



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 17, 2015

Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO)
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2, AND BYRON STATION, UNIT NOS. 1 AND 2 - ISSUANCE OF AMENDMENTS REGARDING DIESEL GENERATOR LOAD REJECTION SURVEILLANCE REQUIREMENT (CAC NOS. MF5460, MF5461, MF5462, AND MF5463)

Dear Mr. Hanson:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 187 to Facility Operating License No. NPF-72 and Amendment No. 187 to Facility Operating License No. NPF-77 for Braidwood Station, Units 1 and 2, and Amendment No. 194 to Renewed Facility Operating License No. NPF-37 and Amendment No. 194 to Renewed Facility Operating License No. NPF-66 for the Byron Station, Unit Nos. 1 and 2. The amendments are in response to your application dated December 14, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14352A204), as supplemented by letters dated June 25, 2015 (ADAMS Accession No. ML15176A987), and September 16, 2015 (ADAMS Accession No. ML15259A077).

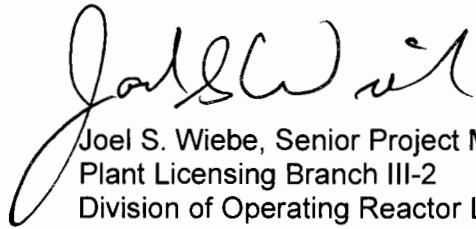
The amendments increase the voltage limit for the diesel generator full load rejection test specified by Technical Specification Surveillance Requirement (TS SR) 3.8.1.10. Additionally, the amendment adds Note 3 to TS SR 3.8.1.10 for alignment with NUREG-1431, "Standard Technical Specifications – Westinghouse Plants," Revision 4, dated April 30, 2012 (ADAMS Accession No. ML12100A222), allowing for full load reject testing in accordance with Regulatory Guide 1.9, "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class IE Onsite Electric Power Systems at Nuclear Power Plants," Revision 3 (ADAMS Accession No. ML003739929), dated July 31, 1993.

B. Hanson

- 2 -

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,

A handwritten signature in black ink, appearing to read "Joel S. Wiebe". The signature is fluid and cursive, with a large loop at the end of the last name.

Joel S. Wiebe, Senior Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Enclosures:

1. Amendment No. 187 to NPF-72
2. Amendment No. 187 to NPF-77
3. Amendment No. 194 to NPF-37
4. Amendment No. 194 to NPF-66
5. Safety Evaluation

cc w/encls: Distribution via Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

EXELON GENERATION COMPANY, LLC

DOCKET NO. STN 50-456

BRAIDWOOD STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 187
License No. NPF-72

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated December 14, 2014, as supplemented by letters dated June 25, 2015, and September 16, 2015, 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:

Enclosure 1

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 187 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 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read 'J. Poole', is written over the typed name below.

Justin C. Poole, Acting Chief
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications and Facility Operating License

Date of Issuance: December 17, 2015



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

EXELON GENERATION COMPANY, LLC

DOCKET NO. STN 50-457

BRAIDWOOD STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 187
License No. NPF-77

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated December 14, 2014, as supplemented by letters dated June 25, 2015, and September 16, 2015, 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:

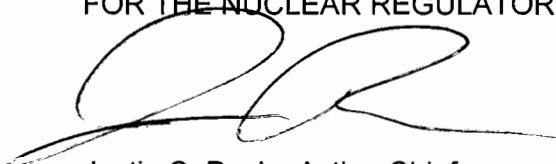
Enclosure 2

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 187 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 of its issuance and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read 'J. Poole', is written over the typed name below.

Justin C. Poole, Acting Chief
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications and Facility Operating License

Date of Issuance: December 17, 2015

ATTACHMENT TO LICENSE AMENDMENT NOS. 187 AND 187

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

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

Replace the following pages of the Facility Operating Licenses 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

License NPF-72
Page 3

License NPF-77
Page 3

TSs
3.8.1-7

Insert

License NPF-72
Page 3

License NPF-77
Page 3

TSs
3.8.1-7

- (3) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (4) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
- (5) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. The license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and 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:

(1) Maximum Power Level

The licensee is authorized to operate the facility at reactor core power levels not in excess of 3645 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein and other items identified in Attachment 1 to this license. The items identified in Attachment 1 to this license shall be completed as specified. Attachment 1 is hereby incorporated into this license.

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 187 and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Emergency Planning

In the event that the NRC finds that the lack of progress in completion of the procedures in the Federal Emergency Management Agency's final rule, 44 CFR Part 350, is an indication that a major substantive problem exists in achieving or maintaining an adequate state of emergency preparedness, the provision of 10 CFR Section 50.54(s)(2) will apply.

material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required.

- (4) Exelon Generation Company, LLC pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
- (5) Exelon Generation Company, LLC pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. The license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and 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:

(1) Maximum Power Level

The licensee is authorized to operate the facility at reactor core power levels not in excess of 3645 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein and other items identified in Attachment 1 to this license. The items identified in Attachment 1 to this license shall be completed as specified. Attachment 1 is hereby incorporated into this license.

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 187 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) Emergency Planning

In the event that the NRC finds that the lack of progress in completion of the procedures in the Federal Emergency Management Agency's final rule, 44 CFR Part 350, is an indication that a major substantive problem exists in achieving or maintaining an adequate state of emergency preparedness, the provision of 10 CFR Section 50.54(s)(2) will apply.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.9 -----NOTE----- This Surveillance shall not be performed in MODE 1 or 2. -----</p> <p>Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and:</p> <ol style="list-style-type: none"> a. Following load rejection, the frequency is ≤ 64.5 Hz; b. Following load rejection, the steady state voltage is maintained ≥ 3950 V and ≤ 4580 V; and c. Following load rejection, the steady state frequency is maintained ≥ 58.8 Hz and ≤ 61.2 Hz. 	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.8.1.10 -----NOTES-----</p> <ol style="list-style-type: none"> 1. Momentary transients above the voltage limit immediately following a load rejection do not invalidate this test. 2. This Surveillance shall not be performed in MODE 1 or 2. 3. If performed with DG synchronized with offsite power, it shall be performed at a power factor ≤ 0.89. However, if grid conditions do not permit, the power factor limit is not required to be met. Under this condition the power factor shall be maintained as close to the limit as practicable. <p>-----</p> <p>Verify each DG does not trip and voltage is maintained ≤ 5600 V during and following a load rejection of ≥ 4950 kW and ≤ 5500 kW.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

EXELON GENERATION COMPANY, LLC

DOCKET NO. STN 50-454

BYRON STATION, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 194
Renewed 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 December 14, 2014, as supplemented by letters dated June 25, 2015, and September 16, 2015, 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 Renewed Facility Operating License No. NPF-37 is hereby amended to read as follows:

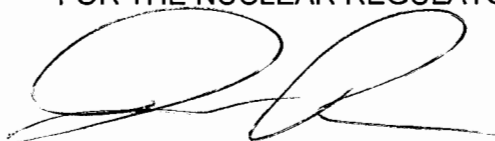
Enclosure 3

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 194 and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this renewed 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 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read 'J. Poole', is written over a horizontal line.

Justin C. Poole, Acting Chief
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications and Renewed Facility Operating License

Date of Issuance: December 17, 2015



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

EXELON GENERATION COMPANY, LLC

DOCKET NO. STN 50-455

BYRON STATION, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 194
Renewed 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 December 14, 2014, as supplemented by letters dated June 25, 2015, and September 16, 2015, 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 Renewed Facility Operating License No. NPF-66 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A (NUREG-1113), as revised through Amendment No. 194 and the Environmental Protection Plan contained in Appendix B, both of which were attached to Renewed License No. NPF-37, dated November 19, 2015, are hereby incorporated into this renewed 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 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read 'J. Poole', is written over a horizontal line.

Justin C. Poole, Acting Chief
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications and Renewed Facility Operating License

Date of Issuance: December 17, 2015

ATTACHMENT TO LICENSE AMENDMENT NOS. 194 AND 194
RENEWED FACILITY OPERATING LICENSE NOS. NPF-37 AND NPF-66
DOCKET NOS. STN 50-454 AND STN 50-455

Replace the following pages of the Renewed 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

License NPF-37
Page 3

License NPF-66
Page 3

TSs
3.8.1-5
3.8.1-6
3.8.1-7
3.8.1-8

Insert

License NPF-37
Page 3

License NPF-66
Page 3

TSs
3.8.1-5
3.8.1-6
3.8.1-7
3.8.1-8

- (2) Pursuant to the Act and 10 CFR Part 70, to receive, possess and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Updated Final Safety Analysis Report, as supplemented and amended;
 - (3) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
 - (4) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
 - (5) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.
- C. The renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and 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:
- (1) Maximum Power Level
The licensee is authorized to operate the facility at reactor core power levels not in excess of 3645 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein.
 - (2) Technical Specifications
The Technical Specifications contained in Appendix A as revised through Amendment No. 194 and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.
 - (3) Deleted.
 - (4) Deleted.

- (2) Pursuant to the Act and 10 CFR Part 70, to receive; possess and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Updated Final Safety Analysis Report, as supplemented and amended;
 - (3) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
 - (4) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
 - (5) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.
- C. The renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and 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:
- (1) Maximum Power Level
The licensee is authorized to operate the facility at reactor core power levels not in excess of 3645 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein.
 - (2) Technical Specifications
The Technical Specifications contained in Appendix A (NUREG-1113), as revised through Amendment No. 194 and the Environmental Protection Plan contained in Appendix B, both of which were attached to Renewed License No. NPF-37, dated November 19, 2015, are hereby incorporated into this renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

Renewed License No. NPF-66
Amendment No. 194

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.1 Verify correct breaker alignment and indicated power availability for each required qualified circuit.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.8.1.2 -----NOTE----- A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.7 must be met. Performance of SR 3.8.1.7 satisfies this SR. ----- Verify each DG starts from standby condition and achieves steady state voltage ≥ 3950 V and ≤ 4580 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.8.1.3 -----NOTES----- 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This Surveillance shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.7. ----- Verify each DG is synchronized and loaded and operates for ≥ 60 minutes at a load ≥ 4950 kW and ≤ 5500 kW.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.4	Verify each day tank contains ≥ 450 gal of fuel oil.	In accordance with the Surveillance Frequency Control Program
SR 3.8.1.5	Check for and remove accumulated water from each day tank.	In accordance with the Surveillance Frequency Control Program
SR 3.8.1.6	Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank(s) to the day tank.	In accordance with the Surveillance Frequency Control Program
SR 3.8.1.7	Verify each DG starts from normal standby condition and achieves: <ul style="list-style-type: none"> a. In ≤ 10 seconds, voltage ≥ 3950 V and frequency ≥ 58.8 Hz; and b. Steady state voltage ≥ 3950 V and ≤ 4580 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz. 	In accordance with the Surveillance Frequency Control Program
SR 3.8.1.8	Verify manual transfer of AC power sources from the required normal qualified circuit(s) to the reserve required qualified circuit(s).	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.9 -----NOTE----- This Surveillance shall not be performed in MODE 1 or 2. -----</p> <p>Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and:</p> <ol style="list-style-type: none"> a. Following load rejection, the frequency is ≤ 64.5 Hz; b. Following load rejection, the steady state voltage is maintained ≥ 3950 V and ≤ 4580 V; and c. Following load rejection, the steady state frequency is maintained ≥ 58.8 Hz and ≤ 61.2 Hz. 	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.8.1.10 -----NOTES-----</p> <ol style="list-style-type: none"> 1. Momentary transients above the voltage limit immediately following a load rejection do not invalidate this test. 2. This Surveillance shall not be performed in MODE 1 or 2. 3. If performed with DG synchronized with offsite power, it shall be performed at a power factor ≤ 0.89. However, if grid conditions do not permit, the power factor limit is not required to be met. Under this condition the power factor shall be maintained as close to the limit as practicable. <p>-----</p> <p>Verify each DG does not trip and voltage is maintained ≤ 5600 V during and following a load rejection of ≥ 4950 kW and ≤ 5500 kW.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.11 -----NOTE----- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. -----</p> <p>Verify on an actual or simulated loss of offsite power signal:</p> <ul style="list-style-type: none"> a. De-energization of ESF buses; b. Load shedding from ESF buses; and c. DG auto-starts from standby condition and: <ul style="list-style-type: none"> 1. energizes permanently connected loads in ≤ 10 seconds, 2. energizes auto-connected shutdown loads through the shutdown load sequence timers, 3. maintains steady state voltage ≥ 3950 V and ≤ 4580 V, 4. maintains steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies permanently connected and auto-connected shutdown loads for ≥ 5 minutes. 	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 187 TO FACILITY OPERATING LICENSE NO. NPF-72,
AMENDMENT NO. 187 TO FACILITY OPERATING LICENSE NO. NPF-77,
AMENDMENT NO. 194 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-37,
AND AMENDMENT NO. 194 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-66

EXELON GENERATION COMPANY, LLC
BRAIDWOOD STATION, UNITS 1 AND 2
BYRON STATION, UNIT NOS. 1 AND 2
DOCKET NOS. STN 50-456, STN 50-457,
STN 50-454, AND STN 50-455,

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC, the Commission) dated December 14, 2014 (Agencywide Documents Access and Management System Accession No. ML14352A204), as supplemented by letters dated June 25, 2015 (ADAMS Accession No. ML15176A987), and September 16, 2015 (ADAMS Accession No. ML15259A077), Exelon Generation Company, LLC (the licensee) requested changes to the facility operating licenses and surveillance requirements (SRs) for the Braidwood Station (Braidwood), Units 1 and 2, and Byron Station (Byron), Unit Nos. 1 and 2. The changes increase the voltage limit for the diesel generator (DG) full load rejection test specified by technical specification (TS) SR 3.8.1.10. The change resolves an existing non-conservative TS for the voltage that is maintained during a DG full load rejection test. Additionally, the proposed amendment adds Note 3 to TS SR 3.8.1.10 for alignment with the NUREG-1431, "Standard Technical Specifications – Westinghouse Plants," Revision 4, dated April 30, 2012 (ADAMS Accession No. ML12100A222). The proposed note aligns with NUREG-1431, "Standard Technical Specifications – Westinghouse Plants," Revision 4, dated April 30, 2012 (ADAMS Accession No. ML12100A222) and allows for full load reject testing in accordance with Regulatory Guide (RG) 1.9, "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class IE Onsite Electric Power Systems at Nuclear Power Plants," Revision 3, (ADAMS Accession No. ML003739929), dated July 31, 1993, while allowing slight deviations where grid conditions do not permit the required power factor limit to be met.

The supplements, contained clarifying information regarding the effects of raising the voltage level for DGs full load reject testing on other equipment and did not change the scope of the proposed action or affect the NRC staff's initial proposed finding of no significant hazards consideration (80 FR 13907; March 17, 2015).

2.0 REGULATORY EVALUATION

The NRC staff finds that the licensee, in Section 4.0 of its submittal, identified the applicable regulatory requirements. The regulatory requirements for which the staff based its acceptance are:

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 17, "Electric power systems," requires, in part, that an onsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The onsite electric power supplies including the batteries and the onsite electric distribution system shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure. In addition, this criterion requires provisions to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies.

GDC 18, "Inspection and testing of electric power systems," requires, in part, that electric power systems important to safety be designed to permit appropriate periodic inspection and testing to demonstrate operability and functional performance.

10 CFR 50.36, "Technical Specifications," requires, in part, that the TSs include items in the following five specific categories related to station operation: (1) safety limits, limiting safety system settings and limiting control settings, (2) limiting conditions for operations, (3) SRs, (4) design features, and (5) administrative controls. 10 CFR 50.36(c)(2)(i), states, in part, that the "[l]imiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility." Paragraph 50.36(c)(3) requires that TSs include SRs, which "are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met." The proposed changes discussed in this evaluation relate to the SR category.

The NRC staff considered the following NRC guidance documents for review of the licensing amendment request (LAR):

RG 1.9, Revision 3, "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," provides guidance for complying with the NRC requirements that DG units intended for use as onsite emergency power sources in nuclear power plants be selected with sufficient capacity, be qualified, and have the necessary reliability and availability for loss of offsite power and design basis accidents.

NUREG-1431, Revision 4, "Standard Technical Specification Westinghouse Plants," contains the improved STS for Westinghouse plants. The improved STS were developed based on the criteria in the Final Commission Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors (dated July 22, 1993; 58 FR 39132), which was subsequently codified by changes to Section 36 of Part 50 of 10 CFR, (10 CFR Section 50.36; 60 FR 36953) NUREG-1431 encourages licensees to upgrade their technical specifications consistent with STS.

3.0 TECHNICAL EVALUATION

The Byron and Braidwood Stations DGs are safety-related and are classified as Seismic Category I components. Two independent and redundant DGs are provided for each unit. The DGs are the onsite emergency power sources and provide power for safe shutdown and to mitigate the consequences of design basis accidents in the event that offsite power is not available. Each DG is rated for 100 percent full load operation at an Apparent Power value of 6875 kVA, power factor of 0.8, and rated voltage of 4160 Volts. This is equal to operation at a Real Power value of 5500 kW and a Reactive Power value of 4125 kVAR.

The DGs are designed for operation at rated full load and to survive a trip from full load without damage.

The purpose of the revised SR 3.8.1.10 is to redefine a new maximum DG voltage limit for the full load rejection test and add a Note in SR 3.8.1.10 which requires that if the DG full load rejection test is performed with the DG synchronized with offsite power it shall be performed at a power factor less than or equal to 0.89, unless grid conditions do not permit that limit to be met.

SR 3.8.1.10 currently states:

SR 3.8.1.10

-----NOTES-----

1. Momentary transients above the voltage limit immediately following a load rejection do not invalidate this test.
2. This Surveillance shall not be performed in MODE 1 or 2.

Verify each DG does not trip and voltage is maintained ≤ 4784 V during and following a load rejection of ≥ 4950 kW and ≤ 5500 kW.

The proposed changes would revise the SR to state (the changes are shown in **BOLD** letters):

SR 3.8.1.10

-----NOTES-----

1. Momentary transients above the voltage limit immediately following a load rejection do not invalidate this test.

2. This Surveillance shall not be performed in MODE 1 or 2.
3. **If performed with DG synchronized with offsite power, it shall be performed at a power factor ≤ 0.89 . However, if grid conditions do not permit, the power factor limit is not required to be met. Under this condition the power factor shall be maintained as close to the limit as practicable.**

Verify each DG does not trip and voltage is maintained ≤ 5600 V during and following a load rejection of ≥ 4950 kW and ≤ 5500 kW.

In the LAR, the licensee provided the following discussion regarding the reason for the changes:

RG 1.9, Revision 3, states in Section C.2.2.8 that the DG full load reject test should be performed at a power factor between 0.8 and 0.9. However, Byron and Braidwood Stations took exception to this power factor range as documented in the updated final safety analysis report (UFSAR), Appendix A, discussion for RG 1.9 (ADAMS Accession No. ML14363A494). UFSAR, Appendix A, states that the DG full load reject test specified by RG 1.9, Revision 3, Section C.2.2.8 is considered to border on destructive testing and can cause premature generator aging. As a result of this exception, the Byron and Braidwood Stations surveillance procedures have been performing the DG full load reject testing required by TS SR 3.8.1.10 at a power factor > 0.9 .

Based upon additional reviews, the licensee determined the original position that DG full load reject testing at rated power factor is potentially destructive testing was overly conservative, and that it is acceptable to perform DG full load reject testing as specified by RG 1.9, Revision 3. In addition, more recent full load reject tests have been successfully performed on all eight of the Byron and Braidwood Stations DGs (i.e., four DGs per station) at a power factor between 0.8 and 0.9 and have demonstrated that the higher peak voltages will not damage the DGs. However, in order to support this testing at a lower power factor, a revision to the maximum DG voltage specified in TS SR 3.8.1.10 for full load reject testing is required.

The proposed SR contains an additional Note 3, which requires that if the DG full load rejection test is performed with the DG synchronized with offsite power it shall be performed at a power factor less than or equal to 0.89. The new Note also states that if grid conditions do not permit meeting this power factor, the load conditions shall be maintained as close to the limit as practicable. The licensee found that recent surveillance test results have demonstrated that a power factor greater than 0.8 and less than 0.89 can be achieved for all DGs when permitted by grid conditions.

Proposed Maximum DG Voltage on Full Load Reject

In the LAR, the licensee provided the following evaluation and justification for the proposed maximum DG voltage of 5600 V on full load reject.

The Byron and Braidwood Stations DGs are rated as follows:

Apparent Power Rating = 6875 kVA
Rated Voltage = 4160 Volts
Rated Power Factor = 0.8

Based on the DG parameters, the licensee's evaluation determined that the maximum DG voltage during a full load reject test at rated and unity power factor would be as follows:

DG Voltage = 5554 Volts (at power factor = 0.8)
DG Voltage = 4742 Volts (at power factor = 1.0)

The licensee's evaluation assumed that the DG was initially operating at 4580 V, which is the maximum allowed steady state voltage in TS 3.8.1, and is considered conservative since the intent is to determine the maximum voltage during a full load reject test. The evaluation also conservatively did not credit operation of the voltage regulator which would reduce excitation following a full load reject and limit the voltage transient. The above DG voltage value of 5554 V is the bounding maximum DG voltages expected for a full load reject test at rated power factor. To provide some margin, the maximum DG voltage on full load reject is proposed as 5600 V.

The licensee stated that the periodic high potential insulation testing of in-service DG stator windings is performed at alternating current (AC) test voltage of $1.5 \times 4160 = 6240$ V. In addition, the peak voltage during a full load reject test will only be experienced for a few seconds. The voltage regulator will quickly reduce the DG output voltage. The proposed maximum DG full load reject voltage of 5600 V is less than the high potential insulation test voltages of 6240 V, and is therefore considered safe for the stator windings of the DG.

Byron and Braidwood Stations performed DG full load reject testing at a power factor between 0.8 and 0.9 in accordance with RG 1.9, Revision 3, to gather data and to verify that actual DG performance is bounded by the calculated values without creating any equipment issues or damage concerns. The licensee found that test data is bounded by the calculated value of 5554 V and proposed that the maximum DG voltage on full load reject as 5600 V to provide some margin.

Note Regarding DG Testing at Specific Power Factor

The licensee proposed to add a note from the STS (NUREG-1431) (ADAMS Accession No. ML12100A222) regarding the required power factor during DG full load reject testing with high grid voltages. NUREG-1431, Note 2 for SR 3.8.1.10, states the following:

"If performed with DG synchronized with offsite power, it shall be performed at a power factor \leq [0.9]. However, if grid conditions do not permit, the power factor limit is not required to be met. Under this condition the power factor shall be maintained as close to the limit as practicable."

For Byron and Braidwood Stations, this note is proposed to be added as Note 3 to SR 3.8.1.10. The Note provides operational flexibility for performing the surveillance during high grid voltage conditions when the grid loading may be lower than normal. During high grid voltage conditions, it may not be possible to achieve the preferred power factor loading on the DG without either exceeding an engineered safety features bus voltage limit or the DG exciter current limit. Without this allowance Note during high grid voltage conditions, the surveillance may need to be stopped and rescheduled to be performed during lower grid voltage conditions. With this allowance note in place, during high grid voltage conditions, the operators would be able to load the DG to the best achievable power factor and continue with the surveillance.

In the note of STS, the power factor is specified as \leq [0.9], wherein the bracketed value is required to be plant-specific based on the worst-case DG loadings. In the LAR, based on the Byron and Braidwood Stations DG Loading Calculations, the licensee proposed a Power Factor of \leq 0.89. This power factor value will be a bounding value to be used in the new allowance note for performance of DG full load reject testing during high grid voltage conditions. The normal power factor range for DG full load reject testing will be \geq 0.80 and \leq 0.89.

In the LAR, the licensee provided justification for the maximum voltage value that the DG stator windings can withstand corresponding to the new proposed TS value (5600 V) upon full load reject. However, the licensee did not provide justification for other equipment, in particular, the potential transformers (PTs) connected to each DG output which will also be subjected to the maximum DG voltage. The NRC staff requested the licensee to provide the maximum test voltages to which these PTs have been tested in order to allow the NRC staff to evaluate the capability of the PTs. In its letter dated June 25, 2015, the licensee stated that each DG has two sets of PTs connected to the DG output, one set of PTs located in the DG room and one set of PTs located in the 4.16 kV switchgear room. The PTs located in the DG rooms for each DG are Basler Model No. BE 13487-001. These PTs have a Dielectric Test Voltage of 12,000 V, which bounds the proposed maximum post-breaker trip DG voltage value of 5600 V in TS SR 3.8.1.10 for DG full load reject testing. The PTs located in the 4.16 kV switchgear rooms for each DG are Westinghouse Type PC-60. These PTs have a Basic Impulse Insulation Level rating of 60 kV (i.e., 60,000 V), which also bounds the requested maximum post-breaker trip DG voltage value of 5600 V (5.6 kV) in TS SR 3.8.1.10 for DG full load reject testing. The NRC staff finds this response acceptable because it provides technical information that supports the fact that the PTs would not be damaged by peak voltage of 5600 V during a DG full load rejection. However, the NRC staff requested the licensee to expand on the characteristics of the PTs located in the 4.16 kV switchgear rooms (Westinghouse Type PC-60) since the staff needed a measure of continuous duty of the PT (power frequency over voltage or withstand value) to assess whether the PT could withstand maximum test voltages. The licensee, in its letter dated September 16, 2015, provided additional information on the Westinghouse Type PC-60 PT. The licensee stated that these PTs are capable of withstanding high potential ac test voltage of

12 kV (12,000 V) for one minute which bounds the maximum transient voltage of 5600 V that could occur during a DG full load reject and also for the duration of the DG full load reject voltage transient, which would only last approximately one second. The NRC staff finds this response acceptable because it provides technical information that supports the fact that the PTs would not be damaged by a peak voltage of 5600 V during a DG full load rejection.

The NRC staff also requested the licensee to discuss how it selected the acceptable range of voltage recording/indicating instrument used for a typical performance of the surveillance. In its letter dated June 25, 2015, the licensee stated the chart recorder AC voltage modules used for the SR will be recalibrated for a secondary voltage range which will bound the proposed maximum voltage. The NRC staff finds this response acceptable because the licensee will recalibrate the chart recorder to accommodate the new voltage level for the DG load rejection test implementation by increasing the upper end of the secondary voltage range to bind the new TS limit of 5600 V. Based on above discussion, the staff finds the new TS limit of 5600 V acceptable.

The NRC staff finds the added Note 3 of SR 3.8.1.10 is consistent with a similar note in NUREG-1431. The Power Factor value indicated as ≤ 0.89 in the Note 3 bounds the power factor values determined based on the DG loading calculations performed by the licensee. Therefore, the staff finds the added Note 3 of SR 3.8.1.10 acceptable.

Based on the evaluation discussed above, the NRC staff finds that the revised limiting voltage value and the power factor note provide more conservative performance levels of equipment required for the safe operation of the facility and result in a requirement for testing more representative of loading characteristics likely to be encountered during an accident. Therefore, the NRC staff concludes that the changes to SR 3.8.1.10 meet 10 CFR 50.36 (c)(3) and conform with the applicable NRC guidance found in RG 1.9, Revision 3, and NUREG-1437. Based on the evaluation discussed above, the NRC staff finds that the testability of the on-site power system is improved because revised test criteria more closely meets conditions during actual operation of the equipment and, therefore, concludes that GDC 17 and GDC 18 are met.

Based on the licensee's use of RG 1.9, Revision 3, NUREG-1431, and the evaluation provided above, the NRC staff concludes that the changes to the limiting voltage and power factor are consistent with the guidance in these documents.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified on October 21, 2015, of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change 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 and changes an SR. The NRC staff has determined that the amendments involve 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, because these revision only modify DG full load reject testing requirements, which does not create new environmental impacts, or alter those already considered. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration (80 FR 13907; March 17, 2015), and there has been no public comment on such finding. Accordingly, the amendments meet 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 amendments.

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) there is reasonable assurance that 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.

Principal Contributor: T.Martinez-Navedo

Date of issuance: December 17, 2015

B. Hanson

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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/

Joel S. Wiebe, Senior Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Enclosures:

1. Amendment No. 187 to NPF-72
2. Amendment No. 187 to NPF-77
3. Amendment No. 194 to NPF-37
4. Amendment No. 194 to NPF-66
5. Safety Evaluation

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