April 19, 2002

Mr. John L. Skolds, President
Exelon Nuclear
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BYRON STATION, UNITS 1 AND 2, AND BRAIDWOOD STATION, UNITS 1 AND 2 - ISSUANCE OF AMENDMENTS (TAC NOS. MB3013, MB3014, MB3011, AND MB3012)

Dear Mr. Skolds:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 127 to Facility Operating License No. NPF-37 and Amendment No. 127 to Facility Operating License No. NPF-66 for the Byron Station, Unit Nos. 1 and 2, respectively, and Amendment No. 122 to Facility Operating License No. NPF-72 and Amendment No. 122 to Facility Operating License No. NPF-77 for the Braidwood Station, Unit Nos. 1 and 2, respectively. The amendments are in response to your application dated September 21, 2001, as supplemented by your letter dated January 31, 2002.

The amendments will revise the reactor core safety limit for peak fuel centerline temperature from less than or equal to 4700 °F (i.e., the current technical specification limit) to the design-basis fuel centerline melt temperature of less than 5080 °F for unirradiated fuel, decreasing by 58 °F per 10,000 Megawatt-Days per Metric Tonne Uranium (MWD/MTU) burnup.

In addition, the NRC staff has determined that it is acceptable to irradiate four fuel rods in a lead test fuel assembly, currently in the Byron Unit 2 reactor, for up to 69,000 MWD/MTU. The assembly contains four previously burned ZIRLO clad fuel rods with a beginning-of-cycle burnup of approximately 45,750 MWD/MTU. Evaluation of the fuel rods is expected to provide data on the performance of fuel at extended burnup conditions.

The NRC staff has refused to release the licensee from its commitment regarding extending burnup limit up to 75,000 MWD/MTU for future Lead Test Assembly (LTA) campaigns.

As part of the amendments, Appendix C to the licenses has been revised to add a license condition reflecting Exelon's agreement to limit the use of the fuel centerline melt temperature equation to uranium dioxide fuel which does not contain poisons mixed homogeneously throughout the fuel matrix.

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/

Mahesh Chawla, Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-454, STN 50-455,
STN 50-456 and STN 50-457

Enclosures: 1. Amendment No. 127 to NPF-37
2. Amendment No. 127 to NPF-66
3. Amendment No. 122 to NPF-72
4. Amendment No. 122 to NPF-77
5. Safety Evaluation

cc w/encls: See next page

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/

Mahesh Chawla, Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-454, STN 50-455,
STN 50-456 and STN 50-457

Enclosures: 1. Amendment No. 127 to NPF-37
2. Amendment No. 127 to NPF-66
3. Amendment No. 122 to NPF-72
4. Amendment No. 122 to NPF-77
5. Safety Evaluation

cc w/encls: See next page

DISTRIBUTION:

PUBLIC	W. Beckner
PD3-2 r/f	A. Stone, RIII
M. Chawla	OGC
G. Dick	ACRS
A. Mendiola	G. Hill (8)
C. Rosenberg	U. Shoop

***See previous concurrences**

ADAMS Accession Number: ML020590491 ****See Memo from Caruso to Mendiola**

TS: ML021130263 **Package: ML021350746**

OFFICE	PM:LPD3-2	PM:LPD3-2	LA:LPD3-2	SC:EMCB	SC:RORP
NAME	MChawla	GDick	CRosenberg	RCaruso**	RDennig*
DATE	04/11/02	04/11/02	04 /11/02	02/15/02	03 /06/02

OFFICE	OGC*	SC:LPD3-2
NAME	SBrock	AMendiola
DATE	04/04/02	04/15/02

OFFICIAL RECORD COPY

Byron/Braidwood Stations

cc:
Ms. C. Sue Hauser, Project Manager
Westinghouse Electric Corporation
Energy Systems Business Unit
Post Office Box 355
Pittsburgh, PA 15230

Joseph Gallo
Gallo & Ross
1025 Connecticut Ave., NW, Suite 1014
Washington, DC 20036

Howard A. Learner
Environmental Law and Policy
Center of the Midwest
35 East Wacker Dr., Suite 1300
Chicago, IL 60601-2110

U.S. Nuclear Regulatory Commission
Byron Resident Inspectors Office
4448 N. German Church Road
Byron, IL 61010-9750

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532-4351

Ms. Lorraine Creek
RR 1, Box 182
Manteno, IL 60950

Chairman, Ogle County Board
Post Office Box 357
Oregon, IL 61061

Mrs. Phillip B. Johnson
1907 Stratford Lane
Rockford, IL 61107

George L. Edgar
Morgan, Lewis and Bockius
1800 M Street, NW
Washington, DC 20036-5869

Attorney General
500 S. Second Street
Springfield, Illinois 62701

Illinois Department of Nuclear Safety
Office of Nuclear Facility Safety
1035 Outer Park Drive
Springfield, IL 62704

Byron Station Manager
Exelon Generation Company, LLC
4450 N. German Church Road
Byron, IL 61010-9794

Site Vice President - Byron
Exelon Generation Company, LLC
4450 N. German Church Road
Byron, IL 61010-9794

U.S. Nuclear Regulatory Commission
Braidwood Resident Inspectors Office
35100 S. Rt. 53, Suite 79
Braceville, IL 60407

Illinois Emergency Management
Agency
Division of Disaster Assistance &
Preparedness
110 East Adams Street
Springfield, IL 62701-1109

Chairman
Will County Board of Supervisors
Will County Board Courthouse
Joliet, IL 60434

Braidwood Station Manager
Exelon Generation Company, LLC
35100 S. Rt. 53, Suite 84
Braceville, IL 60407-9619

Ms. Bridget Little Rorem
Appleseed Coordinator
117 N. Linden Street
Essex, IL 60935

Document Control Desk-Licensing
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Exelon Generation Company, LLC
Site Vice President - Braidwood
35100 S. Rt. 53, Suite 84
Braceville, IL 60407-9619

Senior Vice President, Nuclear Services
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Vice President
Mid-West Operations Support
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Senior Vice President
Mid-West Regional Operating Group
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Director Licensing
Mid-West Regional Operating Group
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Exelon Generation Company, LLC
Regulatory Assurance Supervisor - Braidwood
35100 S. Rt. 53, Suite 84
Braceville, IL 60407-9619

Exelon Generation Company, LLC
Regulatory Assurance Supervisor - Byron
4450 N. German Church Road
Byron, IL 61010-9794

Senior Counsel, Nuclear
Mid-West Regional Operating Group
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Vice President - Licensing and Regulatory Affairs
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Chief Operating Officer
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Manager Licensing - Braidwood and Byron
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

EXELON GENERATION COMPANY, LLC

DOCKET NO. STN 50-454

BYRON STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 127
License No. NPF-37

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

   A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated September 21, 2001, as supplemented by letter dated January 31, 2002, 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 2.C.(2) of Facility Operating License No. NPF-37 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 127 and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Anthony J. Mendiola, Chief, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 19, 2002

EXELON GENERATION COMPANY, LLC

DOCKET NO. STN 50-455

BYRON STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 127
License No. NPF-66

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

   A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated September 21, 2001, as supplemented by letter dated January 31, 2002, 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 2.C.(2) of Facility Operating License No. NPF-66 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A (NUREG-1113), as revised through Amendment No. 127 and the Environmental Protection Plan contained in Appendix B, both of which were attached to License No. NPF-37, dated February 14, 1985, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Anthony J. Mendiola, Chief, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 19, 2002

ATTACHMENT TO LICENSE AMENDMENT NOS. 127 AND 127

FACILITY OPERATING LICENSE NOS. NPF-37 AND NPF-66

DOCKET NOS. STN 50-454 AND STN 50-455

Revise the Operating License, Appendix “A” Technical Specifications, and Appendix “C” Additional Conditions, by removing the pages identified below and inserting the attached pages. The revised pages are identified by amendment number and contain marginal lines indicating the area of change.

License Pages

Remove Pages	Insert Pages
Page 4 (Unit 1)	Page 4 (Unit 1)
Page 4 (Unit 2)	Page 4 (Unit 2)

Technical Specification Pages

Remove Pages	Insert Pages
2.0 - 1	2.0 - 1

Additional Conditions Pages

Remove Pages	Insert Pages
Page 2 (Unit 1)	Page 2 (Unit 1)
Page 2 (Unit 2)	Page 2 (Unit 2)

(7) Deleted

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(9) Deleted.

(10) Deleted.

(11) Deleted.

(12) Deleted.

(13) Deleted.

(14) Deleted.

(15) Deleted.

(16) Deleted.

(17) Additional Conditions

The Additional Conditions contained in Appendix C, as revised through Amendment No. 127, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Additional Conditions.

(18) Exelon Generation Company, LLC shall provide the Director of the Office of Nuclear Reactor Regulation a copy of any application, at the time it is filed, to transfer (excluding grants of security interests or liens) from Exelon Generation Company, LLC to its direct or indirect parent, or to any other affiliated company, facilities for the production, transmission, or distribution of electric energy having a depreciated book value exceeding ten percent (10%) of Exelon Generation Company, LLC's consolidated net utility plant, as recorded on Exelon Generation Company, LLC's books of account.

(19) Exelon Generation Company, LLC, shall have decommissioning trust funds for Byron, Unit 1, in the following minimum amount, when Byron, Unit 1, is transferred to Exelon Generation Company, LLC:

Byron, Unit 1	$169,659,917

(20) The decommissioning trust agreement for Byron, Unit 1, at the time the transfer of the unit to Exelon Generation Company, LLC is effected and thereafter, is subject to the following:

(6) Additional Conditions

The Additional Conditions contained in Appendix C, as revised through Amendment No. 127, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Additional Conditions.

(7) Exelon Generation Company, LLC shall provide the Director of the Office of Nuclear Reactor Regulation, a copy of any application, at the time it is filed, to transfer (excluding grants of security interests or liens) from Exelon Generation Company, LLC to its direct or indirect parent, or to any other affiliated company, facilities for the production, transmission, or distribution of electric energy having a depreciated book value exceeding ten percent (10%) of Exelon Generation Company, LLC's consolidated net utility plant, as recorded on Exelon Generation Company, LLC's books of account.

(8) Exelon Generation Company, LLC shall have decommissioning trust funds for Byron, Unit 2, in the following minimum amount, when Byron, Unit 2, is transferred to Exelon Generation Company, LLC:

Byron Unit 2	$156,560,489

(9) The decommissioning trust agreement for Byron, Unit 2, at the time the transfer of the unit to Exelon Generation Company, LLC is effected and thereafter, is subject to the following:

(a) The decommissioning trust agreement must be in a form acceptable to the NRC.

(b) With respect to the decommissioning trust fund, investments in the securities or other obligations of Exelon Corporation or affiliates thereof, or their successors or assigns are prohibited. Except for investments tied to market indexes or other non-nuclear sector mutual funds, investments in any entity owning one or more nuclear power plants are prohibited.

ADDITIONAL CONDITIONS

FACILITY OPERATING LICENSE NO. NPF-37

The licensee shall comply with the following conditions on the schedules noted below:

Amendment Number	Additional Condition	Implementation Date
119	The licensee shall implement modifications as discussed in Section 5.11.9 of the Safety Evaluation to maintain the stability of the Byron transmission grid. The modifications include a reduction in the existing local breaker backup time settings and a revision of the unit trip schemes.	Prior to implementation of full power uprate conditions
119	The licensee shall submit to the NRC a confirmatory analysis using a model acceptable to the NRC justifying the value of 8.5 hours for the time of switchover to hot leg injection following a loss-of-coolant accident (Safety Evaluation Section 3.1.3); or recalculate the switchover time using the currently accepted methodology.	Submit by June 1, 2002
119	The licensee shall make the instrumentation changes as described in Section 4.15.2 of the Safety Evaluation.	Prior to implementation of full power uprate conditions
127	The safety limit equation specified in TS 2.1.1.3 regarding fuel centerline melt temperature (i.e., less than 5080 °F, decreasing by 58 °F per 10,000 MWD/MTU burnup as described in WCAP-12610-P-A, "VANTAGE+ Fuel Assembly Reference Core Report," April 1995) is valid for uranium oxide fuel without the presence of poisons mixed homogeneously into the fuel pellets. If fuel pellets incorporating homogeneous poisons are used, the topical report documenting the fuel centerline melt temperature basis must be reviewed and approved by the NRC and referenced in this license condition. TS 2.1.1.3 must be modified to also include the fuel centerline melt temperature limit for the fuel with homogeneous poison.	With implementation of the amendment

ADDITIONAL CONDITIONS

FACILITY OPERATING LICENSE NO. NPF-66

The licensee shall comply with the following conditions on the schedules noted below:

Amendment Number	Additional Condition	Implementation Date
119	The licensee shall implement modifications as discussed in Section 5.11.9 of the Safety Evaluation to maintain the stability of the Byron transmission grid. The modifications include a reduction in the existing local breaker backup time settings, a revision of the unit trip schemes, and the installation of a power system stabilizer.	Prior to implementation of full power uprate conditions
119	The licensee shall submit to the NRC a confirmatory analysis using a model acceptable to the NRC justifying the value of 8.5 hours for the time of switchover to hot leg injection following a loss-of-coolant accident (Safety Evaluation Section 3.1.3); or recalculate the switchover time using the currently accepted methodology.	Submit by June 1, 2002
119	The licensee shall make the instrumentation changes as described in Section 4.15.2 of the Safety Evaluation.	Prior to implementation of full power uprate conditions
127	The safety limit equation specified in TS 2.1.1.3 regarding fuel centerline melt temperature (i.e., less than 5080 °F, decreasing by 58 °F per 10,000 MWD/MTU burnup as described in WCAP-12610-P-A, "VANTAGE+ Fuel Assembly Reference Core Report," April 1995) is valid for uranium oxide fuel without the presence of poisons mixed homogeneously into the fuel pellets. If fuel pellets incorporating homogeneous poisons are used, the topical report documenting the fuel centerline melt temperature basis must be reviewed and approved by the NRC and referenced in this license condition. TS 2.1.1.3 must be modified to also include the fuel centerline melt temperature limit for the fuel with homogeneous poison.	With implementation of the amendment

EXELON GENERATION COMPANY, LLC

DOCKET NO. STN 50-456

BRAIDWOOD STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 122
License No. NPF-72

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

   A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated September 21, 2001, as supplemented by letter dated January 31, 2002, 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 2.C.(2) of Facility Operating License No. NPF-72 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 122 and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Anthony J. Mendiola, Chief, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 19, 2002

EXELON GENERATION COMPANY, LLC

DOCKET NO. STN 50-457

BRAIDWOOD STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 122
License No. NPF-77

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

   A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated September 21, 2001, as supplemented by letter dated January 31, 2002, 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 2.C.(2) of Facility Operating License No. NPF-77 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 122 and the Environmental Protection Plan contained in Appendix B, both of which were attached to License No. NPF-72, dated July 2, 1987, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date if its issuance and shall be implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Anthony J. Mendiola, Chief, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 19, 2002

ATTACHMENT TO LICENSE AMENDMENT NOS. 122 AND 122

FACILITY OPERATING LICENSE NOS. NPF-72 AND NPF-77

DOCKET NOS. STN 50-456 AND STN 50-457

Revise the Operating License, Appendix “A” Technical Specifications, and Appendix “C” Additional Conditions, by removing the pages identified below and inserting the attached pages. The revised pages are identified by amendment number and contain marginal lines indicating the area of change

License Pages

Remove Pages	Insert Pages
Page 4 (Unit 1)	Page 4 (Unit 1)
Page 4 (Unit 2)	Page 4 (Unit 2)

Technical Specification Pages

Remove Pages	Insert Pages
2.0 - 1	2.0 - 1

Additional Conditions Pages

Remove Pages	Insert Pages
Page 2 (Unit 1)	Page 2 (Unit 1)
Page 2 (Unit 2)	Page 2 (Unit 2)

(4) Initial Startup Test Program

Any changes to the Initial Test Program described in Section 14 of the FSAR made in accordance with the provisions of 10 CFR 50.59 shall be reported in accordance with 50.59(b) within one month of such change.

(5) Regulatory Guide 1.97, Revision 2 Compliance

The licensee shall submit the final report and a schedule for implementation within six months of NRC approval of the DCRDR.

(6) Deleted.

(7) Additional Conditions

The Additional Conditions contained in Appendix C, as revised through Amendment No. 122, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Additional Conditions.

(8) Exelon Generation Company shall provide to the Director of the Office of Nuclear Reactor Regulation a copy of any application, at the time it is filed, to transfer (excluding grants of security interests or liens) from Exelon Generation Company to its direct or indirect parent, or to any other affiliated company, facilities for the production, transmission, or distribution of electric energy having a depreciated book value exceeding ten percent (10%) of Exelon Generation Company's consolidated net utility plant, as recorded on Exelon Generation Company's books of account.

(9) Exelon Generation Company shall have decommissioning trust funds for Braidwood, Unit 1, in the following minimum amount, when Braidwood, Unit 1, is transferred to Exelon Generation Company:

Braidwood Unit 1	$154,273,345

(10) The decommissioning trust agreement for Braidwood, Unit 1, at the time the transfer of the unit to Exelon Generation Company is effected and thereafter, is subject to the following:

(a) The decommissioning trust agreement must be in a form acceptable to the NRC.

(4) Initial Startup Test Program

Any changes to the Initial Test Program described in Section 14 of the FSAR made in accordance with the provisions of 10 CFR 50.59 shall be reported in accordance with 50.59(b) within one month of such change.

(5) Deleted.

(6) Additional Conditions

The Additional Conditions contained in Appendix C, as revised through Amendment No. 122, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Additional Conditions.

(7) Exelon Generation Company, LLC, shall provide the Director of the Office of Nuclear Reactor Regulation, a copy of any application, at the time it is filed, to transfer (excluding grants of security interests or liens) from Exelon Generation Company, LLC to its direct or indirect parent, or to any other affiliated company, facilities for the production, transmission, or distribution of electric energy having a depreciated book value exceeding ten percent (10%) of Exelon Generation Company, LLC's consolidated net utility plant, as recorded on Exelon Generation Company, LLC's books of account.

(8) Exelon Generation Company, LLC, shall have decommissioning trust funds for Braidwood, Unit 2, in the following minimum amount, when Braidwood, Unit 2, is transferred to Exelon Generation Company, LLC:

Braidwood Unit 2	$154,448,967

(9) The decommissioning trust agreement for Braidwood, Unit 2, at the time the transfer of the unit to Exelon Generation Company, LLC is effected and thereafter, is subject to the following:

(a) The decommissioning trust agreement must be in a form acceptable to the NRC.

(b) With respect to the decommissioning trust fund, investments in the securities or other obligations of Exelon Corporation or affiliates thereof, or their successors or assigns are prohibited. Except for investments tied to market indexes or other non-nuclear sector mutual funds, investments in any entity owning one or more nuclear power plants are prohibited.

ADDITIONAL CONDITIONS

FACILITY OPERATING LICENSE NO. NPF-72

The licensee shall comply with the following conditions on the schedules noted below:

Amendment Number	Additional Condition	Implementation Date
113	The licensee shall implement modifications as discussed in Section 5.11.9 of the Safety Evaluation to maintain the stability of the Braidwood transmission grid including a reduction in the existing local breaker backup time settings.	Prior to implementation of full power uprate conditions
113	The licensee shall submit to the NRC a confirmatory analysis using a model acceptable to the NRC justifying the value of 8.5 hours for the time of switchover to hot leg injection following a loss-of-coolant accident (Safety Evaluation Section 3.1.3); or recalculate the switchover time using the currently accepted methodology.	Submit by June 1, 2002
113	The licensee shall make the instrumentation changes as described in Section 4.15.2 of the Safety Evaluation.	Prior to implementation of full power uprate conditions
122	The safety limit equation specified in TS 2.1.1.3 regarding fuel centerline melt temperature (i.e., less than 5080 °F, decreasing by 58 °F per 10,000 MWD/MTU burnup as described in WCAP-12610-P-A, "VANTAGE+ Fuel Assembly Reference Core Report," April 1995) is valid for uranium oxide fuel without the presence of poisons mixed homogeneously into the fuel pellets. If fuel pellets incorporating homogeneous poisons are used, the topical report documenting the fuel centerline melt temperature basis must be reviewed and approved by the NRC and referenced in this license condition. TS 2.1.1.3 must be modified to also include the fuel centerline melt temperature limit for the fuel with homogeneous poison.	With implementation of the amendment

ADDITIONAL CONDITIONS

FACILITY OPERATING LICENSE NO. NPF-77

The licensee shall comply with the following conditions on the schedules noted below:

Amendment Number	Additional Condition	Implementation Date
113	The licensee shall implement modifications as discussed in Section 5.11.9 of the Safety Evaluation to maintain the stability of the Braidwood transmission grid including a reduction in the existing local breaker backup time settings.	Prior to implementation of full power uprate conditions
113	The licensee shall submit to the NRC a confirmatory analysis using a model acceptable to the NRC justifying the value of 8.5 hours for the time of switchover to hot leg injection following a loss-of-coolant accident (Safety Evaluation Section 3.1.3); or recalculate the switchover time using the currently accepted methodology.	Submit by June 1, 2002
113	The licensee shall make the instrumentation changes as described in Section 4.15.2 of the Safety Evaluation.	Prior to implementation of full power uprate conditions
122	The safety limit equation specified in TS 2.1.1.3 regarding fuel centerline melt temperature (i.e., less than 5080 °F, decreasing by 58 °F per 10,000 MWD/MTU burnup as described in WCAP-12610-P-A, "VANTAGE+ Fuel Assembly Reference Core Report," April 1995) is valid for uranium oxide fuel without the presence of poisons mixed homogeneously into the fuel pellets. If fuel pellets incorporating homogeneous poisons are used, the topical report documenting the fuel centerline melt temperature basis must be reviewed and approved by the NRC and referenced in this license condition. TS 2.1.1.3 must be modified to also include the fuel centerline melt temperature limit for the fuel with homogeneous poison.	With implementation of the amendment

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 127 TO FACILITY OPERATING LICENSE NO. NPF-37,

AMENDMENT NO. 127 TO FACILITY OPERATING LICENSE NO. NPF-66,

AMENDMENT NO. 122 TO FACILITY OPERATING LICENSE NO. NPF-72,

AND AMENDMENT NO. 122 TO FACILITY OPERATING LICENSE NO. NPF-77

EXELON GENERATION COMPANY, LLC

BYRON STATION, UNIT NOS. 1 AND 2

BRAIDWOOD STATION, UNIT NOS. 1 AND 2

DOCKET NOS. STN 50-454, STN 50-455, STN 50-456 AND STN 50-457

1.0 INTRODUCTION

By letter dated September 21, 2001, as supplemented by letter dated January 31, 2002, Exelon Generation Company, LLC, requested that the Nuclear Regulatory Commission (NRC) provide an amendment to the technical specification (TS) for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2. This amendment will revise the reactor core safety limit for peak fuel centerline temperature from less than or equal to 4700 °F to the design-basis fuel centerline melt temperature of less than 5080 °F, for unirradiated fuel, decreasing by 58° per 10,000 Megawatt-Days per Metric Tonne Uranium (MWD/MTU) burnup. Additionally, the licensee requested to increase the rod-average burnup limit for high burnup lead test assemblies (LTAs) from 60,000 MWD/MTU to approximately 69,000 MWD/MTU for Byron Station, Unit 2 Cycle 10 (B2C10) operation and up to 75,000 MWD/MTU for future LTA campaigns. Conference calls to discuss the issues with the licensee and to clarify some portions of the submittal were held on January 14, 28, and 29, 2002.

Two LTAs are currently in use in Byron, Unit 2, Cycle 10. These LTAs are composed of low-tin ZIRLO cladding and fuel pin spring clips, and higher density fuel pellets. Additionally, one of the LTAs was modified to include four fuel rods which have been previously burned during two cycles to 45,750 MWD/MTU. Following irradiation during a third cycle, the four rods will have a projected burnup of approximately 69,000 MWD/MTU. Irradiation of these four fuel rods to a higher burnup will provide data on fuel and materials performance that will support industry goals of extending the current fuel burnup limits and will provide data to address NRC questions related to fuel performance behavior at high burnups. The data will also help confirm the applicability of nuclear design and fuel performance models at high burnups.

The proposed irradiation of this fuel assembly does not require a change to the TS. However, the planned additional cycle of operation for the high burnup fuel rods will result in burnup levels exceeding the rod burnup limit of 60,000 MWD/MTU which is the design limit for the use of Zircaloy or ZIRLO clad fuel in Byron and Braidwood approved in amendments 78 and 70 respectively.

The supplemental letter contained clarifying information and did not change the initial no significant hazards consideration determination and did not expand the scope of the original *Federal Register* notice.

2.0 BACKGROUND

Safety limits (SLs) for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of the reactor. SLs are required to be established by 10 CFR 50.36(c)(1).

In addition, General Design Criterion 10 requires that specified acceptable fuel design limits are not exceeded during steady state operation, normal operational transients, and anticipated operational occurrences. Therefore, reactor core SLs have been established to preclude violation of the following fuel design criteria:

a. There must be at least a 95 percent probability that the hot fuel pellet in the core must not experience centerline fuel melting; and,

b. There must be at least a 95 percent probability at a 95 percent confidence level that the hot fuel rod in the core does not experience departure from nucleate boiling (DNB), (i.e., the 95/95 DNB criterion).

Operating within the restrictions of this SL reduces the possible overheating of the fuel and cladding, as well as possible cladding perforation, that would result in the release of fission products to the reactor coolant. Overheating of the fuel is prevented by maintaining the steady state peak linear heat rate below the level at which fuel centerline melting occurs.

The fuel centerline temperature used in the reactor core safety limit was originally specified to be a bounding value which would protect the fuel from melting and maintain a coolable geometry during operational and anticipated accident conditions. However, fuel centerline melt temperature is a function of burnup, and as the fuel burnup is increased above current approved levels, the bounding value of 4700 °F will no longer remain conservative. The relationship between the burnup and fuel centerline melt temperature demonstrates that for uranium oxide fuel without the presence of poisons mixed homogeneously into the fuel matrix, the fuel melt temperature will be less than 4700 °F after a burnup of approximately 65,500 MWD/MTU. Since the four requested LTAs fuel rods are projected to reach a burnup of approximately 69,000 MWD/MTU, the fuel centerline melt temperature safety limit TS must be modified so that it continues to preclude fuel melt during the normal operation and anticipated transient modes.

By a letter dated January 19, 1999, the NRC approved WCAP-14483, “Generic Methodology for Expanded Core Operating Limits Report.” This WCAP was used as a basis for the justification

and approval of TSTF-339 Rev. 2 in which the TS safety limits were changed in TS section 2.1.1. of the standard technical specifications. TSTF-339 Rev. 2 was approved by the NRC and incorporated into NUREG-1431 Rev. 2, "Standard Technical Specification Westinghouse Plants," in October of 2001. The changes requested in the licensee's amendment request are consistent with NUREG-1431 Rev. 2.

3.0 EVALUATION

The NRC has been working recently with the industry to develop guidelines for lead test assemblies including fuel assemblies such as the one under review. The intention is to develop a set of guidelines which provides a structured process for the evaluation of LTAs while maintaining safety. These guidelines will be consistent with the NRC performance goals which are: maintain safety, maintain public confidence, improve efficiency and effectiveness of regulation, and reduce unnecessary burden. Many different aspects will be addressed in LTA guidelines, including: characterization of the fuel assembly both pre- and postirradiation, the poolside examinations to be performed, the number of LTAs allowed in any given core, the location or placement of LTAs within the core, what the safety analysis should cover and reporting requirements. The evaluation of the request to irradiate the four rods to a higher burnup has been completed with these guidelines in mind.

Extended Burnup for the Four Lead Test Rods

The LTA containing the four twice burned rods was characterized through postirradiation examinations (PIEs) to assure that the fuel assembly parameters were within acceptable limits before it was used for an additional cycle and so that the impact of the increased rod burnup could be quantified after the rods are removed from the core. The examinations performed include oxide measurements, assembly length measurements, assembly bow, profilometry, gamma scans, and crud scraping. The peak crud free measured oxide thicknesses for the four rods in the 45,043 MWD/MTU to 46,310 MWD/MTU burnup range was measured to be 38.6 to 49.6 microns. The ZIRLO rods had a peak oxide value of 14.3 to 16.3 microns over a burnup range of 26,635 to 28,037 MWD/MTU. In comparison, the low-tin ZIRLO rods had a peak oxide value of 5.8 to 10.3 microns over a burnup range of 22,256 to 27,254 MWD/MTU. These oxide values are typical for the given burnup and irradiation for an additional cycle should not result in unusual behavior which would yield an oxide thickness greater than 100 microns.

The LTAs will be used in non-limiting core locations per TS 4.2.1 so they will not be the most limiting assemblies in the core at any point during cycle operation. This was confirmed during the cycle specific reload analysis which included consideration of the four high burnup rods. Additionally, the irradiation to higher burnup levels will not impact the loss-of-coolant-accident (LOCA) analysis because the physical geometry of the fuel was not altered and the fuel temperature and pressure were bounded by the analysis.

Postirradiation testing of LTAs is essential to the value of any LTA program. Exelon described the anticipated postirradiation testing program which will include measurements of rod peak crud free oxidation, assembly length, assembly bow, profilometry, gamma scan, grid growth, grid oxide, guide thimble oxide, and grid cell size. Exelon committed to share the results of these tests with the NRC staff for informational purposes. These anticipated tests are considered to be appropriate by the NRC staff.

Based on these considerations and tests results, the NRC staff believes that allowing Byron, Unit 2 to irradiate these four ZIRLO clad rods to 69,000 MWD/MTU during the cycle 10 reload is acceptable.

Extended Burnup for Future LTA Campaigns

The licensee requested approval to alter the licensee commitment and allow for an extended burnup limit up to 75,000 MWD/MTU for future LTA campaigns. This request was not supported by data nor a rigorous proposed PIE testing program and evaluation success criteria similar to 69,000 MWD/MTU burnup limit, which would be performed to support irradiation of future LTAs to these levels. Therefore, approval for extending the burnup limit to 75,000 MWD/MTU for future LTA campaigns is not granted.

Fuel Centerline Melt Temperature Safety Limit

The fuel centerline melt temperature is a function of burnup. The relationship between uranium dioxide fuel and burnup has been determined to be 5080 °F for unirradiated fuel, decreasing by 58 °F for every 10,000 MWD/MTU burnup. This relationship was established in the initial years of the AEC based on work performed by Westinghouse and was approved for use in the analysis of ZIRLO clad fuel with a burnup up to 60,000 MWD/MTU in WCAP-12610-P-A. This relationship is valid for uranium dioxide fuel which does not contain poisons mixed homogeneously throughout the fuel matrix. Fuels which contain poisons homogeneously mixed throughout the fuel matrix may or may not be conservatively bounded by this relationship. The staff believes that specifically defining the fuel centerline melt temperature equation being used in the fuel centerline melt safety limit TS is material to the staff's approval of the requests for license conditions, and therefore is reflected in a license condition to Appendix C of the Byron and Braidwood licenses. The statement which was agreed to by the licensee on February 8, 2002, shall read:

> The safety limit equation specified in TS 2.1.1.3 regarding fuel centerline melt temperature (i.e., less than 5080 °F, decreasing by 58 °F per 10,000 MWD/MTU burnup as described in WCAP-12610-P-A, "VANTAGE+ Fuel Assembly Reference Core Report," April 1995) is valid for uranium oxide fuel without the presence of poisons mixed homogeneously into the fuel pellets. If fuel pellets incorporating homogeneous poisons are used, the topical report documenting the fuel centerline melt temperature basis must be reviewed and approved by the NRC and referenced in this license condition. TS 2.1.1.3 must be modified to also include the fuel centerline melt temperature limit for the fuel with homogeneous poison.

The four high burnup fuel rods in the LTA for Byron, Unit 2, Cycle 10 will exceed the currently approved limit of 60,000 MWD/MTU for the fuel centerline melt temperature. The correlation provides a continuously decreasing fuel centerline melt temperature limit. This limit is more conservative then the current TS limit of 4700 °F. Therefore, the staff believes that the new relationship will provide greater protection against fuel centerline melt than the current value.

4.0 SUMMARY

Based on its review, the staff concludes that changing the fuel centerline melt temperature safety limit as indicated on the proposed TS amendment is acceptable with the addition of the licensing condition to Appendix C of the Byron and Braidwood licenses. Additionally, it is acceptable to irradiate the proposed four previously burned ZIRLO clad fuel rods presently in Byron, Unit 2, to 69,000 MWD/MTU. However, the licensee did not provide sufficient information to support an extension of the burnup limit to 75,000 MWD/MTU for future LTA campaigns.

5.0 STATE CONSULTATION

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

6.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact was published in the Federal Register on April 11, 2002 (67 FR 17725). Accordingly, based upon the environmental assessment, the Commission has determined that issuance of this amendment will not have a significant effect on the quality of the human environment.

7.0 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

8.0 REFERENCES

1. Letter from T.W. Simpkin, Exelon Generation Company, to the U.S. Nuclear Regulatory Commission, submitting a request for a license amendment to Revise the Fuel Centerline Temperature Safety Limit for Byron and Braidwood Stations, September 21, 2001.

2. Westinghouse Electric Corporation, "Generic Methodology for Expanded Core Operating Limits Report," WCAP-14483-A, January 19, 1999.

3. Westinghouse Electric Corporation, "VANTAGE+ Fuel Assembly Reference Core Report," WCAP-12610-P-A, April 1995.

4. Westinghouse Electric Corporation, "Westinghouse Fuel Criteria Evaluation Process," WCAP-12488-A, July 27, 1994.

5. Letter from K.R. Jury, Exelon Generation Company, to the U.S. Nuclear Regulatory Commission, Response to Request for Additional Information Regarding a Previous License Amendment Request to Revise the Fuel Centerline Temperature Safety Limit for Byron and Braidwood Stations, January 31, 2001.

Principal Contributor: Undine Shoop

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