads on the dryer are less than those at QCNPS.

During the recent DNPS outages, EGC installed strain gauges on each main steam line on both DNPS units. As described above, in-plant pressure measurement data will be collected at various power levels during power ascension and EPU operation for both units. The collected data will then be used in the acoustic circuit analysis to better define the loads at EPU power. During January 2005, the FEA will be updated to include the new acoustic circuit analysis time histories. This will further demonstrate the robustness of the 2004 repairs and modifications as compared to the 2003 repairs and modifications. EGC will then submit to the NRC the updated evaluation of the DNPS steam dryers to replace those in Reference 2. EGC will share the results of the above analytical work with the NRC during a meeting in mid-February 2005.

Additionally, EGC plans to instrument the replacement QCNPS Unit 1 steam dryer and the main steam lines. Data will be collected during startup and operation following installation of the replacement steam dryer. The collected data will provide the in-plant pressure measurements for additional validation of the acoustic circuit model together with scale model test results for the QCNPS Unit 1 steam dryer. EGC will evaluate the acoustic circuit model using the main steam line (MSL) strain gauge data without bias from the instrumented steam dryer test data. EGC will share the predicted QCNPS Unit 1 steam dryer loads based on the acoustic circuit model using the MSL strain gauge data with the NRC for comparison to the actual QCNPS Unit 1 loads obtained from the instrumented steam dryer. Based on the evaluation of the acoustic circuit model, EGC will consider whether conducting scale model testing of the DNPS steam dryers is necessary for confirmation of the adequacy of the dryer design. EGC will make these evaluations available to the NRC. Results are expected in early May 2005, and EGC will meet with the NRC technical staff in late May 2005 to share the insights gained from the preliminary results. Subsequently, EGC will meet with NRC management to present and summarize the preliminary results and to discuss implications for operation of the DNPS units at EPU conditions.

EGC will perform steam dryer inspections during the next refueling outage on each DNPS unit, in accordance with GE SIL 644, Revision 1. The Unit 2 refueling outage is currently scheduled for Fall 2005. Unit 2 will have operated at EPU power levels for approximately one year, with the modified dryer, prior to shutdown for the refueling outage. The results of the Unit 2 inspection will be factored into decisions concerning DNPS Unit 3, including operation at EPU power levels, and the need to perform a mid-cycle outage and steam dryer inspection. EGC will make its evaluations of the DNPS Unit 2 steam dryer inspections and the basis for decisions concerning the DNPS Unit 3 steam dryer available to the NRC. EGC will meet with the NRC within a month following completion of the DNPS Unit 2 refueling outage to share the Unit 2 inspection results and the impact on, and plans for, Unit 3.

As described above, evaluations of EPU operation are ongoing. As new insights are gained, EGC will promptly apply the lessons learned to DNPS. Where lessons learned from these evaluations indicate significant potential degradation of the steam dryer, EGC will take appropriate actions, up to and including shutting down the applicable DNPS units to conduct inspections or modifications on an expedited basis.

### **Other Plant Components**

During the DNPS Unit 3 Fall 2004 refueling outage, EGC implemented the actions from the EPU vulnerability evaluation of plant equipment that had been developed following the adverse power uprate effects at QCNPS. EGC has taken appropriate action based on the implementation of the equipment vulnerability study at DNPS Unit 3. EGC will implement actions from the EPU vulnerability evaluation at DNPS Unit 2 during its Fall 2005 refueling outage. The details of this vulnerability review were shared with the NRC during meetings on September 23 and 24, and on October 25, 2004.

During the meeting between EGC and the NRC on December 2, 2004, the NRC requested the basis for EGC's decision to attempt to locate and retrieve the missing DNPS Unit 2 feedwater sample probe during the next refueling outage instead of during the current forced outage. This decision was based on a consideration of the dose impact associated with this effort. Activities to locate and retrieve the missing probe would require the moisture separator to be removed from the reactor vessel and placed in the dryer separator pit. Since work activities to inspect and modify the Unit 2 steam dryer were ongoing in the dryer separator pit, the divers working in that location would receive additional dose from the moisture separator. EGC estimated that approximately 20 roentgen equivalent man (rem) of additional dose would be received by the divers in the planned work sequence. Additionally, this dose may have resulted in the divers not having sufficient margin to annual dose limits to allow completion of dryer modifications. In addition, an operability determination has been performed for the missing probe, which concludes that the missing probe will have no adverse affect on safety related components. As discussed with the NRC during the meeting on October 25, 2004, EGC will attempt to locate and retrieve the missing feedwater sample probe during the Fall 2005 Unit 2 refueling outage.

### **Commitments**

During the December 2, 2004, meeting, EGC and the NRC discussed certain commitments related to the DNPS steam dryers and operation at EPU conditions. The Attachment to this letter provides regulatory commitments that EGC is making related to EPU operation for DNPS Units 2 and 3. The remaining commitments made in Reference 2 related to DNPS are included in the Attachment to this letter. Therefore, the commitments in the Attachment represent our commitments for DNPS in their entirety. The commitments made in Reference 2 regarding QCNPS remain in effect. These commitments reflect EGC's pledge to keep the NRC informed on steam dryer and other EPU related developments at key points in the process as technical information is collected and analyzed.

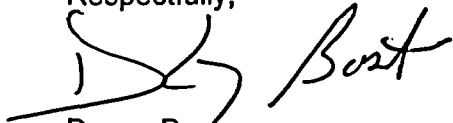
### **Summary**

EGC has concluded that the service life of the DNPS steam dryers remains acceptable to support the current fuel cycles on both units. EGC will continue to monitor and evaluate the situation using the analytical tools and operating experience of the steam dryers described in this letter to determine the optimum long-term solution.

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If you have any questions concerning this submittal, please contact Mr. Pedro Salas, at (815) 416-2800.

Respectfully,

A handwritten signature in black ink, appearing to read "Bost", written over a stylized, abstract scribble.

Danny Bost  
Site Vice President  
Dresden Nuclear Power Station

Attachment: Summary of Commitments

cc: Regional Administrator – NRC Region III  
NRC Senior Resident Inspector – Dresden Nuclear Power Station

**ATTACHMENT**  
**Summary of Commitments**

The following tables identify commitments being made by Exelon Generation Company, LLC (EGC). Any other actions discussed in this letter represent intended or planned actions by EGC. They are described for the NRC's information and are not regulatory commitments.

Commitment		Committed Date or Outage
1	EGC will have a Startup and Power Ascension Monitoring Plan in place for steam, feedwater, and reactor parameters at Dresden Nuclear Power Station (DNPS) Units 2 and 3. The criteria in place will allow for evaluation of steam dryer performance and the identification of steam dryer structural degradation. EGC will evaluate the monitored parameters and take the appropriate actions based upon the indications. If reasonable assurance of steam dryer structural integrity cannot be confirmed, positive action will be taken to reduce reactor power up to and including reactor shutdown.	For each unit, prior to each start-up from Fall 2004 outage
2	For each DNPS unit, EGC will use the data collected from the main steam line strain gauges in the acoustic circuit analysis to better define the loads at extended power uprate (EPU) power. A dynamic finite element model (FEM) will then be completed for the as-modified steam dryers. The acoustic circuit analysis time histories will be put into the FEM to demonstrate the robustness of the 2004 repairs and modifications compared to the 2003 repairs and modifications. EGC will submit an updated evaluation of the DNPS steam dryers for EPU operation.	January 2005
3	EGC will meet with the NRC to share the results of the detailed acoustic circuit analyses described in commitment 2.	Mid-February 2005
4	EGC will evaluate the acoustic circuit model using the main steam line (MSL) strain gauge data without bias from the Quad Cities Nuclear Power Station (QCNPS) Unit 1 instrumented steam dryer test data, and take appropriate action in response to the application of the test results to the DNPS steam dryers. EGC will share the predicted QCNPS Unit 1 steam dryer loads based on the acoustic circuit model using the MSL strain gauge data with the NRC for comparison to the actual QCNPS Unit 1 loads obtained from the instrumented steam dryer. EGC will meet with the NRC technical staff to discuss: (1) preliminary results of the collected QCNPS Unit 1 instrumented steam dryer data including fidelity with the steam dryer analytical work and DNPS strain gauge data at higher power levels, (2) results of scale model testing of the QCNPS Unit 1 steam dryer, and (3) the decision and its basis regarding scale model testing of the DNPS steam dryers.	Late May 2005

**ATTACHMENT**  
**Summary of Commitments**

<b>Commitment</b>		<b>Committed Date or Outage</b>
5	EGC will meet with NRC management to present and summarize the preliminary results described in commitment 4 as they apply to the operation of the DNPS units at EPU conditions.	Late June 2005
6	EGC will conduct an inspection of the DNPS Unit 2 steam dryer during its next refueling outage using General Electric Service Information Letter 644, Revision 1, and other appropriate inspection guidance. EGC will evaluate results of the DNPS Unit 2 steam dryer inspection, and determine appropriate action for DNPS Unit 3. The acceptance criteria will be that no structurally significant cracking is identified that would limit operation.	Fall 2005 refueling outage for DNPS Unit 2
7	EGC will meet with the NRC to share the results of the DNPS Unit 2 inspection conducted as part of commitment 6, and the impact on, and plans for, Unit 3. EGC will factor the Unit 2 inspection results and analytical work done to date into the decision making process related to operating DNPS Unit 3 at EPU power levels and whether a mid-cycle outage is appropriate for a steam dryer inspection.	Within 1 month after the Fall 2005 refueling outage for DNPS Unit 2
8	Where lessons learned from evaluations or inspections conducted pursuant to commitments described in this letter indicate significant potential degradation of the steam dryer, EGC will take appropriate actions up to and including shutting down the applicable unit to conduct inspections or modifications on an expedited basis.	Fall 2006 refueling outage for DNPS Unit 3
9	EGC will attempt to locate and retrieve the lost DNPS Unit 2 feedwater sample probe.	Fall 2005 refueling outage
10	For DNPS Unit 2, based on results of the EPU vulnerability team effort, EGC will perform a general visual inspection of the reactor pressure vessel internals, steam, and feedwater systems, including inspection and disassembly if needed of the most susceptible components, which include electromatic relief valves.	Fall 2005 refueling outage