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UNITED STATES NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

March 8, 2012

Mr. Michael J. Pacilio President and Chief Nuclear Officer Exelon Nuclear 4300 Winfield Road Warrenville, IL 60555

SUBJECT:

QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT REGARDING TECHNICAL SPECIFICATION CHANGE FOR MINIMUM CRITICAL POWER SAFETY LIMIT (TAC NOS. ME6383 AND ME7613)

Dear Mr. Pacilio:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 250 to Renewed Facility Operating License No. DPR-29 and Amendment No. 245 to Renewed Facility Operating License No. DPR-30 for the Quad Cities Nuclear Power Station, Units 1 and No. 2, respectively. The amendments are in response to your applications dated June 7, 2011, and November 22, 2011, as supplemented by your letters dated September 21, 2011, November 2, 2011, and January 9, 2012.

The amendments revise the values of the single (Units 1 and 2) and dual (Unit 2) recirculation loop operation safety limit (SL) minimum critical power ratio in Technical Specification Section 2.1.1, "Reactor Core SLs."

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

Sincerely,

Joel S. Wiebe, Senior Project Manager

Plant Licensing Branch III-2

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Division of Operating Reactor Licensing Office of Nuclear Reactor Regulation

Docket No. 50-254 and 50-265

Enclosures:

1. Amendment No. 250 to DPR-29

2. Amendment No. 245 to DPR-30

3. Safety Evaluation (Redacted)

4. Safety Evaluation (Official Use Only - Proprietary)

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

EXELON GENERATION COMPANY, LLC

AND

MIDAMERICAN ENERGY COMPANY

DOCKET NO. 50-254

QUAD CITIES NUCLEAR POWER STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 250 Renewed License No. DPR-29

- 1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Exelon Generation Company, LLC, et al. (the licensee) dated June 7, 2011, as supplemented by letter(s) dated September 21, 2011, November 2, 2011 and January 9, 2012, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B. of Renewed Facility Operating License No. DPR-29 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 250, are hereby incorporated into the renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Jacob I. Zimmerman, 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: March 8, 2012

ATTACHMENT TO LICENSE AMENDMENT NO. 250

RENEWED FACILITY OPERATING LICENSE NO. DPR-29

DOCKET NO. 50-254

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

| Remove | <u>Insert</u> | | |
|-----------------------|-----------------------|--|--|
| <u>License DPR-29</u> | <u>License DPR-29</u> | | |
| Page 4 | Page 4 | | |
| <u>TSs</u> | <u>TSs</u> | | |
| 2.0-1 | 2.0-1 | | |

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 250, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. The licensee shall maintain the commitments made in response to the March 14, 1983, NUREG-0737 Order, subject to the following provision:

The licensee may make changes to commitments made in response to the March 14, 1983, NUREG-0737 Oder without prior approval of the Commission as long as the change would be permitted without NRC approval, pursuant to the requirements of 10 CFR 50.59. Consistent with this regulation, if the change results in an Unreviewed Safety Question, a license amendment shall be submitted to the NRC staff for review and approval prior to implementation of the change.

D. Equalizer Valve Restriction

Three of the four valves in the equalizer piping between the recirculation loops shall be closed at all times during reactor operation with one bypass valve open to allow for thermal expansion of water.

E. The licensee shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822), and the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined sets of plans¹, which contain Safeguards Information protected under 10 CFR 73.21, is entitled: "Quad Cities Nuclear Power Station Security Plan, Training and Qualification Plan, and Safeguards Contingency Plan, Revision 2," submitted by letter dated May 17, 2006.

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Exelon Generation Company CSP was approved by License Amendment No. 249.

F. The licensee shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report for the facility and as approved in the Safety Evaluation Reports dated July 27, 1979 with supplements dated November 5, 1980, and

¹ The Training and Qualification Plan and Safeguards Contingency Plan are Appendices to the Security Plan.

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be ≤ 25% RTP.

2.1.1.2 With the reactor steam dome pressure \geq 785 psig and core flow \geq 10% rated core flow:

For Unit 1, two recirculation loop operation, MCPR shall be ≥ 1.11 , or for single recirculation loop operation, MCPR shall be ≥ 1.14 .

For Unit 2, two recirculation loop operation, MCPR shall be ≥ 1.11 , or for single recirculation loop operation, MCPR shall be ≥ 1.13 .

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1345 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

- 2.2.1 Restore compliance with all SLs; and
- 2.2.2 Insert all insertable control rods.



UNITED STATES NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

EXELON GENERATION COMPANY, LLC

AND

MIDAMERICAN ENERGY COMPANY

DOCKET NO. 50-265

QUAD CITIES NUCLEAR POWER STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 245 Renewed License No. DPR-30

- 1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Exelon Generation Company, LLC, et al. (the licensee) November 22, 2011, as supplemented by letter dated January 9, 2012, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B. of Renewed Facility Operating License No. DPR-30 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 245, are hereby incorporated into the renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented after Cycle 21 and prior to Cycle 22 operation.

FOR THE NUCLEAR REGULATORY COMMISSION

Jacob I. Zimmerman, 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: March 8, 2012

ATTACHMENT TO LICENSE AMENDMENT NO. 245

RENEWED FACILITY OPERATING LICENSE NO. DPR-30

DOCKET NO. 50-265

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

| Remove | <u>Insert</u> | | |
|-----------------------|-----------------------|--|--|
| <u>License DPR-30</u> | <u>License DPR-30</u> | | |
| Page 4 | Page 4 | | |
| <u>TSs</u> | <u>TSs</u> | | |
| 2.0-1 | 2.0-1 | | |

B. <u>Technical Specifications</u>

The Technical Specifications contained in Appendix A, as revised through Amendment No. 245, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. The license shall maintain the commitments made in response to the March 14, 1983, NUREG-0737 Order, subject to the following provision:

The licensee may make changes to commitments made in response to the March 14, 1983, NUREG-0737 Order without prior approval of the Commission as long as the change would be permitted without NRC approval, pursuant to the requirements of 10 CFR 50.59. Consistent with this regulation, if the change results in an Unreviewed Safety Question, a license amendment shall be submitted to the NRC staff for review and approval prior to implementation of the change.

D. Equalizer Valve Restriction

Three of the four valves in the equalizer piping between the recirculation loops shall be closed at all times during reactor operation with one bypass valve open to allow for thermal expansion of water.

E. The licensee shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822), and the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans¹, which contain Safeguards Information protected under 10 CFR 73.21, is entitled: "Quad Cities Nuclear Power Station Security Plan, Training and Qualification Plan, and Safeguards Contingency Plan, Revision 2," submitted by letter dated May 17, 2006.

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Exelon Generation Company CSP was approved by License Amendment No. 244.

F. The licensee shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report for the facility and as approved in the Safety Evaluation Reports dated July 27, 1979 with supplements dated

¹ The Training and Qualification Plan and Safeguards Contingency Plan are Appendices to the Security Plan.

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be ≤ 25% RTP.

2.1.1.2 With the reactor steam dome pressure \geq 785 psig and core flow \geq 10% rated core flow:

For Unit 1, two recirculation loop operation, MCPR shall be ≥ 1.11 , or for single recirculation loop operation, MCPR shall be ≥ 1.14 .

For Unit 2, two recirculation loop operation, MCPR shall be ≥ 1.12 , or for single recirculation loop operation, MCPR shall be ≥ 1.14 .

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1345 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

- 2.2.1 Restore compliance with all SLs; and
- 2.2.2 Insert all insertable control rods.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO AMENDMENT NO. 250 TO RENEWED FACILITY OPERATING

LICENSE NO. DPR-29 AND AMENDMENT NO. 245 TO RENEWED FACILITY

OPERATING LICENSE NO. DPR-30

EXELON GENERATION COMPANY, LLC

AND

MIDAMERICAN ENERGY COMPANY

QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-254 AND 50-265

1.0 INTRODUCTION

By letters to the U.S. Nuclear Regulatory Commission (NRC, the Commission) dated June 7, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML111590206), and November 22, 2011 (ADAMS Accession No. ML113260347), as supplemented by letters dated September 21, November 2, 2011, and January 9, 2012 (ADAMS Accession Nos. ML112650398 and ML113070430, and ML120090250, respectively), Exelon Generation Company, LLC, (the licensee) requested changes to the technical specifications (TS), for the Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2. The proposed changes would revise the value of the single (Units 1 and 2) and two (Unit 2) recirculation loop operation safety limit minimum critical power ratio (SLMCPR) in TS Section 2.1.1, "Reactor Core SLs."

The September 21, 2011, November 2, 2011, and January 9, 2012, supplements, contained clarifying information and did not change the NRC staff's initial proposed finding of no significant hazards consideration.

2.0 REGULATORY EVALUATION

The purpose of the SLMCPR is to ensure that specified acceptable fuel design limits (SAFDLs) are not exceeded during steady state operation and analyzed transients. The fuel cladding is one of the physical barriers that separate the radioactive materials from the environment. The integrity of this cladding barrier is related to its relative freedom from perforations or cracking. Fuel cladding perforations can result from thermal stresses which can occur from reactor operation significantly above design conditions. Since the parameters that result in fuel damage

are not directly observable during reactor operation, the thermal and hydraulic conditions that result in the onset of transition boiling have been used to mark the beginning of the region in which fuel cladding damage could occur.

The NRC staff finds that the licensee, in Section 4.1 of its submittals, identified the applicable regulatory requirements. The regulatory requirements and guidance for which the NRC staff based its acceptance are identified below.

General Design Criteria (GDC)-10, "Reactor Design," of Appendix A, GDC for Nuclear for Nuclear Power Plants, to Title 10 of the *Code of Federal Regulations* (10 CFR Part 50) states, in part, that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that SAFDLs are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," provides guidance on the acceptability of the reactivity control systems, the reactor core and fuel system design. Specifically, Section 4.2, "Fuel System Design," specifies all fuel damage criteria for evaluation of whether fuel designs meet the SAFDLs, and Section 4.4, "Thermal Hydraulic Design," provides guidance on the review of thermal-hydraulic design in meeting the requirement of GDC-10 and the fuel design criteria established in Section 4.2.

3.0 TECHNICAL EVALUATION

The NRC staff has reviewed the licensee's technical and regulatory analyses in support of its proposed license amendment which are described in Sections 3.0 and 4.0 of the licensee's submittal. The detailed evaluation below will support the conclusion that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (2) such activities will be conducted in compliance with the Commission's regulations; and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

The licensee requested to change the QCNPS Technical Specifications (TS) 2.1.1.2 Unit 1 SLMCPR for single recirculation loop operation (SLO) from 1.13 to 1.14 and proposed no change to the current value of 1.11 for two recirculation loop operation (TLO). The licensee proposed to change the QCNPS TS 2.1.1.2 Unit 2 SLMCPR for SLO from 1.13 to 1.14 and for TLO from 1.11 to 1.12. These SLMCPR values are for the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10 percent of rated core flow.

The licensee describes the methodology to calculate the new SLMCPR values for the TS in its submittals and supplements. The staff determined from the licensee's description that the QCNPS Unit 1 and Unit 2 Cycle 22 SLMCPR analyses were performed by Westinghouse Electric Company (Westinghouse) using the plant - and cycle-specific fuel and core parameters, U.S. Nuclear Regulatory Commission (NRC) approved methodologies including CENPD-300-P-A, "Reference Safety Report for Boiling Water Reactor Reload Fuel," CENPD-300-P, "10x10 SEVA Fuel Critical Power Experiments and CPR Correlation: SEVA-96+, "and associated codes related to application of CENPD-300-P-A to this minimum critical power ratio calculation including the McSLAP code.

The staff determined from the licensee's submittals that the McSLAP computer code system is the code system that implements the Monte Carlo process in CENPD-300-P-A to determine the SLMCPR[

]in order to determine that the safety limit was not to exceed 0.1 percent of all fuel rods in the reactor core subject to the onset of transition boiling or dryout.

]

McSLAP processes the inputs from[

]. The relationship of these codes to McSLAP and the roles of these codes in CENPD-300-P-A are described in the January 9, 2012, supplement but not listed in CENPD-300-P-A. The staff has determined that while the McSLAP code is not specifically referenced in CENPD-300-P-A it is an implementation of the staff approved methodology described in CENPD-300-P-A. As part of the staff review of revisions to CENPD-300-P-A, the staff will ensure that this ambiguity is clarified. The staff notes that supplement 1 to CENPD-300-P-A has been submitted to the NRC (ADAMS Accession No. ML102850344) and has been accepted for staff review (ADAMS Accession No. ML103500217).

The licensee also addressed in their submittals: (1) the final core loading pattern selection for the QCNPS, Units 1 and 2, Cycle 22, operation with respect to the combination of the reload control procedure, reload design review criteria, cycle design inputs and requirements (CDIR) including input parameters such as cycle energy requirements, thermal limit margins, reactivity margins, discharge exposure limitations and other limits, desired control rod patterns, and channel distortion; (2) the SLMCPR calculation process with respect to the uncertainties associated with[

1(3) the reason to have a

1

higher SLMCPR value for SLO only and the application of a 1 percent correction due to errors found in the McSLAP code for QCNPS Unit 1; and (4) the backup stability protection scram and controlled entry regions in the power to flow map using approved method CENPD-295-P-A.

The NRC staff reviewed the information presented in the licensee submittals and responses to the NRC staff requests for additional information (RAI) including the NRC staff audit conducted on October 19 and November 10, 2011, on the SLMCPR calculations using the McSLAP code and determined that:

- (1) approved methodologies are used;
- (2) qualitative and quantitative descriptions of the final core loading pattern and critical power analysis are provided;
- (3) the SLMCPR value increase for QCNPS Unit 1 SLO only is justified due to a 1 percent correction for the McSLAP code errors; and
- (4) the SLMCPR value increase for QCNPS Unit 2 is due to[
 used in the previous cycle.

Based on the above discussion the staff concluded that the SLMCPR analysis for QCNPS, Units 1 and 2, Cycle 22, operation using the plant- and cycle-specific calculation with the approved method is acceptable. The Cycle 22 SLMCPRs will ensure that 99.9 percent of the fuel rods in the core will not experience boiling transition which satisfies the requirements of GDC-10 of Appendix A to 10 CFR Part 50, regarding acceptable fuel design limits.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes the requirements with respect to the use of a facility's component located within the restricted area as defined in 10 CFR Part 20. 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 (76 FR 50762; August 16, 2011 and 77 FR 140; January 3, 2012). 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) 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: Tai Huang

Date of issuance: March 8, 2012

Mr. Michael J. Pacilio President and Chief Nuclear Officer Exelon Nuclear 4300 Winfield Road Warrenville, IL 60555

March 8, 2012

SUBJECT:

QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT REGARDING TECHNICAL SPECIFICATION CHANGE FOR MINIMUM CRITICAL POWER SAFETY LIMIT (TAC NOS. ME6383 AND

ME7613)

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A copy of the related 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 No. 50-254 and 50-265

Enclosures:

- 1. Amendment No. 250 to DPR-29
- 2. Amendment No. 245 to DPR-30
- 3. Safety Evaluation (Redacted)
- 4. Safety Evaluation (Official Use Only Proprietary)

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Package Accession No. ML120690194

| Amendment Accession No. ML113202795 | | | | NRR-058 | | *by memo | | |
|-------------------------------------|----------|------------|----------|----------|----------|------------|----------|---|
| OFFICE | LPL3/PM | LPL3-2/LA | ITSB/BC | SRXB/BC* | OGC /NLO | LPL3-2/BC | LPL/PM | ٦ |
| NAME | JWiebe | KGoldstein | RElliott | TUIses | DRoth | JZimmerman | JWiebe | ٦ |
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