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

August 17, 2016

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

SUBJECT: CLINTON POWER STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT CONCERNING INCORPORATION OF REVISED ALTERNATIVE SOURCE TERM (CAC NO. MF7336) (RS-16-019)

Dear Mr. Hanson:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 210 to Facility Operating License No. NPF-62 for the Clinton Power Station (CPS), Unit No. 1. The amendment is in response to the Exelon Generation Company, LLC (EGC, the licensee) submittal dated January 29, 2016, as supplemented by letters dated June 2 and 10, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML116029A418, ML16154A129, and ML16174A361, respectively). The amendment revises the post- loss-of-coolant-accident drawdown time for secondary containment from 12 to 19 minutes as described in the CPS Updated Safety Analysis Report (USAR) and technical specification bases. The NRC staff notes that the applicability of this approval is limited to the existing secondary containment boundary as defined in Revision 17 of the USAR.

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,

/RA/

Eva A. Brown, Senior Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-461

Enclosures:
1. Amendment No. 210 to NPF-62
2. Safety Evaluation

cc w/encls: Distribution via Listserv

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

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-461

CLINTON POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 210
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), January 29, 2016, as supplemented by letters dated June 2 and 10, 2016, 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, by Amendment No. 210, the license is amended to authorize revision to the Updated Safety Analysis Report (USAR), as set forth in the application dated January 29, 2016, as supplemented by letters dated June 2 and 10, 2016. The licensee shall update the USAR to incorporate the change as described in the licensee's application dated January 29, 2016, and the NRC staff's safety evaluation attached to this amendment, and shall submit the revised description authorized by this amendment with the next update of the USAR.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance. The UFSAR changes shall be implemented in the next periodic update to the UFSAR in accordance with 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

Eddie Miller

G. Edward Miller, Chief (Acting)
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Date of Issuance: August 17, 2016

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 210 TO FACILITY OPERATING LICENSE NO. NPF-62

EXELON GENERATION COMPANY, LLC

CLINTON POWER STATION, UNIT NO. 1

DOCKET NO. 50-461

By application dated January 29, 2016 (as supplemented by letters dated June 2 and 10, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML116029A418, ML16154A129, and ML16174A361, respectively)), Exelon Generation Company, LLC (EGC, the licensee) submitted a license amendment request for Clinton Power Station, Unit 1 (CPS). The submittal requests the revision of the post- loss-of-coolant-accident (LOCA) drawdown time for secondary containment from 12 to 19 minutes as described in the CPS Updated Safety Analysis Report (USAR). The licensee plans to make conforming changes to technical specification (TS) Bases, which are controlled by the licensee and were submitted for information.

The June 2 and 10, 2016, supplements, contained clarifying information and did not change the U.S. Nuclear Regulatory Commission (NRC or Commission) staff's initial proposed finding of no significant hazards consideration.

2.0 REGULATORY EVALUATION

2.1 Applicable Regulations

Section 3.1 of the Clinton Updated Safety Analysis Report (USAR) discusses conformance with the GDC. The proposed amendment was evaluated against the following GDC, as incorporated in the Clinton licensing basis through the UFSAR. Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 17, "Electric power systems," requires, in part, that an onsite electrical power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system shall be to provide sufficient capacity and capability to assure that: (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents. From GDC 19, "Control Room [CR]," comes the requirements that the licensee provide adequate radiation protection to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 5 roentgen equivalent man (rem) whole body, or its equivalent to any part of the body, for the duration of the accident.

Section 50.49 to 10 CFR, "Environmental qualification [EQ] of electric equipment important to safety for nuclear power plants," in part, requires that the electrical equipment important to safety which are relied upon to remain functional during and following design basis events be qualified for accident (harsh) environment. This provides assurance that the equipment needed in the event of an accident will perform its intended function.

Section 50.36 to 10 CFR, "Technical specifications" states that the plant technical specifications (TSs) include items in five specific categories. These categories include: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation (LCO); (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls. Surveillance requirements are defined as relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and the LCO will be met.

Section 50.67 to 10 CFR, "Accident source term [AST]", allows a holder of an operating license issued prior to January 10, 1997, whose initial operating license was issued prior to January 10, 1997, to voluntarily revise the AST used in design basis radiological consequence analyses. Paragraph 50.67(b) requires that applications under this section contain an evaluation of the consequences of applicable design-basis accident previously analyzed in the plant's FSAR, as updated.

Once a nuclear power plant license is issued, the licensee is required by 10 CFR 50.54(q)(2) to maintain the effectiveness of an emergency plan that that meets the planning standards of 10 CFR 50.47(b) and the requirements in Appendix E to 10 CFR Part 50. Section 50.47(b)(8) to 10 CFR requires a licensee's emergency plan provide and maintain adequate emergency facilities and equipment to support the emergency response. Section IV.E.8.a of Appendix E to 10 CFR 50 requires, adequate provisions be made and described for a licensee onsite technical support center (TSC) from which effective direction and control can be given and effective control can be exercised during an emergency.

2.2 <u>Guidance</u>

Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," provides guidance to licensees of operating power reactors on acceptable applications of ASTs; the scope, nature, and documentation of associated analyses and evaluations; consideration of impacts on analyzed risk; and content of submittals. This guide provides guidance on an acceptable AST and identifies the significant attributes of other ASTs that may be found acceptable by the NRC staff. This RG also identifies acceptable radiological analysis assumptions for use in conjunction with the accepted AST. This RG states that the licensees may use the AST or the Technical Information Document (TID) 14844, "Calculation of Distance Factors for Power and Test Reactor Sites," assumptions for performing the required EQ analyses to show that the equipment remains bounding. RG 1.183 further states that no plant modifications are required to address the impact of the difference in source term characteristics (i.e., AST versus TID 14844) on EQ doses. Also, Regulatory Position 6, "Assumptions for Evaluating the Radiation Doses for Equipment Qualification," the licensee may use either the AST or the TID-14844 assumptions for performing the required EQ analyses until such time as a generic issue related to the effect of increased cesium releases on EQ doses is resolved. This generic issue has been resolved in a memorandum dated April 30, 2001 (ADAMS Accession No. ML011210348) and in Supplement 25 to NUREG-0933, Generic Issue 187, "The Potential Impact of Postulated Cesium Concentration on Equipment Qualification in the Containment Sump in Nuclear Power Plants," June 2001 (ADAMS Accession No. ML012190402). The NRC staff concluded in the memorandum and NUREG 0933 that there was no clear basis for back-fitting the requirement to modify the design basis for equipment qualification to adopt the AST and there would be no discernable risk reduction associated with such a requirement. Section II.H, Emergency Facilities and Equipment" of NUREG-0654 / FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," was issued as an acceptable method for implementing the agency's emergency planning regulations.

NUREG-0696, "Functional Criteria for Emergency Response Facilities" establishes the criteria used to evaluate whether an applicant/licensee meets the requirements of 10 CFR 50, Appendix E, Article IV, E.8, and Appendix A, GDC 19.

The model SR 3.6.4.1.4 of NUREG-1434, "Standard Technical Specifications – General Electric BWR [boiling-water reactor]/6 Plants" requires verification that secondary containment pressure can be drawn down to a specified vacuum in less than a specified time using one standby gas treatment (SBGT) subsystem.

Statement of Consideration for the Final Rule – 10 CFR 50.59 "Changes, Tests, and Experiments" (64 FR 53582; dated October 4, 1999) discusses that the Commission will conclude that the requirements of the rule are met if the calculated doses from a change at a facility would be less than 10 percent of the remaining margin between current calculated dose values and acceptance values in the regulations 3 (e.g., GDC 19 or Part 100) for the particular accident.

2.3 System Description

CPS, Unit 1, is a BWR nuclear steam supply system designed and supplied by the General Electric Company and designated as a BWR/6 unit. The primary containment system designed by Sargent & Lundy employs the drywell/pressure suppression pool features of the BWR-Mark III containment concept. The primary containment is a right cylindrical, reinforced concrete, steel-lined pressure vessel with a hemispherical dome. The secondary containment is a structure that completely encloses the primary containment except for the upper personnel hatch, and consists of the containment gas control boundary (CGCB), the CGCB extension (i.e., siding within the auxiliary building), the Fuel Building (FB), the emergency core cooling system residual heat removal (RHR) heat exchanger rooms, the RHR pump rooms, the reactor water cleanup pump room, and the main steam pipe tunnel.

The secondary containment, in conjunction with the operation of SBGT system is designed to limit the total effective dose equivalent (TEDE) within the guidelines of 10 CFR 50.67 at the exclusion area boundary (EAB) and low-population area (LPZ). Also, the design limits the TEDE dose for the control room occupants to within the requirements of 10 CFR 50.67 and design considerations in GDC 19.

2.4 Related Regulatory Finding

In letter dated November 6, 2015 (ADAMS Accession No. ML15313A464), the NRC staff issued an integrated inspection report for CPS. The report documents that the inspectors reviewed Engineering Change 395976, "ISFSI-Extended Secondary Containment Boundary to FB Outer Railroad Bay Doors," Revision 0. This engineering change attempted to modify the established boundary of the secondary containment to include the FB railroad bay airlock. The NRC staff issued a finding for failure to obtain a license amendment prior to making modifications to secondary containment.

The NRC staff questioned whether this amendment request was intended to support expansion of secondary containment to include the FB Railroad Bay Airlock, as the initial request did not address the FB Railroad Bay Airlock. In the June 2, 2016 supplement, the licensee indicated that a typical drawdown time test result was about 28 seconds and additional testing in 2014 with the fuel building railroad bay airlock volume included was 37 seconds, although the design basis configuration is with the railroad bay airlock inner door closed and this additional volume excluded. However, the licensee indicated that no additional change in the drawdown SR procedure acceptance criterion is planned and that the FB Railroad Bay Airlock will not be incorporated into secondary containment.

3.0 TECHNICAL EVALUATION

3.1 Standby Gas Treatment System Impact (SGTS)

In order to accommodate the increased heat from a loaded spent fuel cask in secondary containment due to dry cask storage activities at CPS, the licensee is requesting a revision to the post-LOCA drawdown time for secondary containment. The revision will increase the drawdown time from the 12 minutes to 19 minutes. The increased drawdown time delays the time at which the SBGT system can be credited to effectively limit the release of fission products to the environment from primary containment leakage. This results in an increase in the LOCA dose consequences. While the revised dose consequence analyses remain within the 10 CFR 50.67 acceptance criteria, the licensee determined that the increase in CR dose is more than minimal and as such requires prior NRC approval in accordance with 10 CFR 50.59(c)(1)(iii). The following table shows the LOCA dose consequences for the current licensing basis (CLB) 12 minute drawdown case and the proposed 19 minute drawdown case.

LOCA TEDE (rem)			
Location	CLB 12 minute drawdown time	Proposed 19 minute drawdown time	10 CFR 50.67 Acceptance Criteria
EAB	17.31	17.31	25
LPZ	7.37	7.42	25
CR	4.73	4.84	5

Since the increase in CR dose (4.84 – 4.73 = 0.11) exceeds 10 percent of the difference between the CLB value and the acceptance criterion ((5 – 4.73) x 0.1 = 0.027) the proposed change is more than minimal as discussed in the statement of consideration for the final rule "Changes, Tests, and Experiments" (64 FR 53582) and, therefore, requires prior NRC approval.

As can be seen from the following reproduction of Table 4 from RG 1.183 the onset of the substantial early in-vessel fuel melt source term is not expected to begin until 30 minutes post-accident. Therefore, changes in the drawdown time in the range from 12 minutes to 19 minutes would not be expected to result in significant changes to the dose consequence analysis. The NRC staff performed a sensitivity analysis to determine the impact of changes in the drawdown time on the resultant dose consequences. As expected, substantial changes in dose consequences did not occur until the drawdown time exceeded 30 minutes.

Table 4 from RG 1.183

LOCA Release phases

	PWRs		**BWRs**	
Phase	**Onset**	**Duration**	**Onset**	**Duration**
Gap Release	30 sec	0.5 hr	2 min	0.5 hr
Early In-Vessel	0.5 hr	1.3 hr	0.5 hr	1.5 hr

In addition, the NRC staff notes that changes in the drawdown time only impacts the containment leakage pathway in the LOCA dose consequence analysis. The other significant pathways such as the main steam isolation valve leakage pathway are not impacted by changes in the secondary containment drawdown time.

The licensee provided a table comparing all of the data and assumptions in the existing LOCA dose consequence analysis with the revised analysis. Under the existing analysis 100 percent of the primary containment leakage is assumed to bypass the SBGT system for the first 12 minutes of the accident. In the revised analysis, 100 percent on the primary containment leakage is assumed to bypass the SBGT system for the first 19 minutes of the analysis. Consistent with the existing assumptions in the analysis, in both cases after the SBGT system is credited with drawing a negative pressure within the secondary containment, 8 percent of the primary containment leakage is assumed to bypass the SBGT system. As explained earlier, this change in drawdown time does not have a significant impact on the calculated doses because the substantial fuel melt developed. Due to the relatively small margin between the existing CR dose and the acceptance criterion, the licensee was required to submit this change for NRC approval. The NRC staff reviewed the analysis used by the licensee to assess the radiological impacts of an increase in the drawdown time assumed in the LOCA dose consequence analysis and concludes that the revised analysis continues follow the guidance in RG 1.183 and is, therefore, acceptable.

As described above, the NRC staff reviewed the assumptions, inputs, and methods used by the licensee to assess the radiological consequences of the revised AST LOCA analysis for CPS. The NRC staff finds that the licensee used analysis methods and assumptions consistent with the regulatory requirements, which should continue to provide sufficient safety margins with adequate defense-in-depth to address unanticipated events and to compensate for uncertainties in accident progression and analysis assumptions and parameters. Therefore, the NRC staff finds proposed changes acceptable with respect to the radiological consequences of the analyzed LOCA.

3.2 Environmental Qualification (EQ)

The licensee proposed change would revise an input parameter for the LOCA dose calculation and the subsequent calculation results. The licensee is proposing to implement dry cask storage activities at CPS during which a fully-loaded cask will be present in the FB. The licensee has determined that added heat from a fully-loaded design basis cask will impact the post-LOCA temperature in several areas of secondary containment. Due to the added heat, the post-LOCA drawdown time (time period necessary for the SGBT system to achieve and maintain the required negative pressure) for secondary containment will increase from the existing value of 12 minutes to 19 minutes.

In a letter dated September 19, 2005 (ADAMS Accession No. ML052570461), CPS previously received NRC approval for full implementation of the AST methodology for design basis accidents, including LOCA dose calculation methodology, in accordance with 10 CFR 50.67. Also, the licensee implemented a design change that revised the operating cycle to the current value of 12 months and revised an input parameter to the original AST post-LOCA dose calculation. The licensee has re-evaluated the impact of the increased draw-down time on post-accident radiological consequences and determined that the increase in post-LOCA CR dose, while within the 10 CFR 50.67 limit for CR, was more than minimal, and as such requires prior NRC approval.

The NRC staff focused its review on the impact of the electrical power distribution system and/or equipment capacity due to: (1) the increased heat load, and resultant draw-down time, as well as (2) any changes to the mechanical equipment. In Chapter 6.2.3.3.1 of the USAR the licensee stated that calculations indicate that the SBGT system fan has been adequately sized to achieve a 0.25-inch water gauge negative pressure in less than 12 minutes after the LOCA event. In Section 3.2 of the submittal, the licensee is proposing to change the time requirement to 19 minutes due to the increase in drawdown time. The NRC staff questioned whether this increase in SBGT system fan operation time will impact the emergency diesel generators (EDGs) capability and capacity. In letter dated June 2, 2016, the licensee stated that the proposed change in secondary containment post-LOCA heat load and drawdown time does not affect the assumed operation of SBGT system in the loading profiles of the EDGs. The licensee further indicated that the Divisions 1 and 2 EDG loading profiles assume continuous, full-load operation of SGBT system following a design basis LOCA event. As such, the additional heat load and resultant drawdown time will not impact EDG capability and capacity. Also, the licensee stated that the proposed change does not require the addition of any new loads to the EDGs, nor does it result in any changes to the EDG loading sequence. Based on the additional heat load and resultant drawdown time not impacting the EDG, the NRC staff concludes that there is no significant impact on safety-related electrical systems and that electrical system should continue to meet the requirements of GDC 17 as a result of full implementation of the AST.

The NRC staff questioned whether any nonsafety-related systems and components were credited in the AST analyses in order to assess their impact on the safety-related electrical systems. In the June 2, 2016, supplement, the licensee stated that the AST analyses do not credit any nonsafety-related systems or components.

In Enclosure 5 of the January 29, 2016, submittal, the licensee addressed the impact of a fully-loaded design basis spent fuel cask on post-LOCA temperatures in the secondary containment. The licensee indicated that the temperature increases in 15 of 20 secondary containment zones. Further, 11 of the 15 affected environmental zones were located in the FB, for which 60 EQ binders were found to have an affected zone, and, therefore, a corresponding component that could be potentially impacted. For each of these 60 EQ binders, the licensee conducted an evaluation and found the equivalent aging hours for a postulated LOCA event with a fully-loaded spent fuel cask were bounded by the equivalent aging performed during the simulated accident testing. The other four of the 15 affected environmental zones were connected to six additional EQ binders that were found to have an affected zone, and, therefore, a component that could be potentially impacted. For five of these six EQ binders, the licensee found the postulated post-accident temperature, assuming a fully-loaded spent fuel cask in the FB, should be bounded by the existing qualification. For the sixth binder, the licensee's evaluation, found that the new equivalent time is less than the equivalent test time and, therefore, there is no impact on the qualification of the equipment in the binder.

Based on the above information, the NRC staff questioned whether the individual equipment based on the location of the equipment would be adversely affected by the post-LOCA temperatures in the secondary containment. In the June 10, 2016, supplement, the licensee provided a table of components and their respective qualification levels and parameters, EQ temperature profiles for all the affected EQ zones, and revised environmental zone maps of the containment. The licensee stated that it conducted a two-phase evaluation to ensure the EQ of all equipment important to safety within the affected zones and rooms, to demonstrating continuing compliance with the requirements of 10 CFR 50.49. The licensee used the Arrhenius methodology to identify each EQ component within the affected zones and rooms. The licensee used equivalent aging hours assuming the increased post-LOCA temperatures. These values were then compared to the equivalent aging hours derived from the EQ test program to verify that the EQ test program values bounded the revised values. If, however, the test program equivalent aging hours for a particular component, did not envelop the equivalent aging hours with the revised temperatures, the licensee re-evaluated that component using one of two alternate conservative temperature profiles that were more representative of the actual expected profile.

In the June 2 and 10, 2016, supplements, the licensee provided the result of its EQ evaluation in a tabular form. Also, the licensee provided the Environmental Zone Maps for those areas of the FB that would experience an analytical increase in the post-LOCA temperature, due to the presence of a fully loaded cask. The table contained the list of each component affected by the proposed AST with its respective zone, current and revised post-LOCA temperature, peak qualification temperature and temperature and equivalent aging hours or duration, and margins. The NRC staff reviewed the table and verified that each component's identified post-LOCA temperature remain bounded by the licensee's EQ evaluation. The NRC staff concludes that the electrical equipment should continue to meet the requirements of 10 CFR 50.49 following the proposed increase in the drawdown time.

The NRC staff also requested that the licensee address whether any environmental zones or components within these zones will be reclassified from mild to harsh. In the June 2, 2016, supplement, the licensee stated that the environmental zones that are impacted by the proposed change are currently classified as harsh. The revised AST analyses do not result in the reclassification of any affected environmental zone, or the components within those zones. Furthermore in the June 10, 2016, supplement, the licensee provided graphs of post-LOCA temperatures in the CPS FB and emergency core cooling systems rooms. The NRC staff reviewed these graphs and finds that the post-LOCA conditions (temperature), with the proposed configuration, remain bounded by the licensee's EQ evaluation.

On page 2 of Enclosure 5 to the January 29, 2016, submittal, the licensee stated that in addition to the potential impact of increased temperature on the EQ of affected equipment, it evaluated any potential EQ impact from a postulated increase in post-accident radiation levels in secondary containment (due to the increased drawdown time). The analysis to determine the post-LOCA radiation dose rates and doses within secondary containment is not dependent on the time to draw down the secondary containment atmosphere. As such, the proposed change has no impact on the post-accident radiation levels in secondary containment.

Regulatory Position 6 of RG 1.183 addresses the resolution of a generic issue related to the effect of increased cesium releases on EQ doses. On page 4 of the Attachment to the January 29, 2016, submittal, the licensee stated that in the 1995 submittal for full implementation of the AST, the licensee used AST methodology for design basis accidents, in accordance with 10 CFR 50.67, with the exception that TID-14844 continued to be used as the radiation dose basis for equipment environmental qualification. The NRC staff asked the licensee if the radiation dose basis for EQ of safety-related equipment, will continue to be based on TID-14844 assumptions. In the June 2, 2016, supplement, the licensee stated that the proposed change in secondary containment post-LOCA heat load and drawdown time does not result in any change to post-LOCA radiation dose levels or duration within secondary containment. The radiation dose basis for EQ of safety-related equipment will continue to be based on TID-14844, assumptions. Given that there will be no change in the radiation dose basis (i.e., TID-14844), the NRC staff finds that it is acceptable for the TID-14844 based assumptions to remain the licensing basis for equipment EQ analyses and will remain unaffected in support of the increase in the drawdown time.

Based on the above evaluation, the NRC staff finds that, due to the increased heat load and resultant increase of drawdown time in the secondary containment, there should be no impact of this change to the safety and nonsafety-related power distribution systems of the CPS design. The NRC staff also determined that the electrical equipment should continue to meet the requirements of 10 CFR 50.49 following the AST implementation as there is no change in the EQ requirement and CPS AST analyses did not result in the addition of any new components to the EQ program. Therefore, the NRC staff finds the proposed changes acceptable as they relate to the EQ of equipment located in secondary containment.

3.3 Secondary Containment

CPS, Unit 1, is currently preparing to implement initial dry cask storage of spent fuel. During the cask loading process, a fully-loaded cask will be present in the FB. The licensee has determined that the added heat from a fully-loaded design basis cask will impact the post-LOCA temperature in various areas of secondary containment. Due to the added heat from a loaded spent fuel cask in secondary containment, the post-LOCA drawdown time for secondary containment will increase from the CLB value of 12 minutes to 19 minutes. This increased drawdown time was determined to result in an increase in the post-LOCA dose for the control room.

The model SR 3.6.4.1.4 in NUREG 1434, requires verification that secondary containment pressure can be drawn down to a specified vacuum in less than a specified time using one SBGT subsystem. The CPS TS SR 3.6.4.1.4 requires verification that each SBGT subsystem will draw down the secondary containment to ≥ 0.25 inch vacuum water gage within the time specified. The drawdown time criterion is not identified in this TS SR, and was included in the TS Bases (a licensee controlled document) at the time full implementation of AST was approved for CPS. In the June 2, 2016, supplement, the licensee indicated that the surveillance procedure specified a drawdown time acceptance criterion of 78 seconds. The proposed AST calculation change incorporates the additional heat load that would be present with a cask with spent fuel loaded. The calculation drawdown time would change from 12 minutes to 19 minutes and assumes the postulated accident conditions whereas the SR acceptance criterion of 78 seconds was established for performance during the usual range of conditions existing when the test is conducted ensures the secondary containment ventilation boundary and SBGT subsystems are intact and provide reasonable assurance that the drawdown time should an accident occur will be well within that assumed by the AST calculation.

The NRC staff has reviewed the licensee's technical basis for the proposed changes. Based on the above evaluation, the NRC staff has determined that the existing surveillance procedure criterion for secondary containment drawdown time continues to be acceptable with the requested change to implement a revised AST analysis.

3.4 Emergency Response Facility Habitability

Due to the added heat from a loaded spent fuel cask in secondary containment, the post-LOCA drawdown time will increase from 12 minutes to 19 minutes. This increased drawdown time was determined to result in an increase in the post-LOCA dose for the control room. The licensee re-evaluated the impact of the increased drawdown time on post-accident radiological consequences for the EAB and the LPZ. This radiological consequence evaluation identified that the post-accident doses for LPZ and control room locations increased, while the value for the EAB post-accident dose remained constant. EGC determined that the increase in the post-accident dose for the LPZ was not more than minimal, and therefore, could be changed in accordance with 10 CFR 50.59.

However, the increase in post-accident CR dose, while within the 10 CFR 50.67 limit, was more than minimal, and as such requires prior NRC approval. Specifically, the postulated control room dose received during a 30-day period after a LOCA will increase from the current value of 4.73 rem to 4.84 rem, relative to the applicable criteria, which specifies a control room design criterion of 5 rem TEDE for facilities using the AST.

Technical Support Center (TSC)

Enclosure 2 to the Attachment to the January 29, 2016, submittal, provides the physical input parameters and assumptions that were used for the revised post-LOCA dose calculations, as well as the corresponding parameters used in the original calculations (i.e., in support of full implementation of AST) and the 12-month operating cycle calculations.

Table 2, "Parameters and Data Applicable to All AST Post-accident Dose Calculations," of Enclosure 1 provides that the volume of the CR includes the volume of the TSC as an input parameter and assumption. Since the purpose of the TSC is to provide direct management and technical support to the CR during an accident, it is designed to have the same radiological habitability as the CR under accident conditions. Therefore, since the proposed change is within the dose criteria for radiological habitability of the TSC as specified in GDC 19 of 5 rem TEDE for facilities using the AST, the change should not adversely impact the ability for the TSC staff to effectively perform required emergency response actions.

Emergency Operations Facility (EOF)

Table 2, "Relation of EOF Location to Habitability Criteria," of NUREG-0696 provides no radiological habitability criteria for an EOF beyond 10 miles. Because the Exelon Midwest EOF is located beyond 10 miles from CPS, there was no impact identified on this facility due to this proposed change.

The NRC staff has reviewed the licensee's technical basis for the proposed changes. Based on the above evaluation, the NRC staff has determined that there is no impact on the licensee's emergency plan, and the licensee's emergency plan should continue to meet planning standards of 10 CFR 50.47(b) and the requirements of Appendix E to 10 CFR Part 50. As such, the emergency plan should continue to provide reasonable assurance that adequate protective measures can and should be taken in the event of a radiological emergency at the facility.

The NRC staff notes that TS bases pages were submitted by the licensee, the NRC staff expects the licensee to update the TS Bases to be consistent with this approval as required by the TS Bases Control Program.

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 requirements to 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 (81 FR 21599; dated April 12, 2016). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

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

Principal Contributors: J. Parillo, NRR
S. Basturescu, NRR
J. Bettle, NRR
M. Norris, NSIR

Date of issuance: August 17, 2016

August 17, 2016

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

SUBJECT: CLINTON POWER STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT CONCERNING INCORPORATION OF REVISED ALTERNATIVE SOURCE TERM (CAC NO. MF7336) (RS-16-019)

Dear Mr. Hanson:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 210 to Facility Operating License No. NPF-62 for the Clinton Power Station (CPS), Unit No. 1. The amendment is in response to the Exelon Generation Company, LLC (EGC, the licensee) submittal dated January 29, 2016, as supplemented by letters dated June 2 and 10, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML116029A418, ML16154A129, and ML16174A361, respectively). The amendment revises the post- loss-of-coolant-accident drawdown time for secondary containment from 12 to 19 minutes as described in the CPS Updated Safety Analysis Report (USAR) and technical specification bases. The NRC staff notes that the applicability of this approval is limited to the existing secondary containment boundary as defined in Revision 17 of the USAR.

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,
/RA/
Eva A. Brown, Senior Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-461

Enclosures:
1. Amendment No. to NPF-62
2. Safety Evaluation

cc w/encls: Distribution via Listserv

DISTRIBUTION:
PUBLIC LPL3-2 R/F
RidsNrrLASRohrer Resource
RidsNrrDirsStsb Resource
RidsNrrPMClinton Resource
RidsNrrDorlLpl3-2 Resource
RidsNrrDorlDpr Resource
RidsNrrRgn3MailCenter Resource
RidsAcrs_MailCTR Resource
RecordsAmend Resource
JBettle, NRR
SBasturescu, NRR
JParillo, NRR
MChernoff, NRR
MNorris, NSIR

ADAMS Accession No.: ML16217A332 *by letter dated

OFFICE	LPL3-2/PM	LPL3-2/LA	SBPB/BC	EEEB/BC	
NAME	EBrown	SRohrer	RDennig	JZimmerman	
DATE	08/04/16	08/04/16	07/27/16*	07/01/16*	
OFFICE	ARCB/BC	NSIR/DPR/RT/BC	OGC NLO w/edits	LPL3-2/BC(A)	
NAME	UShoop	JAnderson	BMazuno	GEMIller	
DATE	06/24/16*	06/29/16*	08/05/16	08/17/16	

OFFICIAL RECORD COPY