



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

September 1, 2000

Mr. Oliver D. Kingsley, President  
Nuclear Generation Group  
Commonwealth Edison Company  
Executive Towers West III  
1400 Opus Place, Suite 500  
Downers Grove, IL 60515

SUBJECT: ISSUANCE OF AMENDMENTS (TAC NOS. MA8027, MA8028, MA8025, AND  
MA8026)

Dear Mr. Kingsley:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 114 to Facility Operating License No. NPF-37 and Amendment No. 114 to Facility Operating License No. NPF-66 for the Byron Station, Unit Nos. 1 and 2, respectively, and Amendment No. 108 to Facility Operating License No. NPF-72 and Amendment No. 108 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 January 20, 2000, as supplemented on April 3 and July 7, 2000.

The amendments revise the technical specifications to extend the allowable completion times associated with restoration of an inoperable emergency diesel generator. The amendments also permit the performance of the 24-hour endurance run during Modes 1 and 2.

In the January 20, 2000, submittal, Commonwealth Edison Company (ComEd) indicated that concerns regarding the essential service water systems had been identified and that ComEd will be making plant modifications to eliminate the concerns. Additional information regarding the modifications was provided in the April 3, 2000, letter. Although the risk analysis conducted by ComEd in support of this amendment excluded representation of both flooding and the modifications to correct the vulnerability, ComEd stated that the incremental changes to the risk parameters are unaffected. Nevertheless, ComEd stated that the modifications would be made prior to implementation of the amendments and that post-implementation sensitivity studies would be conducted to support the contention that the results do not change the conclusions reported in the original amendment request. Approval of the amendments is based on the information provided to us regarding the current plant configurations as well as proposed modifications. The amendments are effective upon the completion the proposed modifications. We request notification when the modification is complete for each unit.

Mr. O. Kingsley

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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,



George F. Dick, Jr., 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. 114 to NPF-37  
2. Amendment No. 114 to NPF-66  
3. Amendment No. 108 to NPF-72  
4. Amendment No. 108 to NPF-77  
5. Safety Evaluation

cc w/encs: See next page

Mr. O. Kingsley

-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,

/RA/

George F. Dick, Jr., 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. 114 to NPF-37
  2. Amendment No. 114 to NPF-66
  3. Amendment No. 108 to NPF-72
  4. Amendment No. 108 to NPF-77
  5. Safety Evaluation

cc w/encls: See next page

DISTRIBUTION:

PUBLIC  
 PD3 r/f (2)  
 OGC, O15B18  
 ACRS, T2E26  
 WBeckner, O12H4  
 GHill (8), T5C3  
 MJordan, RIII  
 SSaba, O9D5  
 SLee, O10H4

\*concurrence provided by memo; no major revisions

DOCUMENT NAME: G:\PDIII-2\braid-by\EDG.AOT.amd.wpd

OFFICE	PM:LPD3	LA:LPD3	NRR:EEIB	NRR:SPSB	OGC	SC:LPD3
NAME	GDICK	CMOORE	*JCALVO	*RBARRETT		AMENDIOLA
DATE	08/16/00	08/10/00	08/10/00	08/07/00	08/10/00	08/10/00

OFFICIAL RECORD COPY

O. Kingsley  
Commonwealth Edison Company

cc:

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O. Kingsley  
Commonwealth Edison Company

- 2 -

Byron/Braidwood Stations

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Downers Grove, Illinois 60515



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

COMMONWEALTH EDISON COMPANY

DOCKET NO. STN 50-454

BYRON STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 114  
License No. NPF-37

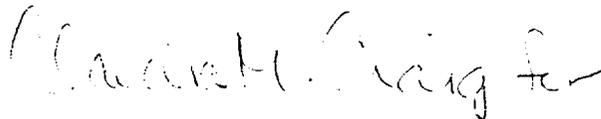
1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Commonwealth Edison Company (the licensee) dated January 20, 2000, as supplemented on April 3 and July 7, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, 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. 114 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 upon completion of the plant modifications cited in the April 3, 2000, submittal.

FOR THE NUCLEAR REGULATORY COMMISSION



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: September 1, 2000



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

COMMONWEALTH EDISON COMPANY

DOCKET NO. STN 50-455

BYRON STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 114  
License No. NPF-66

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Commonwealth Edison Company (the licensee) dated January 20, 2000, as supplemented on April 3 and July 7, 2000, 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. 114 and revised by Attachment 2 to NPF-66, 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. Attachment 2 contains a revision to Appendix A which is 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 upon completion of the plant modifications cited in the April 3, 2000, submittal.

FOR THE NUCLEAR REGULATORY COMMISSION



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: September 1, 2000

ATTACHMENT TO LICENSE AMENDMENT NOS. 114 AND 114

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

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

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

Remove Pages

3.8.1-1  
3.8.1-2  
3.8.1-3  
3.8.1-4  
3.8.1-5  
3.8.1-6  
3.8.1-9

Insert Pages

3.8.1-1  
3.8.1-2  
3.8.1-3  
3.8.1-4  
3.8.1-5  
3.8.1-6  
3.8.1-9

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources – Operating

- LCO 3.8.1 The following AC electrical sources shall be OPERABLE:
- a. Two qualified circuits per bus between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System; and
  - b. Two Diesel Generators (DGs) capable of supplying the onsite Class 1E AC Electrical Power Distribution System.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more buses with one required qualified circuit inoperable.	A.1 Perform SR 3.8.1.1 for the required OPERABLE qualified circuits.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u> A.2 Restore required qualified circuit(s) to OPERABLE status.	72 hours <u>AND</u> 17 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One required DG inoperable.	B.1 Verify both opposite-unit DGs OPERABLE.	1 hour <u>AND</u> Once per 24 hours thereafter
	<u>AND</u>	
	B.2 Perform SR 3.8.1.1 for the required qualified circuits.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u>	
	B.3 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	<u>AND</u>	
	B.4.1 Determine OPERABLE DG is not inoperable due to common cause failure.	24 hours
<u>OR</u>		
B.4.2 Perform SR 3.8.1.2 for OPERABLE DG.	24 hours	
<u>AND</u>	(continued)	

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.5 Restore DG to OPERABLE status.	14 days <u>AND</u> 17 days from discovery of failure to meet LCO
C. Required Action and associated Completion Time of Required Action B.1 not met.	C.1 Restore DG to OPERABLE status.	72 hours
D. One or more buses with two required qualified circuits inoperable.	D.1 Restore one required qualified circuit per bus to OPERABLE status.	24 hours
E. One DG inoperable and one or more buses with one required qualified circuit inoperable.  <u>OR</u>  One DG inoperable and one bus with two required qualified circuits inoperable.	-----NOTE----- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," when Condition E is entered with no AC power source to a division. ----- E.1 Restore required qualified circuit(s) to OPERABLE status.  <u>OR</u> E.2 Restore DG to OPERABLE status.	12 hours          12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Two DGs inoperable.	F.1 Restore one DG to OPERABLE status.	2 hours
<p>G. Required Action and associated Completion Time of Condition A, C, D, E, or F not met.</p> <p><u>OR</u></p> <p>Required Action and associated Completion Time of Required Action B.2, B.3, B.4.1, B.4.2, or B.5 not met.</p>	<p>G.1 Be in MODE 3.</p> <p><u>AND</u></p> <p>G.2 Be in MODE 5.</p>	<p>6 hours</p> <p>36 hours</p>
<p>H. Two DGs inoperable, and one or more buses with one or more required qualified circuits inoperable.</p> <p><u>OR</u></p> <p>One DG inoperable, one bus with two required qualified circuits inoperable, and the second bus with one or more required qualified circuits inoperable.</p>	H.1 Enter LCO 3.0.3.	Immediately

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>7 days</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.</p> <p>-----</p> <p>Verify each DG starts from standby condition and achieves steady state voltage <math>\geq 3950</math> V and <math>\leq 4580</math> V and frequency <math>\geq 58.8</math> Hz and <math>\leq 61.2</math> Hz.</p>	<p>31 days</p>
<p>SR 3.8.1.3     -----NOTES-----</p> <ol style="list-style-type: none"> <li>1. DG loadings may include gradual loading as recommended by the manufacturer.</li> <li>2. Momentary transients outside the load range do not invalidate this test.</li> <li>3. This Surveillance shall be conducted on only one DG at a time.</li> <li>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.</li> </ol> <p>-----</p> <p>Verify each DG is synchronized and loaded and operates for <math>\geq 60</math> minutes at a load <math>\geq 4950</math> kW and <math>\leq 5500</math> kW.</p>	<p>31 days</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.4	Verify each day tank contains $\geq$ 450 gal of fuel oil.	31 days
SR 3.8.1.5	Check for and remove accumulated water from each day tank.	31 days
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.	31 days
SR 3.8.1.7	Verify each DG starts from normal standby condition and achieves in $\leq$ 10 seconds, voltage $\geq$ 3950 V and $\leq$ 4580 V, and frequency $\geq$ 58.8 Hz and $\leq$ 61.2 Hz.	184 days
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).	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.12 Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal each DG auto-starts from standby condition and:</p> <ul style="list-style-type: none"> <li>a. In <math>\leq 10</math> seconds achieves voltage <math>\geq 3950</math> V and <math>\leq 4580</math> V;</li> <li>b. In <math>\leq 10</math> seconds achieves frequency <math>\geq 58.8</math> Hz and <math>\leq 61.2</math> Hz; and</li> <li>c. Operates for <math>\geq 5</math> minutes.</li> </ul>	18 months
<p>SR 3.8.1.13 Verify each DG's automatic trips are bypassed on actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ESF actuation signal except:</p> <ul style="list-style-type: none"> <li>a. Engine overspeed; and</li> <li>b. Generator differential current.</li> </ul>	18 months
<p>SR 3.8.1.14 -----NOTE----- Momentary transients outside the load range do not invalidate this test. -----</p> <p>Verify each DG operates for <math>\geq 24</math> hours:</p> <ul style="list-style-type: none"> <li>a. For <math>\geq 2</math> hours loaded <math>\geq 5775</math> kW and <math>\leq 6050</math> kW; and</li> <li>b. For the remaining hours of the test loaded <math>\geq 4950</math> kW and <math>\leq 5500</math> kW.</li> </ul>	18 months

(continued)



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

COMMONWEALTH EDISON COMPANY

DOCKET NO. STN 50-456

BRAIDWOOD STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 108  
License No. NPF-72

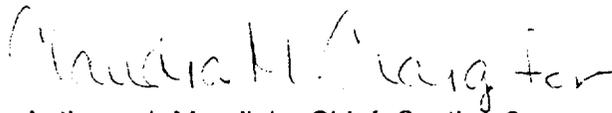
1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Commonwealth Edison Company (the licensee) dated January 20, 2000, as supplemented on April 3 and July 7, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, 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. 108 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 upon completion of the plant modifications cited in the April 3, 2000, submittal.

FOR THE NUCLEAR REGULATORY COMMISSION



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: September 1, 2000



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

COMMONWEALTH EDISON COMPANY

DOCKET NO. STN 50-457

BRAIDWOOD STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 108  
License No. NPF-77

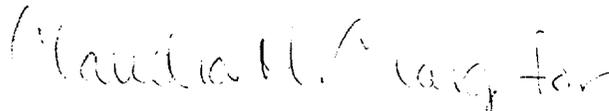
1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Commonwealth Edison Company (the licensee) dated January 20, 2000, as supplemented on April 3 and July 7, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, 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. 108 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 upon completion of the plant modifications cited in the April 3, 2000, submittal.

FOR THE NUCLEAR REGULATORY COMMISSION



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: September 1, 2000

ATTACHMENT TO LICENSE AMENDMENT NOS. 108 AND 108

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

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

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages

3.8.1-1  
3.8.1-2  
3.8.1-3  
3.8.1-4  
3.8.1-5  
3.8.1-6  
3.8.1-9

Insert Pages

3.8.1-1  
3.8.1-2  
3.8.1-3  
3.8.1-4  
3.8.1-5  
3.8.1-6  
3.8.1-9

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources – Operating

- LCO 3.8.1 The following AC electrical sources shall be OPERABLE:
- a. Two qualified circuits per bus between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System; and
  - b. Two Diesel Generators (DGs) capable of supplying the onsite Class 1E AC Electrical Power Distribution System.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more buses with one required qualified circuit inoperable.	A.1 Perform SR 3.8.1.1 for the required OPERABLE qualified circuits.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u> A.2 Restore required qualified circuit(s) to OPERABLE status.	72 hours <u>AND</u> 17 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One required DG inoperable.	B.1 Verify both opposite-unit DGs OPERABLE.	1 hour <u>AND</u> Once per 24 hours thereafter
	<u>AND</u>	
	B.2 Perform SR 3.8.1.1 for the required qualified circuits.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u>	
	B.3 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	<u>AND</u>	
	B.4.1 Determine OPERABLE DG is not inoperable due to common cause failure.	24 hours
<u>OR</u>		
B.4.2 Perform SR 3.8.1.2 for OPERABLE DG.	24 hours	
<u>AND</u>		
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.5 Restore DG to OPERABLE status.	14 days <u>AND</u> 17 days from discovery of failure to meet LCO
C. Required Action and associated Completion Time of Required Action B.1 not met.	C.1 Restore DG to OPERABLE status.	72 hours
D. One or more buses with two required qualified circuits inoperable.	D.1 Restore one required qualified circuit per bus to OPERABLE status.	24 hours
E. One DG inoperable and one or more buses with one required qualified circuit inoperable.  <u>OR</u>  One DG inoperable and one bus with two required qualified circuits inoperable.	-----NOTE----- Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating," when Condition E is entered with no AC power source to a division. ----- E.1 Restore required qualified circuit(s) to OPERABLE status.  <u>OR</u> E.2 Restore DG to OPERABLE status.	12 hours         12 hours

(continued)



SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.1.1    Verify correct breaker alignment and indicated power availability for each required qualified circuit.	7 days
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 $\geq 3950$ V and $\leq 4580$ V and frequency $\geq 58.8$ Hz and $\leq 61.2$ Hz.	31 days
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 $\geq 60$ minutes at a load $\geq 4950$ kW and $\leq 5500$ kW.	31 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.1.4 Verify each day tank contains $\geq$ 450 gal of fuel oil.	31 days
SR 3.8.1.5 Check for and remove accumulated water from each day tank.	31 days
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.	31 days
SR 3.8.1.7 Verify each DG starts from normal standby condition and achieves in $\leq$ 10 seconds, voltage $\geq$ 3950 V and $\leq$ 4580 V, and frequency $\geq$ 58.8 Hz and $\leq$ 61.2 Hz.	184 days
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).	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.12 Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal each DG auto-starts from standby condition and:</p> <ul style="list-style-type: none"> <li>a. In <math>\leq 10</math> seconds achieves voltage <math>\geq 3950</math> V and <math>\leq 4580</math> V;</li> <li>b. In <math>\leq 10</math> seconds achieves frequency <math>\geq 58.8</math> Hz and <math>\leq 61.2</math> Hz; and</li> <li>c. Operates for <math>\geq 5</math> minutes.</li> </ul>	18 months
<p>SR 3.8.1.13 Verify each DG's automatic trips are bypassed on actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ESF actuation signal except:</p> <ul style="list-style-type: none"> <li>a. Engine overspeed; and</li> <li>b. Generator differential current.</li> </ul>	18 months
<p>SR 3.8.1.14 -----NOTE----- Momentary transients outside the load range do not invalidate this test. -----</p> <p>Verify each DG operates for <math>\geq 24</math> hours:</p> <ul style="list-style-type: none"> <li>a. For <math>\geq 2</math> hours loaded <math>\geq 5775</math> kW and <math>\leq 6050</math> kW; and</li> <li>b. For the remaining hours of the test loaded <math>\geq 4950</math> kW and <math>\leq 5500</math> kW.</li> </ul>	18 months

(continued)



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 114 TO FACILITY OPERATING LICENSE NO. NPF-37,  
AMENDMENT NO. 114 TO FACILITY OPERATING LICENSE NO. NPF-66,  
AMENDMENT NO. 108 TO FACILITY OPERATING LICENSE NO. NPF-72,  
AND AMENDMENT NO. 108 TO FACILITY OPERATING LICENSE NO. NPF-77  
COMMONWEALTH EDISON COMPANY  
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 January 20, 2000, Commonwealth Edison Company (ComEd, the licensee) proposed changes to Appendix A, Technical Specifications (TSs) of Facility Operating Licenses Nos. NPF-72, NPF-77, NPF-37 and NPF-66 for Braidwood Station, Units 1 and 2 (Braidwood) and for Byron Station, Units 1 and 2 (Byron), respectively. Subsequently, the licensee submitted a followup letter dated April 3, 2000, and a response to a staff request for additional information dated July 7, 2000. The April 3 and July 7, 2000, submittals provided additional information that did not change the initial proposed no significant hazards consideration determination.

The proposed changes to TS Section 3.8.1, "AC Sources - Operating" will extend the present allowable completion time for the Required Actions associated with restoration of an inoperable emergency diesel generator (EDG) from "72 hours and 6 days from discovery of failure to meet [Limiting Condition for Operation] LCO" to "14 days and 17 days from discovery of failure to meet LCO." In conjunction with this proposed change, a new Required Action is proposed to be incorporated into the TS to verify the operability of the opposite unit EDGs while the affected EDG is inoperable.

Another change was proposed to allow performance of the EDG 24-hour Surveillance Requirement (SR) 3.8.1.14 in Mode 1 (Power Operation) and in Mode 2 (Startup) which are currently prohibited by Note 2 to SR 3.8.1.14. The requested changes will allow ComEd to perform periodic EDG overhauls and post-maintenance testing online, to reduce plant refueling outage duration and to improve EDG availability during shutdown.

## 2.0 BACKGROUND

The Engineered Safety Feature (ESF) power systems of each unit at the Braidwood and Byron Stations are comprised of two electrically independent and physically isolated electrical divisions. Each division consists of a Class 1E, 4.16 kV bus which feeds the various ESF loads and downstream buses. Each 4.16 kV bus has three independent sources of power.

1. A normal preferred source from the offsite 345 kV system through the system auxiliary transformers (SATs) directly to each bus.
2. A second reserve source from the 345 kV switchyard. This source is a delayed access circuit requiring manual operator action.
3. An emergency onsite source consisting of one dedicated EDG per 4.16 kV ESF bus.

The loss of a single power source by voluntary entry into a TS Action for EDG maintenance will not reduce the amount of available equipment to a level below that necessary to mitigate a design basis accident (DBA) and an station blackout (SBO).

The justification submitted by the licensee for the proposed changes included both deterministic and risk components. The amendment requests are categorized as "risk informed." Therefore, in its evaluation, the staff review consisted of the traditional considerations of defense-in-depth and compensatory measures as well as an assessment of the licensee's probabilistic risk analysis (PRA).

## 3.0 DETERMINISTIC EVALUATION

The licensee has proposed the following changes to the Byron and Braidwood TS:

### 3.1 Change 1:

Currently, TS Section 3.8.1, "AC Sources - Operating" requires an inoperable EDG to be restored to operable status within 72 hours and 6 days from discovery of failure to meet the TS LCO. The licensee has proposed the following specific change to the Braidwood and Byron TS.

- Change the required completion time for Required Action B.4 (renumbered B.5) of TS Section 3.8.1, "AC Sources - Operating." This change extends the completion time for the EDG from "72 hours and 6 days from discovery of failure to meet LCO" to "14 days and 17 days from discovery of failure to meet LCO."

This change allows an EDG to be inoperable for up to 14 days and 17 days from discovery of failure to meet LCO in Mode 1 (Power Operation), Mode 2 (Startup), Mode 3 (Hot Standby) and Mode 4 (Hot Shutdown). The justification for the extended Completion Time is based upon both a deterministic and risk informed evaluation as follows:

### 3.1.1 Evaluation

The Braidwood and Byron Stations proposed changes increase the length of time an EDG can be out-of-service during unit operation; however, the system is designed with adequate defense-in-depth philosophy to accomplish the safety functions in such situations. Each station has diverse power sources available to cope with a loss-of-offsite power (LOOP). The EDGs at Byron and Braidwood Stations are qualified as excess capacity Alternate AC (AAC) source in conformance with the SBO rule. In the event of an SBO, either one of the two EDGs for each unit serves as an AAC power source for the opposite unit. The AAC power source is available within 10 minutes of the onset of the SBO event and has sufficient capacity and capability to operate equipment necessary to attain and maintain a safe shutdown condition for one of the affected units. Thus, the opposite unit EDGs can be temporarily used to compensate for an EDG that is inoperable thru the inter-unit cross-tie. The overall availability of the AC power sources to the ESF buses will not be reduced significantly as a result of increased online preventive maintenance activities. With two EDGs per unit, the design is capable of performing its intended safety function with an assumed single failure on one EDG; thus the loss of one EDG will not result in the loss of safety function. These elements provide assurance that power can be provided to the ESF buses during all DBAs.

In addition, there will be a combination of TS requirements and compensatory actions that the licensee will have in place during an extended EDG AOT in order to minimize any increase in risk:

- The TSs require:
  - that the SAT and cross-tie breakers are operable;
  - verification of the correct breaker alignment and indicated power availability on the required qualified circuits;
  - verification that the opposite unit EDGs are operable;
- Increases in risk posed by potential combinations of equipment out of service will be managed under the configuration risk management program (CRMP, see Section 4.3). For example:
  - an EDG extended completion time will not be entered for scheduled maintenance purposes if severe weather conditions are expected;
  - while in the proposed extended EDG completion time, additional elective equipment maintenance or testing or equipment failure will be evaluated using the CRMP. Activities that yield unacceptable results via the CRMP will be avoided;
  - the condition of the offsite power supply and switchyard, including transmission lines and ring bus-tie breakers, will be evaluated by performing switchyard walkdowns and conducting documentation reviews;

- The licensee has committed to have procedures in place for the following actions:
  - no elective maintenance will be scheduled within the switchyard that would challenge the SAT connection or offsite power availability during the proposed extended EDG completion time;
  - no elective work will be performed on the diesel-driven auxiliary feedwater (AFW) pump of the operating unit or the opposite unit, or on the essential service water (ESW) pumps or on opposite Train emergency core cooling system (ECCS) equipment during the extended EDG completion time;
  - assure operating crews are briefed on the EDG work plan and key procedural actions regarding:
    - + LOOP,
    - + SBO,
    - + reactor coolant system (RCS) bleed and feed,
    - + AC cross-tie,
    - + refill of diesel-driven AFW pump fuel tank,
    - + alignment of common component cooling water (CCW) pump, and
  - assure availability of bleed and feed systems, structures and components (SSCs) supported by the available EDG.

With regard to the commitments, the staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to these regulatory commitments are best provided by the licensee's administrative processes, including its commitment management program which is controlled under 10 CFR 50.59. In particular, procedures are controlled in accordance with the ComEd Quality Assurance Program. These regulatory commitments do not warrant the creation of regulatory requirements (i.e., items requiring prior NRC approval of subsequent changes).

### 3.1.2 Summary

The staff finds the proposed change to extend the EDG AOT from the current 72-hours to 14 days to be acceptable. The conclusion is based on the following: (1) the availability of the "preferred" and "reserve" offsite power sources via the SATs and unit cross-tie; (2) verification that the opposite unit EDGs and offsite power source are operable; and (3) implementation of the CRMP while an EDG is in an extended completion time, and (4) the procedural changes to which the licensee committed. Further, the staff believes that precluding testing and maintenance of other electrical systems during extended outage and not scheduling preplanned maintenance when adverse weather is expected will minimize the impact of the longer AOT. Also, the staff finds that the changes made to the TS Bases section are consistent with the requested EDG AOT extension.

### 3.2 Change 2

A new Required Action, B.1, is added to TS Section 3.8.1.

B.1 states: "verify both opposite-unit DGs OPERABLE," within a required completion time of "1 hour and once per 24 hours thereafter."

This verification of operability of both opposite unit EDGs while the affected EDG is inoperable, is to ensure the availability of the remaining AC power sources to the affected ESF bus. Therefore, the proposed change is acceptable.

### 3.3 Change 3

A new Condition, C, is added to TS Section 3.8.1 that states: "Required Action and associated Completion Time of Required Action B.1 not met." The Required Action C.1 corresponding to Condition C states: "Restore DG to OPERABLE status," within a required completion time of "72 hours."

The new Required Action B.1 is to verify both opposite-unit DGs are operable (see Section 3.2). If B.1 is not met, the Required Action C.1 to restore the DG to operable status with a completion time of 72 hours takes into account the capacity and the capability of the remaining AC sources, a reasonable time for repairs and the low probability of a DBA occurring during this period. The staff finds the proposed addition of the Condition C reasonable and acceptable.

### 3.4 Change 4

The completion time for Required Action A.2 (restore required qualified circuit(s) to OPERABLE status) is changed from "72 hours and 6 days from discovery of failure to meet LCO" to "72 hours and 17 days from discovery of failure to meet LCO." This is a corresponding change resulting from the EDG completion time change evaluated in Section 3.1 and is acceptable.

### 3.5 Change 5

Conditions and Required Actions are renumbered as necessary due to the addition of the new Required Action B.1 and Condition C.

These editorial changes are appropriate and therefore, are acceptable.

### 3.6 Change 6

The licensee is proposing to change SR 3.8.1.14, associated with the 24-hour EDG endurance run to allow performance of this surveillance in any mode, by deleting Note 2. This note presently states that: "This surveillance shall not be performed in Mode 1 or 2".

The current SR 3.8.1.14 requires that the operability of the EDGs be verified every 18 months by operating each EDG for  $\geq 24$  hours in parallel with the offsite power. The licensee proposal to delete Note 2 will allow the SR to be performed during any mode of operation.

The EDGs at Braidwood and Byron were designed for parallel testing and as such, design features, such as protective devices, were included. The requested change does not affect parallel testing design features, the consequences of postulated failures during parallel testing, and postulated interactions with offsite power during parallel testing. If problems are encountered during testing, the EDG will separate from the bus allowing the offsite circuit to continue to supply the bus. Failure to meet the SR when performed at power will result in an inoperable EDG, which in itself does not result in a challenge to plant safety systems.

Only one EDG per unit will be in parallel with the offsite source at a time in order to prevent any grid disturbances from potentially affecting more than one EDG. During the test, the remaining EDG will be available to respond normally to a start signal. The unit's remaining EDG is capable of supplying power to mitigate all DBAs. This test configuration is consistent with the configuration used during the monthly EDG tests.

The EDG system design at these plants includes emergency override of the test mode for both accident conditions (safety injection) and LOOP to permit response to bona fide emergency signals and return control of the EDG to the automatic control system. Upon receipt of either a safety injection signal or a LOOP signal, the governor is automatically shifted from droop to the isochronous mode. The diesel generator breaker controls trip the breaker upon receipt of a safety injection signal concurrent with the EDG operating in the test mode.

Further justification is provided in that the amount of time that the EDGs will be inoperable will be reduced by improved maintenance scheduling permitted by the more flexible SR. The flexibility allows performing the 24-hour EDG endurance run in other than shutdown conditions when heavy and complex maintenance activities occur resulting in unavailability of equipment. In addition, the capability to safely complete emergency shutdown procedures following a DBA coincident with a single failure is maintained throughout the performance of the surveillance.

The licensee committed that no actions will be taken to affect the operability of the unit's remaining EDG and its support systems throughout the surveillance test, and no actions will be taken to affect the capability of the onsite Class 1E AC electrical distribution system and its support systems to complete plant shutdown and maintain safe shutdown conditions following a DBA. The staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to these regulatory commitments are best provided by the licensee's administrative processes, including its commitment management program which is controlled under 10 CFR 50.59. These regulatory commitments do not warrant the creation of regulatory requirements (i.e., items requiring prior NRC approval of subsequent changes).

If the EDG fails the 24-hour endurance test, it will be declared inoperable and the appropriate TS Required Actions will be taken.

### 3.6.1 Summary

The staff concludes that performance of the 24-hour EDG endurance test during power operation is acceptable because of a design feature that allows the EDGs at these plants to

automatically switch from the test mode to the standby mode on the receipt of an accident signal.

#### 4.0 PRA EVALUATION OF EDG AOT EXTENSION

The staff used a three-tiered approach to evaluate the risk associated with the proposed amendment to extend the allowed outage time (AOT) of the EDGs in both Braidwood and Byron Stations. The first tier evaluated the PRA model and the impact of the change on plant operational risk. The second tier addressed the need to preclude potentially high risk configurations if additional equipment will be taken out-of-service simultaneously or other risk-significant operational factors such as concurrent system or equipment testing are involved. The third tier evaluated the licensee's CRMP, to ensure that equipment removed from service prior to or during the proposed AOT will be appropriately assessed from a risk perspective. Each tier and associated findings are discussed below.

##### 4.1 Tier 1 PRA Capability and Insights

The Tier 1 staff review of the licensee's PRA with respect to EDG AOT extension involved two aspects: (1) evaluation of the PRA model and its application to the proposed AOT extension; and (2) evaluation of PRA results and insights stemming from the application.

###### 4.1.1 Evaluation of PRA Model and its Application to the EDG AOT Extension

The licensee's risk analysis used to support the proposed change is based on recent upgrades to the Byron and Braidwood Stations' PRAs used for the "modified Individual Plant Examinations (IPE)," submitted to the NRC by letter dated March 27, 1997. These modified IPEs had been accepted by the NRC by letters dated December 3, 1997, for Byron Station and October 27, 1997, for Braidwood Station. The NRC letters noted that the modified IPE submittals met the intent of Generic Letter 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities - 10 CFR 50.54(f)," dated November 23, 1988.

The updated PRAs incorporated several significant changes. One enhancement was a conversion to linked fault tree models using Computer Aided Fault Tree Analysis (CAFTA). Another was a revision of initiating event analysis which included updating the data with recent industry data, documenting a systematic search and categorization for initiating events in preparation for the PRA certification effort, and addition of several new initiating events and associated logic structures. The human reliability analysis (HRA) was also updated using plant procedures and completely revised to make it applicable to the linked fault tree PRA model. The equipment failure rates and unavailability were updated to include recent plant experience in accordance with current industry practice and NRC guidance. A comprehensive update of common cause failure treatment was also performed. The Multiple Greek Letter (MGL) method was applied to quantify common cause basic event probabilities, using the most recent NRC-sponsored common cause data base to update generic estimates for MGL model parameters.

The current upgraded PRA results for each reactor unit at the Braidwood and Byron Stations and the original IPE (modified) results are shown in Table 1 below. The results of the upgraded PRAs show that the baseline core damage frequency (CDF) of both stations is slightly higher

than the numbers reported in the modified IPEs. As indicated above, these changes are the result of numerous changes to the modeling of accident sequences, success criteria, quantification of common cause failures and human reliability, characterization of generic data, incorporation of plant-specific data, and other model changes.

TABLE 1 CORE DAMAGE FREQUENCY RESULTS

Station	Reactor Unit	Modified IPE Result Core Damage Freq.	Current PRA Update Core Damage Freq.
Braidwood Station	Unit 1	2.80E-5/year	4.86E-05/year
	Unit 2		4.86E-5/year
Byron Station	Unit 1	4.05E-5/year	4.98E-5/year
	Unit 2		4.89E-5/year

The contributions to CDF are similar for each of the four unit PRAs. The most important contributions from major initiating event classes arise from transients caused by support system faults, in particular, the loss of ESW initiating events. A loss of ESW event that affects both units accounts for most of the ESW support system initiator contribution and nearly half of the total CDF. Smaller contributions are due to front line system induced transients and from LOCAs, with about equal contributions from loss-of-coolant accident (LOCA) into the containment and containment bypass LOCAs. Nearly 70 percent of the total CDF is associated with sequences involving a reactor coolant pump (RCP) seal-LOCA.

It is important to note that during their PRA upgrade evaluation, the licensee identified a significant risk contributor associated with auxiliary building flooding. The evaluation showed that the auxiliary building flooding resulted in a loss of ESW to the charging pump, leading to a loss of injection to the RCP seals. The licensee stated in their April 3, 2000, letter that the vulnerability would be eliminated by a plant modification, providing alternate cooling to the charging pump lube oil cooler. See Section 4.1.2.

It is also noted that the accident sequences and cutsets that could be impacted by the proposed increase in the EDG AOT are a small subset of the contributions from LOOP events. LOOP initiating events contribute about 13 percent to the CDF, and only a small fraction of this contribution is due to scenarios involving EDG maintenance. Only the maintenance scenarios are expected to be impacted by an increase in the EDG AOT.

For the Level 2 analysis, Large Early Release Frequency (LERF) was estimated using the methodology in NUREG/CR-6595, January 1999, "An Approach for Estimating the Frequencies of Various Containment Failure Modes and Bypass Events." This analysis was also used to

evaluate the impacts of the proposed increase in EDG AOT on LERF and to evaluate the incremental conditional large early release probability (ICLERP).

As shown in Table 2 below, steam generator tube rupture (SGTR) initiating events were determined to be the largest contributors (59 percent to 63 percent) to LERF at each reactor unit. Containment failure at vessel breach (high pressure) contributes 19 percent to 23 percent. Containment isolation failures contribute 9 percent to 10 percent. Inter-system loss-of-coolant accidents (ISLOCAs) contribute about 7 percent to 8 percent. And, induced SGTRs contribute about 1 percent to LERF.

TABLE 2 LARGE EARLY RELEASE FREQUENCY (LERF) RESULTS FOR BYRON AND BRAIDWOOD STATIONS (PER YEAR)

LERF Contribution	Byron Station		Braidwood Station	
	Unit 1	Unit 2	Unit 1	Unit 2
Unisolated SG Tube Ruptures	3.33E-6	3.23E-6	3.12E-6	3.12E-6
Containment Overpressurization	1.22E-6	1.26E-6	9.42E-7	9.42E-7
Containment Isolation Failures	5.55E-7	5.47E-7	4.46E-7	4.46E-7
Interfacing Systems	3.89E-7	3.83E-7	3.97E-7	3.97E-7
Induced SG Tube Ruptures	5.55E-8	5.47E-8	4.96E-8	4.96E-8
Total LERF	5.55E-6	5.47E-6	4.96E-6	4.96E-6
LERF as a percentage of CDF	11.4%	11.0%	10.0%	10.1%

The licensee also provided EDG performance data associated with unavailability and reliability for each EDG. The EDGs performed well during 1997 and 1998 and exceeded the Maintenance Rule performance criteria.

To evaluate the quality of the PRAs, an independent assessment of the Byron and Braidwood Station PRAs was performed by a consultant in May through July 1999 using the self-assessment process developed as part of the Westinghouse Owners Group (WOG) PRA Peer Review Certification Program. In addition, peer review certification of the Braidwood Station PRA using the WOG Peer Review Certification Guidelines was performed in August 1999 by a team of independent PRA experts from the nuclear utility PRA groups and consultants. The certification team made several findings and observations, some of which were considered extremely important and necessary to address to ensure the technical adequacy of the PRA, the quality of the PRA, or the quality of the PRA update process. For example, one finding revealed that the time window that had been assumed in the PRA for an operator to switch over to high pressure recirculation was much larger than would actually be available. In response, the licensee changed the PRA model to reflect a more realistic time window to accomplish this

operator action. Based on its evaluation, the certification team concluded, with the incorporation of the changes to their PRA, that all elements of the PRA are of sufficient quality.

Based on the staff's review of the licensee's July 7, 2000, response to the staff's request for additional information, the staff agrees that the licensee responded adequately to all of the certification team's findings by making appropriate changes to the PRA model.

Due to the commonalities in plant designs between Byron and Braidwood Stations, and the corresponding commonalities in the PRA methods and models, the licensee concluded that the Braidwood Station PRA Certification leads to confidence in the quality of the Byron Station PRA models. Most of the findings and observations that were made by the Braidwood Station PRA Certification Team were directly applicable to the Byron Station PRA as well. Regardless, the licensee plans to have the Byron Station PRA certified sometime in Year 2000.

#### 4.1.2 Plant Flooding Vulnerabilities

As described in Attachment E of the licensee's original submittal dated January 20, 2000, as well as in the licensee's followup letter dated April 3, 2000, the licensee identified a flooding vulnerability which involves two specific issues. The first issue is only applicable to Braidwood Station and involves the potential for introduction of water to the auxiliary building via the ESW system discharge lines. Failure of one of the ESW discharge lines inside the auxiliary building (i.e., a large break in excess of design basis requirements with no operator action to isolate the break), has the potential to flood the lower level of the auxiliary building and cause the ESW pumps to fail. This postulated failure is due to the termination of the ESW system discharge piping below the level of the cooling lake. The modification being implemented to eliminate this concern involves extending the discharge piping such that it terminates above the lake level.

The second concern is applicable to both Braidwood and Byron Stations and involves the consequences of a loss of ESW system cooling. Loss of ESW results in: (1) loss of cooling flow to the centrifugal charging pump (CCP) oil coolers and associated gearboxes; and (2) loss of cooling flow to the CCW system heat exchangers. This, in turn, would result in a loss of RCP seal injection due to the loss of the charging pump, and the loss of RCP seal cooling provided by the CCW flow to the RCP thermal barrier heat exchanger. With both of the functions lost, the RCP seals could degrade and RCS inventory could be lost through the RCP seals.

To ensure that at least one method of cooling is available to the RCP seals, a modification will be made to provide alternate cooling to the oil coolers and associated gearboxes on at least one CCP per unit. Using available hoses and fittings, the ability to supply the charging pump oil coolers from the plant fire protection system will be established. This supply will ensure the continued operation of the charging pump to provide the necessary seal injection for the RCPs, thus, ensuring continued operability at the RCPs. With seal injection maintained, the potential for a loss of reactor coolant inventory is minimized.

The licensee committed to making these modifications to address the flooding concerns prior to implementing the extended AOT for the EDGs. The license amendment for each unit at Byron and Braidwood will become effective upon completion of the modification for that unit. The licensee is requested to notify the staff when the modifications are complete for each unit.

In response to the staff's RAI (June 13, 2000), the licensee, in a letter dated July 7, 2000, indicated that the PRA model used for the EDG AOT extension submittal excluded representation of both flooding and the modifications. However, the licensee reported that neither flooding nor the proposed modifications have any influence on the LOOP scenarios, which lead to dependence on the EDGs. The licensee maintained that since flooding equally impacts the base risk and the elevated risk due to an EDG being unavailable, the conclusion of the risk analysis relative to  $\Delta$ CDF,  $\Delta$ LERF, incremental conditional core damage probability, and incremental conditional large early release probability is essentially unaffected. The licensee also committed to conducting additional sensitivity studies in support of planning the proposed modifications to confirm that PRA scenarios involving flooding and the effects of the proposed modifications do not change the conclusions reported in the submittal.

The staff concludes that the flooding vulnerabilities are being addressed sufficiently and that they do not pose significant impact on the risk analysis of the proposed AOT extension. Based on its review, the staff agrees with the licensee that the risk analysis used in support of the proposed application is of sufficient quality.

#### 4.1.3 Evaluation of Risk Analysis Results and Insights

For Braidwood Station, the licensee reported the baseline CDF estimate of about  $4.86\text{E-}5/\text{year}$  for each of the two units. The licensee estimated that the annual average increase in CDF ( $\Delta$ CDF) associated with the proposed 14-day AOT is about  $2.4\text{E-}7/\text{year}$  for both units. The incremental conditional core damage probability (ICCDP) was estimated to be  $3.6\text{E-}7$  for both units.

The baseline LERF for Braidwood Station was estimated to be about  $4.96\text{E-}6/\text{year}$  for both units. The annual average increase in LERF ( $\Delta$ LERF) associated with the proposed 14-day AOT was reported to be about  $1.2\text{E-}8/\text{year}$  for both units. The incremental conditional large early release probability (ICLERP) was estimated to be about  $1.8\text{E-}8$  for both units.

For Byron Station, the baseline CDF estimate was reported to be  $4.98\text{E-}5/\text{year}$  for Unit 1 and  $4.89\text{E-}5/\text{year}$  for Unit 2. The  $\Delta$ CDF increase due to the proposed increase in EDG AOT was estimated to be about  $2.2\text{E-}7/\text{year}$  for Unit 1 and about  $2.0\text{E-}7/\text{year}$  for Unit 2. The ICCDP was estimated to be  $3.6\text{E-}7$  for Unit 1 and  $3.5\text{E-}7$  for Unit 2.

The baseline LERF for Byron Station was estimated to be about  $5.55\text{E-}6/\text{year}$  for Unit 1 and  $5.47\text{E-}6/\text{year}$  for Unit 2. The  $\Delta$ LERF increase associated with the proposed 14-day AOT was reported to be about  $8.7\text{E-}9/\text{year}$  for Unit 1 and  $7.6\text{E-}9/\text{year}$  for Unit 2. The ICLERP was estimated to be about  $1.5\text{E-}8$  for both units.

The staff finds that all of the above estimates ( $\Delta$ CDF,  $\Delta$ LERF, ICCDP, ICLERP) for the two units at Braidwood and two units at Byron are small and are within the guidelines in Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis" and RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decision Making: Technical Specifications," and are therefore acceptable.

#### 4.2 Tier 2: Avoidance of Risk-Significant Plant Configurations

The second tier addresses the need to preclude potentially high risk configurations, should additional equipment outages occur during the AOT period. The licensee identified a list of activities to prevent the plants from entering such high risk configurations. See Section 3.1.1.

The licensee maintained that the TSs require the SATs and cross-tie breaker to be operable. Offsite power operability is ensured by the performance of TS Section 3.8.1, Required Action B.2, to perform a surveillance test, SR 3.8.1.1, on the required qualified circuits. The opposite unit EDGs will be verified to be operable within 1 hour of entering the TS 3.8.1, Condition B, and at least once per 24 hours thereafter, while the EDG is inoperable.

The licensee also indicated that potential increases in risk posed by combinations of equipment out-of-service will be managed under the CRMP (further discussed in Section 4.3). As an example, an EDG AOT will not be entered for scheduled maintenance purposes if severe weather conditions are expected. While in the proposed EDG AOT, any additional maintenance activities or equipment failure which yield unacceptable results via the CRMP will be avoided.

In addition, no elective maintenance will be scheduled within the switchyard that could challenge the SAT connection or offsite power availability during the proposed extended EDG AOT. Furthermore, no elective work will be performed on the diesel-driven AFW pump of the operating unit or the opposite unit, ESW pumps or opposite train ECCS equipment during the EDG AOT. Other compensatory actions include briefing the operating crews on the EDG work plan as well as key procedural actions regarding LOOP, SBO, RCS bleed and feed, AC cross-tie, refill of diesel-driven AFW pump fuel tank, alignment of common CCW pump. (See Section 3.1.1).

The staff considers all of these proposed actions to be adequate to preclude potentially high risk plant configurations.

#### 4.3 Tier 3: Risk-Informed Plant Configuration Management

Consistent with 10 CFR 50.65(a)(4), Braidwood and Byron Stations have developed a CRMP governed by Nuclear Station Procedure (NS)-WC-3006, "On-Line Maintenance," that ensures that the risk impact of equipment out-of-service is appropriately evaluated prior to performing any maintenance activity. This program enables the licensee to perform a configuration dependent assessment of the overall impact on risk of proposed plant configurations prior to, and during the performance of maintenance activities that remove equipment from service. Risk is reassessed if an equipment failure/malfunction or emergent condition produces a plant configuration that has not been previously assessed.

For planned maintenance activities, an assessment of the overall risk of the activity on plant safety includes a number of considerations. Maintenance activities that affect redundant and diverse SSCs that provide backup for the same function are minimized. The potential for planned activities to cause a plant transient are reviewed and work on SSCs that would be required to mitigate the transient are avoided. Moreover, work is not scheduled that is

considered to be highly likely to exceed a TS AOT. For activities that are expected to exceed 50 percent of a TS AOT, compensatory measures and contingency plans are required to minimize SSC unavailability and maximize SSC reliability. For Maintenance Rule High Risk Significant SSCs, the impact of the planned activity on the unavailability performance criteria is evaluated. As a final check, a quantitative risk assessment is performed to ensure that the activity does not pose any unacceptable risk. This evaluation is performed using the Level 1 PRA model. The results of the risk assessment are classified by a color code based on the increased risk of the activity.

In support of the maintenance activity, emergent work is reviewed by Shift Operations to ensure that the work does not invalidate the assumptions made during the work management process. If an offsite power source becomes unavailable or degraded, or the risk of losing offsite power significantly increases due to inclement weather (e.g., high wind, severe thunderstorm forecast, tornado watch/warning, or freezing rain), then systems required to mitigate the LOOP shall be made available as soon as possible in accordance with contingency plans.

The licensee has also committed to update the PRA model, prior to implementing the proposed changes. The procedure for this activity, NEP 17-04, "PRA Model Update Procedure," defines the requirements for ensuring that the PRA model used to evaluate online maintenance activities is an accurate model of the current plant design and operational characteristics. Plant modifications and procedure changes will be monitored, assessed, and dispositioned. Evaluation of changes in plant configuration or PRA model features will be dispositioned by implementing PRA model changes or by the qualitative assessment of the impact of the changes on the PRA assessment tool.

The staff finds that the licensee's program to control the risk associated with the activities regarding EDG outages is reasonable and that program has met the intent of the Tier 3 guidance in RG 1.177.

#### 4.4 Summary of PRA Assessment

The staff did not identify any significant weaknesses or deficiencies associated with the licensee's risk analysis used to support the proposed change that could impact the overall quantitative conclusion. The staff finds that the risk analysis methodology and approach used by the licensee to estimate the risk impact were reasonable, and that the risk impact, measured in  $\Delta$ CDF,  $\Delta$ LERF, ICCDP, ICLERP of the proposed change was found to be small. The licensee also has a CRMP that provides reasonable tools and processes for configurational risk control during EDG outages. The staff concludes that there is a reasonable assurance that the licensee's risk analysis support the EDG AOT extension and the overall risk impact of the proposed change meets the intent of the criteria and guidelines used in RGs 1.174 and 1.177.

#### 5.0 OVERALL SUMMARY

The staff finds the proposed change to extend the EDG AOT from the current 72-hours to 14 days to be acceptable. The conclusion is based on the following: (1) the availability of the "preferred" and "reserve" offsite power sources via the SATs and unit cross-tie; (2) verification that the opposite unit EDGs and offsite power source are operable; and (3) implementation of

the CRMP while an EDG is in an extended completion time; and (4) compensatory actions that will be in place during the period that an EDG is out-of-service. The staff finds that the risk analysis methodology and approach used by the licensee to estimate the risk impact were reasonable, and that the risk impact was found to be small.

The staff also concludes that performance of the 24-hour EDG endurance test during power operation is acceptable because of a design feature that allows the EDGs to automatically switch from the test mode to the standby mode on the receipt of an accident signal.

#### 6.0 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.

#### 7.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change a surveillance requirement. 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. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (65 FR 21035). 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.

#### 8.0 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.

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