



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

April 30, 2018

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

SUBJECT: CLINTON POWER STATION, UNIT NO. 1 – ISSUANCE OF AMENDMENT  
REGARDING THE SPENT FUEL POOL LEVEL (CAC NO. MF9962; EPID  
L-2017-LLA-0258)

Dear Mr. Hanson:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 217 to Facility Operating License No. NPF-62 for the Clinton Power Station, Unit No. 1. The amendment consists of changes to the technical specifications (TSs) in response to your application dated July 18, 2017.

The amendment revises the design value for the spent fuel storage pool in TS 4.3.2, "Drainage," to an appropriate value, consistent with the original design basis.

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

Sincerely,

A handwritten signature in black ink, appearing to read "J Rankin".

Jennivine Rankin, Project Manager  
Plant Licensing Branch III  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-461

Enclosures:

1. Amendment No. 217 to NPF-62
2. Safety Evaluation

cc w/encls: Listserv



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-461

CLINTON POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 217  
License No. NPF-62

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Exelon Generation Company, LLC (the licensee), dated July 18, 2017, 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.

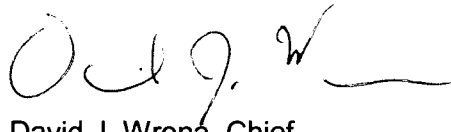
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-62 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 217, are hereby incorporated into this license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



David J. Wrona, Chief  
Plant Licensing Branch III  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications and Facility Operating License

Date of Issuance: April 30, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 217

CLINTON POWER STATION, UNIT NO. 1

FACILITY OPERATING LICENSE NO. NPF-62

DOCKET NO. 50-461

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

Remove

License NPF-62  
Page 3

TSs  
Page 4.0-2

Insert

License NPF-62  
Page 3

TSs  
Page 4.0-2

- (4) Exelon Generation Company, pursuant to the Act and to 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
  - (5) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components;
  - (6) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility. Mechanical disassembly of the GE14i isotope test assemblies containing Cobalt-60 is not considered separation; and
  - (7) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30, to intentionally produce, possess, receive, transfer, and use Cobalt-60.
- C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:
- (1) Maximum Power Level  
Exelon Generation Company is authorized to operate the facility at reactor core power levels not in excess of 3473 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein.
  - (2) Technical Specifications and Environmental Protection Plan  
The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 217, are hereby incorporated into this license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

4.0 DESIGN FEATURES (continued)

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4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

- a.  $k_{eff} \leq 0.95$  if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1.2 of the USAR;
- b. A nominal fuel assembly center to center storage spacing of 7 inches within rows and 12.25 inches between rows in the low density storage racks in the upper containment pool; and
- c. For the fuel storage racks supplied by Nuclear Energy Services (NES), a nominal fuel assembly spacing of 6.4375 inches in the high density storage racks in the spent fuel pool or fuel cask storage pool. For the fuel storage racks supplied by Holtec International, a nominal fuel assembly spacing of 6.243 inches in the high density storage racks in the spent fuel pool or fuel cask storage pool.

4.3.1.2 The new fuel storage racks are designed and shall be maintained with:

- a.  $k_{eff} \leq 0.95$  if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1.1 of the USAR; and
- b. A nominal fuel assembly center to center storage spacing of 7 inches within rows and 12.25 inches between rows in the new fuel storage racks.

4.3.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 741 ft 0 inches.

4.3.3 Capacity

4.3.3.1 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 3796 fuel assemblies. The fuel cask storage pool is designed and shall be maintained with a storage capacity limited to no more than 363 fuel assemblies.

4.3.3.2 No more than 160 fuel assemblies may be stored in the upper containment pool.

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UNITED STATES  
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 217 TO FACILITY OPERATING LICENSE NO. NPF-62

EXELON GENERATION COMPANY, LLC

CLINTON POWER STATION, UNIT NO. 1

DOCKET NO. 50-461

1.0 INTRODUCTION

By application dated July 18, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17199F854), Exelon Generation Company, LLC (EGC, the licensee), submitted a license amendment request (LAR) for Clinton Power Station, Unit No. 1 (CPS). The proposed amendment would revise the design value for the spent fuel storage pool in technical specification (TS) 4.3.2, "Drainage," to an appropriate value, consistent with the original design basis.

2.0 REGULATORY EVALUATION

2.1 BACKGROUND

The licensee provided the following description of the spent fuel storage facility:

The CPS spent fuel storage facility consists of a spent fuel pool (SFP), a fuel transfer pool (FTP), a fuel cask storage pool (FCSP), a fuel cask washdown area (FCWA), and an upper containment fuel pool (UCFP). The SFP, FTP, FCSP, and FCWA are adjacent to each other in the fuel building (FB) and are physically separated from each other by removable gates.

The structures housing the CPS spent fuel storage facility (i.e., the FB and containment) are designed to seismic Category I criteria, as are the fuel storage racks, pool liners, gates, and storage pools. These buildings are also designed against flooding and tornado missiles.

Several piping lines discharge into the SFP, the FTP, and the FCSP that lack check valves to prevent inadvertent draining as a result of back-flow in the event of piping failure. The top of the stored fuel assemblies in the SFP and FCSP is at elevation 726 feet 7¾ inches. The lowest of the discharge lines without check valves to prevent inadvertent drainage are the two SFP cooling system return lines at elevation 741 feet 0 inches. One 6 inch line discharges in the SFP at an elevation of 736 feet 6 inches, but the lowest elevation of the line outside the SFP is 742 feet and the line is equipped with a check valve to prevent back-flow. In addition, discharge

lines are connected to diffusers in both the FTP and FCSP at an elevation of approximately 712 feet, but these lines are outside the SFP and provided with check valves to prevent back-flow.

A separate potential drainage path exists around the gates separating the pools. The gates are held in place by support brackets that prevent displacement of installed gates during design-basis seismic events. However, the pneumatic seals around each gate are not safety-related. Each gate has two redundant seals that are supplied by the instrument air system, with a backup air supply from bottles permanently connected to the instrument air system. The air supply line to each seal contains a check valve to prevent a loss of air from the seal. If the FTP, FCSP, and FCWA were drained of all water, postulated failure of the seals for the gates connecting the SFP to these volumes would reduce the SFP water level to 740 feet 6 inches from the normal level of 754 feet 0 inches.

## 2.2 PROPOSED CHANGE

During a U.S. Nuclear Regulatory Commission (NRC or Commission) Component Design Basis Inspection at CPS in 2016, NRC inspectors identified an inconsistency between the drainage prevention value specified in TS 4.3.2 and the original design basis for design features to prevent SFP drainage. When this issue was identified, EGC entered this issue into the EGC corrective action program. After review of the issue, EGC determined that the correct value for the elevation of the SFP drainage prevention design features is 741 feet 0 inches.

Existing CPS TS 4.3.2, "Drainage," which is part of TS Section 4.0, "Design Features," states that the spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 754 feet 0 inches. The license proposed to modify TS 4.3.2 to the following:

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 741 ft 0 inches.

## 2.3 REGULATORY INFORMATION

Section 3.1, "Conformance with NRC General Design Criteria," of the CPS Updated Safety Analysis Report (USAR) (ADAMS Accession No. ML17305A094) provides an evaluation of the design basis of the CPS plant against the NRC General Design Criteria (GDC) contained in Appendix A to Part 50, "Domestic Licensing of Production And Utilization Facilities," of Title 10, "Energy," of the *Code of Federal Regulations* (10 CFR). Section 3.1.2.6.2 of the CPS USAR addresses conformance with GDC 61, "Fuel storage and handling and radioactivity control," which specifies, in part, that the fuel storage and handling systems shall be designed to assure adequate safety under normal and postulated accident conditions, and to prevent significant reduction in fuel storage coolant inventory under accident conditions. This section references USAR Section 9.1.2, "Spent Fuel Storage" (ADAMS Accession No. ML17305A108), for further discussion.

Section 9.1.2 of the CPS USAR states that the spent fuel storage facility is designed in accordance with Regulatory Guide (RG) 1.13, "Spent Fuel Storage Facility Design Basis," Revision 1 (ADAMS Accession No. ML003739943). Regulatory Position C.6 of RG 1.13 precludes the installation or inclusion in the design of drains, permanently connected mechanical or hydraulic systems, and other features that, by maloperation or failure, could cause loss of coolant that would uncover fuel.



The content and information that must be included in a station's TSs are detailed in 10 CFR 50.36, "Technical specifications." As described in 10 CFR 50.36(c)(4), design features are those features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety.

### 3.0 TECHNICAL EVALUATION

The current elevation included in the TS 4.3.2 of 754 feet 0 inches does not correspond to a drainage prevention design feature of the SFP. The licensee states that the SFP is normally maintained at this elevation, which is approximately 27 feet above the top of irradiated fuel assemblies stored in the SFP. Procedural controls in the CPS Operational Requirements Manual, Section 2.4.8, "Spent Fuel Storage, Cask Storage, and Upper Containment Pools," specify that at least 23 feet of water be maintained above the stored fuel.

The licensee evaluated the installed connections to the SFP to identify permanently connected systems that could drain the SFP through maloperation or failure. Table 1 in Attachment 1 to the license amendment request listed the piping systems connected to the SFP, FTP, and FCSP. This listing shows that two 14 inch diameter SFP cooling system discharge pipes have the potential to drain the SFP to a lower elevation through maloperation or failure of the piping than other connected systems. These connections are at an elevation of 741 feet 0 inches.

This LAR represents a change to TS 4.3.2 to accurately reflect the lowest elevation to which the SFP could be inadvertently drained following improper operation of a connected system. The LAR involves no physical change to the configuration of the SFP and its connected systems. The licensee's evaluation confirms that the SFP is protected against drainage through maloperation or failure of connected piping systems by the design geometric arrangement of the piping.

The NRC staff also evaluated the potential drainage path that exists around the gates separating the pools where the SFP water level could be reduced to 740 feet 6 inches if the FTP, FCSP, and FCWA were all drained of water, the seals for the gates connecting the SFP to these volumes failed, and no operator actions were taken. The NRC staff considers the approximate 12.5 feet of water above the top of active fuel sufficient as a safe shielding level and consistent with the GDC 61 criterion of preventing a substantial reduction in fuel storage pool coolant inventory under accident conditions. However, the NRC staff does not consider this arrangement a specific design feature appropriate for TS 4.3.2 because the FTP and FCSP are not normally drained and, if these pools were drained, the necessary failures (i.e., multiple failures involving the redundant pneumatic seals on each gate, check valves retaining air in each seal, the service air system, and the backup air bottles) makes inadvertent draining via this path non-credible.

The NRC staff has reviewed the licensee's evaluation and determined that the SFP is protected against drainage that would cause the fuel to be uncovered because the design geometric arrangement of the piping, where the most limiting connection at 741 feet 0 inches, provides approximately 13 feet of water above the top of irradiated fuel assemblies. This is consistent with GDC 61 and Regulatory Position C.6 of RG 1.13 in the CPS design basis. Therefore, the NRC staff concludes the change to TS 4.3.2 to reflect design protection against inadvertent drainage to an elevation of 741 feet 0 inches is acceptable and consistent with the requirements of 10 CFR 50.36(c)(4) for design feature TSs.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendment on March 12, 2018. The State official had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (82 FR 42848, dated September 12, 2017). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

#### 6.0 CONCLUSION

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

Principal Contributor: S. Jones, NRR

Date of issuance: April 30, 2018

SUBJECT: CLINTON POWER STATION, UNIT NO. 1 – ISSUANCE OF AMENDMENT REGARDING THE SPENT FUEL POOL LEVEL (CAC NO. MF9962; EPID L-2017-LLA-0258) DATED APRIL 30, 2018

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**ADAMS Accession No. ML18072A050**

**\*via memo**

**\*\*via email**

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