November 7, 2006

Mr. Christopher M. Crane, President
and Chief Nuclear Officer
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: DRESDEN NUCLEAR POWER STATION, UNIT 3 - ISSUANCE OF AMENDMENT RE: MINIMUM CRITICAL POWER RATIO SAFETY LIMIT (TAC NO. MD2706)

Dear Mr. Crane:

The Commission has issued the enclosed Amendment No. 213 to Renewed Facility Operating License No. DPR-25 for Dresden Nuclear Power Station, Unit 3. The amendment is in response to your application dated July 21, 2006, as supplemented by letter dated October 19, 2006.

The amendment revises the values of the safety limit (SL) minimum critical power ratio in Technical Specification Section 2.1.1, “Reactor Core SLs.”

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

John Honcharik, Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-249

Enclosures:
1. Amendment No. 213 to DPR-25
2. Safety Evaluation

cc w/encls: See next page

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Amendment: ML062990277
TS Pages: ML063170083 NRR-058

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DATE	11/6/2006	11/6/2006	11 / 3 /2006	11/6/2006	11/7/2006

OFFICIAL RECORD COPY

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EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-249

DRESDEN NUCLEAR POWER STATION, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 213
Renewed License No. DPR-25

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Exelon Generation Company, LLC (the licensee) dated July 21, 2006, as supplemented by letter dated October 19, 2006, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 3.B. of Renewed Facility Operating License No. DPR-25 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 213, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented prior to startup for cycle 20.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Daniel S. Collins, Chief
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Facility Operating License
and Technical Specifications

Date of Issuance: November 7, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 213

RENEWED FACILITY OPERATING LICENSE NO. DPR-25

DOCKET NO. 50-249

Replace the following pages of the Facility Operating License and Appendix “A” Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
License Page 4	License Page 4
2.0-1	2.0-1

f. Surveillance Requirement 4.9.A.10 - Diesel Storage Tank Cleaning (Unit 3 and Unit 2/3 only)

Each of the above Surveillance Requirements shall be successfully demonstrated prior to entering into MODE 2 on the first plant startup following the fourteenth refueling outage (D3R14).

3. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations: 10 CFR Part 20, Section 30.34 of 10 CFR Part 30, Section 40.41 of 10 CFR Part 40, Sections 50.54 and 50.59 of 10 CFR Part 50, and Section 70.32 of 10 CFR Part 70; is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

A. Maximum Power Level

The licensee is authorized to operate the facility at steady state power levels not in excess of 2957 megawatts (thermal), except that the licensee shall not operate the facility at power levels in excess of five (5) megawatts (thermal), until satisfactory completion of modifications and final testing of the station output transformer, the auto-depressurization interlock, and the feedwater system, as described in the licensee's telegrams; dated February 26, 1971, have been verified in writing by the Commission.

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 213, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. Reports

The licensee shall make certain reports in accordance with the requirements of the Technical Specifications.

D. Records

The licensee shall keep facility operating records in accordance with the requirements of the Technical Specifications.

E. Restrictions

Operation in the coastdown mode is permitted to 40% power.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED

AMENDMENT NO. 213 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-25

EXELON GENERATION COMPANY, LLC

DRESDEN NUCLEAR POWER STATION, UNIT 3

DOCKET NO. 50-249

1.0 INTRODUCTION

By letter to the Nuclear Regulatory Commission (NRC, the Commission) dated July 21, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML062140120), as supplemented by letter dated October 19, 2006 (ADAMS Accession Number ML062930010), Exelon Generation Company, LLC (the licensee) requested a change to the technical specifications (TSs) for Dresden Nuclear Power Station (Dresden), Unit 3. The proposed change would revise TS Section 2.1.1, "Reactor Core SLs [Safety Limits]." Specifically, the proposed change would require that for Dresden, Unit 3, the safety limit minimum critical power ratio (SLMCPR) for Global Nuclear Fuel (GNF) fuel shall be $\geq$ 1.10 for two recirculation loop operation, or $\geq$ 1.11 for single recirculation loop operation. Additionally, the proposed change would require the SLMCPR for Westinghouse fuel to be $\geq$ 1.12 for two recirculation loop operation, or $\geq$ 1.14 for single recirculation loop operation.

The October 19, 2006, supplement contained clarifying information and proposed to use the more conservative SLMCPR value of $\geq$ 1.12 for two recirculation loop operation, or $\geq$ 1.14 for single recirculation loop operation, for both the GNF and Westinghouse fuel. Therefore, since the more conservative and limiting SLMCPR is used for all fuel types in the core, the supplement provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination published in the *Federal Register* on August 29, 2006 (71 FR 51228).

The licensee is replacing Framatome-ANP (FANP) ATRIUM-9B fuel with Westinghouse SVEA-96 Optima2 fuel assemblies for Dresden, Unit 3 Cycle 20. Therefore, the Cycle 20 core contains both GNF GE14 and Westinghouse SVEA-96 Optima2 fuel. The reference core for Cycle 20 consists of 240 twice-burned GNF GE14 assemblies located at the periphery of the core, 240 once-burned GNF GE14 assemblies distributed throughout the core, and 244 fresh Westinghouse SVEA-96 Optima2 assemblies distributed throughout the core.

The NRC-approved Westinghouse methodology calculates a unique SLMCPR value for each of the two fuel product lines present in the core. The higher SLMCPR for the Westinghouse fuel will be adopted for all the bundles in the core, including the co-resident fuel.

2.0 REGULATORY EVALUATION

In its regulatory evaluation, the NRC staff considered the applicable General Design Criteria (GDC), the licensee's use and application of NRC-approved methods, and limitations applied thereto. The NRC staff also evaluated the proposed license amendment in terms of conformance with the Standard TSs.

2.1 General Design Criteria

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, GDC 10 states that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences (AOOs).

Additionally, Section 4.4, "Thermal and Hydraulic Design," of NUREG-0800, Revision 3, "NRC Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants," dated June 1996, states, in part, that the critical power ratio (CPR) is to be established such that at least 99.9 percent of the fuel rods in the core would not be expected to experience departure from nucleate boiling or boiling transition during normal operation or AOOs. The guidance provided by NUREG-0800 forms the basis for the NRC staff's review and ensures that the requirements of GDC 10 are met.

2.2 Use of NRC-Approved Methods

The CPR correlation developed for Westinghouse SVEA-96 Optima2 fuel is described in WCAP-16081-P-A, "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima 2" (ADAMS Accession Number ML051260171), which the NRC approved in a safety evaluation dated May 24, 2000. Westinghouse uses this correlation to model the CPR performance of the Westinghouse SVEA-96 Optima2 fuel that will be loaded into the Dresden, Unit 3 Cycle 20 core. WCAP-16081-P-A presents correlations that are based on methods discussed in topical report, CENPD-300-P-A, "Reference Report for Boiling Water Reactor Reload Fuel." This report was approved by the NRC in a safety evaluation dated May 24, 1996.

Westinghouse performed the Dresden, Unit 3 Cycle 20 SLMCPR analysis using plant- and cycle-specific parameters based on the core loading pattern as stated in the licensee's letter dated July 21, 2006. Westinghouse used NRC-approved neutronic methods (POLCA/PHOENIX, discussed in Combustion Engineering Nuclear Power, LLC, Report CENPD-390-P-A, "The Advanced PHOENIX and POLCA Codes for Nuclear Design of Boiling Water Reactors [BWRs]," dated December 2000 (ADAMS Accession Number ML010100348), and approved by the NRC for Dresden, Unit 3 Cycle 20 in an NRC letter dated April 4, 2006 (ADAMS Accession Number ML060750258)), to analyze the planned operating strategy. The licensee confirmed the nuclear design using CASMO-4/MICROBURN-B2, which is discussed in Siemens Power Corporation Report EMF-2158(P)(A), "Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/Microburn-B2," dated October 1999 (ADAMS Accession Number ML003698553). PHOENIX and CASMO4 are lattice physics codes, and POLCA and MICROBURN-B2 are three dimensional core simulators.

2.3 Limitations to NRC-Approved Methods

The Westinghouse methodology determines separate SLMCPR values for different, co-resident fuel. For the transient analyses, Westinghouse developed the USAG14 correlation to model the co-resident GNF fuel. USAG14 is used to determine the conservative adder to be applied to the operating limit minimum critical power ratio (OLMCPR) for the legacy fuel that ensures that the legacy fuel operating limits meet the 95/95 statistical criterion required by the NRC staff. The NRC staff did not generically review and approve the Westinghouse CPR correlation for GNF GE14 fuel. Therefore, the use of this method must be reviewed and approved on a plant- and cycle-specific basis.

The Westinghouse methodology does not generate the information necessary to calculate a technically justified SLMCPR value for the co-resident legacy fuel. Therefore, the NRC staff finds that the Westinghouse methodology is not a cycle-specific methodology.

Dresden, Unit 3 has implemented an extended power uprate (EPU) to 120 percent of the original licensed thermal power. In addition, Dresden, Unit 3 will operate at uprated conditions with a mixed-vendor core. In order to meet the energy requirement for the EPU and long cycle length, the core has been loaded with a large fresh batch fraction. Therefore, the NRC staff reviewed the applicability of the currently approved Westinghouse SLMCPR methodology to Dresden, Unit 3 Cycle 20 operation. The NRC staff requested that the licensee demonstrate that the SLMCPR values assumed for the different resident fuel product lines bound the SLMCPR for a core consisting of 33.7 percent fresh fuel and 66.3 percent once- or twice-burned fuel operated with a limiting rod pattern. This is further discussed in Section 3.2 of this safety evaluation.

2.4 Conformance with Technical Specifications

Fuel design limits can be exceeded if the core exceeds critical power. Critical power is a term used for the power at which the fuel departs from nucleate boiling and enters a transition to film boiling. Due to core-wide and operational variations, the margin to boiling transition is most easily described in terms of a CPR, which is defined as the rod critical power as calculated by an experimental correlation, divided by the actual rod power.

Safety limits are required to be in the TS by 10 CFR 50.36(c)(1), "Safety limits, limiting safety system settings, and limiting control settings." The SLMCPR is a safety limit required to protect the fuel design limits with respect to critical power. The SLMCPR is calculated on a cycle-specific basis, because it is necessary to account for the core configuration-specific neutronic and thermal-hydraulic response. It is calculated using a statistical process that takes into account all operating parameters and associated uncertainties. The SLMCPR is the core-wide critical power ratio at which 99.9 percent of the rods in the core would not be expected to undergo boiling transition during normal operation.

The MCPR fuel cladding integrity safety limit ensures that during normal operation and during AOOs, at least 99.9 percent of the fuel rods in the core do not experience transition boiling. This is accomplished by the determination of a CPR margin for transients, which is added to the SLMCPR to determine the OLMCPR. At the OLMCPR, at least 99.9 percent of the fuel rods

would be expected not to experience transition boiling during normal operations and transients caused by single operator error or equipment malfunction.

3.0 TECHNICAL EVALUATION

3.1 SLMCPR for Westinghouse SVEA-96 Optima2 Fuel

The SLMCPR was determined in accordance with the approved methods discussed in Section 2.2 of this safety evaluation. WCAP-16081-P-A provides the CPR correlation adaptation and validation for 10x10 SVEA-96 Optima2 fuel for input to the methods described in CENPD-300-P-A. Upon approval of the reports discussed above, the NRC issued several conditions that must be satisfied by the licensee that are relevant to the SLMCPR determination. The NRC staff reviewed conditions applied to the approval of each report.

Restrictions imposed on the CPR for Westinghouse SVEA-96 Optima2 fuel apply limitations to the range of parameters over which the CPR correlation is valid. The range of parameters envelops the operating range expected for Dresden, Unit 3 Cycle 20. Therefore, the NRC staff concludes that WCAP-16081-P-A has been applied correctly.

The Westinghouse BWR licensing methodology described in CENPD-300-P-A presents overall, generic approaches for performing the required safety analyses. However, the NRC staff safety evaluation report (SER) and the supporting technical evaluation report (TER) for CENPD-300-P-A defined the specific acceptable methodology and delineated the important limitations and restrictions.

The NRC staff reviewed the limitations and restrictions in the SER approving CENPD-300-P-A and determined that, for Dresden, Unit 3 Cycle 20, restrictions 1-6 and 8 are satisfied, because the licensee applied the methodologies from CENPD-300-P-A consistent with the manner specified in restrictions 1-6 and 8 of the SER approving CENPD-300-P-A.

The NRC staff also concludes that Restriction 7 of the SER, and Restriction 5 of the TER, rely on evaluation of the core- and cycle-specific conditions. Therefore, the NRC staff further evaluated the applicability of these conditions to Dresden, Unit 3 Cycle 20. These restrictions are discussed and evaluated in Section 3.2 of this safety evaluation.

The NRC staff concludes that the licensee applied an NRC-approved methodology in an acceptable manner. The proposed SLMCPR for the Westinghouse SVEA-96 Optima2 fuel is acceptable.

3.2 SLMCPR for Co-resident GE14 Fuel

The Westinghouse SLMCPR methodology for the co-resident GNF GE14 fuel involves assumptions that are intended to yield a bounding SLMCPR value for the legacy fuel. TER Condition 5 discusses the legacy fuel assumed loading pattern. Condition 5 states that a review is performed with the understanding that non-ABB (now Westinghouse) fuel will not be located in the limiting positions of the core so that if ABB/CE (Westinghouse) has no access to the CPR correlation for that particular fuel, its use of a renormalized CPR correlation will not impact the calculation of safety limits. However, if this is not the case, the use of a

renormalized CPR correlation is restricted unless it has been demonstrated to produce adequately conservative results.

Evaluation of the Dresden, Unit 3 Cycle 20 shows that the 1/3 once-burned GNF GE14 fuel is at its most reactive state and is distributed evenly throughout the core, with specific control cells containing four GE14 fuel bundles. The loading pattern cannot be characterized as "non-limiting." This is due to the fact that Dresden, Unit 3 operates at EPU levels, and there is a larger batch fraction of once-burned fuel loaded into the core than had been anticipated by the NRC staff at the time of the 1996 approval of CENPD-300-P-A. The NRC staff requested that Westinghouse demonstrate that the assumptions made regarding the legacy SLMCPR data were valid for the Dresden, Unit 3 Cycle 20 core.

In lieu of providing the requested information, the licensee elected to apply the higher SLMCPR value to the co-resident GNF GE14 fuel. In its October 19, 2006 submittal, the licensee proposed to envelope the entire core with a single SLMCPR value of $\geq$ 1.12 for dual recirculation loop operation, and $\geq$ 1.14 for single recirculation loop operation.

The NRC staff is satisfied that the application of the higher, Westinghouse SVEA-96 Optima2 SLMCPR value to the co-resident, legacy fuel provides adequate assurance that the SLMCPR applied to the GNF GE14 fuel in the core will bound the SLMCPR performance of Dresden, Unit 3 Cycle 20. The Westinghouse fuel SLMCPR value is derived assuming a full Westinghouse SVEA-96 Optima2 core is burned at limiting control rod patterns throughout the cycle. The NRC staff finds that the higher SLMCPR value, along with the additional adder to the OLMCPR, provides reasonable confidence in the SLMCPR value.

With regard to the OLMCPR adder, Condition 7 of the NRC staff SER of CENPD-300-P-A states that the ABB/CE (Westinghouse) methodology for determining the operating limit maximum critical power ratio (OLMCPR) for non-ABB/CE (Westinghouse) fuel as described in CENPD-300-P-A and additional submittals is acceptable only when each licensee application of the methodology identifies the value of the conservative adder to the OLMCPR. The correlation applied to the experimental data to determine the value of the adder must be shown to meet the 95/95 statistical criteria. In addition, the licensee's submittal must include the justification for the adder and reference the appropriate supporting documentation.

The USAG14 CPR correlation was developed from the Westinghouse CPR correlation by varying key parameters important to the CPR correlation such as mass flux, enthalpy, and pressure. The correlation prediction was corrected using operational and experimental data. The CPR correlation predictions were validated using the results of core-specific GEXL correlation predictions, which were developed from actual, full-scale bundle data. The Westinghouse methodology also adds a multiplicative factor to the USAG14 CPR prediction such that a conservative adder to the OLMCPR is developed. The licensee complied with this approach and established the conservative multiplier. The NRC staff concludes that Restriction 7 of the SER to CENPD-300-P-A has been satisfied. The USAG14 correlation has been applied in an acceptable manner based on compliance with Restriction 7 of the SER to CENPD-300-P-A.

The NRC staff also reviewed the licensee's target OLMCPRs for each species of fuel and determined that the statistical treatment of the USAG14 correlation makes the OLMCPR value for the GE14 fuel conservative.

Since approval of CENPD-300-P-A, insight gained through operating experience has shown that additional conservatisms must be applied to CPR correlations to obtain SLMCPR values. A notice submitted by GE in accordance with 10 CFR Part 21, "Reporting of Defects and Noncompliance" identified potential non-conservatisms related to the critical power determination. The licensee indicated that this 10 CFR Part 21 notification concerns GNF GE14 fuel, and that the Westinghouse correlation used for the GNF GE14 fuel was developed using GE data corrected for the issue identified in the 10 CFR Part 21 notification. The NRC staff finds consideration and resolution of the 10 CFR Part 21 issue acceptable.

The licensee provided adequate information to justify the revised methods applied by Westinghouse to determine the SLMCPR for GNF GE14 fuel in the core. In consideration of the information provided by the licensee, identification of the OLMCPR adder, and the 10 CFR Part 21 issue resolution, the NRC staff finds that the licensee may implement the proposed and amended SLMCPR for GNF GE14 fuel for Dresden, Unit 3 Cycle 20.

3.3 Single Loop Operation SLMCPR

During reactor operation with a single recirculation loop in service, the licensee proposed an SLMCPR value of $\geq$ 1.14. This value has additional conservatism beyond that approved for dual recirculation loop operation to account for core flow uncertainty. The NRC staff reviewed the licensee's applications of core flow uncertainty to the SLMCPR and found it acceptable because the single recirculation loop SLMCPR provides adequately conservative margin for core flow uncertainty associated with single recirculation loop operation. Therefore, the single recirculation loop SLMCPR is acceptable and may be implemented for Dresden, Unit 3 Cycle 20.

3.4 Summary

In consideration of the information discussed above, the NRC staff finds that the proposed amendment is acceptable. Specifically, the licensee for Dresden, Unit 3, may revise TS 2.1.1.2, to reflect cycle-specific values. These values shall be $\geq$ 1.12 for two recirculation loop operation, and $\geq$ 1.14 for single recirculation loop operation.

The NRC staff has reviewed the licensee's proposed revision to the TSs Bases and found them acceptable because they are NRC approved methodologies that support the SLMCPR calculation. However, the NRC staff recommends that the licensee conduct a timely review of the methodologies listed in the "Reference," section of the TS Bases to comply with the guidance specified in Generic Letter 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications." For example, Items 2, 3 and 5 are Framatome methodologies, yet there will be no Framatome fuel in the Dresden, Unit 3, Cycle 20 core. Items 2, 3 and 5 would then be removed from the "Reference" section of the TS Bases.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes the requirements with respect to installation or use of a facility's components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (71 FR 51228; August 29, 2006). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: B. Parks, NRR

Date: November 7, 2006