

April 3, 2002

Mr. Oliver D. Kingsley, President
and Chief Nuclear Officer
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Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, Illinois 60555

SUBJECT: CLINTON POWER STATION, UNIT 1 - ISSUANCE OF AMENDMENT
(TAC NO. MB2572)

Dear Mr. Kingsley:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 147 to Facility Operating License No. NPF-62 for the Clinton Power Station, Unit 1. The amendment is in response to the application from AmerGen Energy Company, LLC, dated July 5, 2001, as supplemented December 28, 2001, and March 1, 2002.

The amendment relaxes operability requirements for primary containment, secondary containment systems, and the standby gas treatment system during the movement of irradiated fuel and during core alterations.

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/

Jon B. Hopkins, Senior Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-461

Enclosures: 1. Amendment No. 147 to NPF-62
2. Safety Evaluation

cc w/encls: See next page

April 3, 2002

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OFFICIAL RECORD COPY

Clinton Power Station, Unit 1

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AMERGEN ENERGY COMPANY, LLC

DOCKET NO. 50-461

CLINTON POWER STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 147
License No. NPF-62

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by AmerGen Energy Company, LLC (the licensee), dated July 5, 2001, as supplemented December 28, 2001, and March 1, 2002, 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. 147 are hereby incorporated into this license. AmerGen Energy Company, LLC 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 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

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: April 3, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 147

FACILITY OPERATING LICENSE NO. NPF-62

DOCKET NO. 50-461

Replace the following pages of the 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 Pages

3.3-53
3.3-57
3.3-59
3.3-64
3.6-3
3.6-7
3.6-9
3.6-14
3.6-15
3.6-43
3.6-44
3.6-47
3.6-49
3.6-51
3.6-52
3.6-53

Insert Pages

3.3-53
3.3-57
3.3-59
3.3-64
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3.6-7
3.6-9
3.6-14
3.6-15
3.6-43
3.6-44
3.6-47
3.6-49
3.6-51
3.6-52
3.6-53

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 147 TO FACILITY OPERATING LICENSE NO. NPF-62

AMERGEN ENERGY COMPANY, LLC

CLINTON POWER STATION, UNIT 1

DOCKET NO. 50-461

1.0 INTRODUCTION

By letter dated July 5, 2001, as supplemented by letters dated December 28, 2001, and March 1, 2002, AmerGen Energy Company, LLC (the licensee), requested a license amendment for Clinton Power Station (CPS). The proposed amendment relaxes operability requirements for primary containment, secondary containment systems, and the standby gas treatment system during the movement of irradiated fuel and during core alterations. The proposed changes are based on the selective implementation of the alternate source term for the fuel handling accident (FHA) as described in Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design-Basis Accidents at Nuclear Power Reactors," dated July 2000 pursuant to 10 CFR 50.67.

The supplemental letters contained clarifying information and did not change the initial no significant hazards consideration determination and did not expand the scope of the original *Federal Register* notice.

2.0 BACKGROUND

Where applicable, the licensee is following Technical Specification Task Force Traveler 51 (TSTF). TSTF-51, Revision 2, was approved by the Nuclear Regulatory Commission (NRC) on October 15, 1999. TSTF-51 changes the technical specification (TS) requirements for engineered safety features (ESF) to be OPERABLE such that they are not applicable after sufficient radioactive decay has occurred to ensure off-site doses remain below a small fraction of 10 CFR Part 100 limits. Fuel that is not sufficiently decayed to allow relaxation of OPERABILITY requirements is referred to as "recently" irradiated fuel. Recently irradiated fuel could still be moved but the appropriate ESF systems are required to be OPERABLE. TSTF-51 also allows the deletion of OPERABILITY requirements for ESF mitigation features during CORE ALTERATIONS.

The Reviewers Note in TSTF-51 requires that licensees adding the term "recently" make a commitment consistent with draft NUMARC 93-01, Revision 3, Section 11.2.6, "Safety Assessment for Removal of Equipment from Service During Shutdown Conditions," subheading "Containment - Primary (PWR)/Secondary (BWR)." The commitment in the Reviewer's Note reads:

“The following guidelines are included in the assessment of systems removed from service during movement of irradiated fuel:

- During fuel handling/core alterations, ventilation system and radiation monitor availability (as defined in NUMARC 91-06) should be assessed, with respect to filtration and monitoring of releases from the fuel. Following shutdown, radioactivity in the fuel decays fairly rapidly. The basis of the Technical Specification operability amendment is the reduction in doses due to such decay. The goal of maintaining ventilation system and radiation monitor availability is to reduce doses even further below that provided by the natural decay.
- A single normal or contingency method to promptly close primary or secondary containment penetrations should be developed. Such prompt methods need not completely block the penetration or be capable of resisting pressure.

The purpose of the “prompt methods” mentioned above are to enable ventilation systems to draw the release from a postulated fuel handling accident in the proper direction such that it can be treated and monitored.”

Since TSTF-51, Revision 2 was approved, NUMARC 93-01, Revision 3, was issued. The requirements of the draft Section 11.2.6 are now located in the final Section 11.3.6 “Containment - Primary (PWR)/Secondary (BWR).”

3.0 EVALUATION

The current CPS TS requires that the primary containment, drywell isolation instrumentation, the secondary containment isolation instrumentation, primary containment air locks, the primary containment isolation valve, the secondary containment, the SCIDs, and the standby gas treatment system (SGTS) to be operable during core alterations and movement of irradiated fuel assemblies within the primary and secondary containment. These requirements ensure that any potential release of fission products from the primary and secondary containment to the environment as a result of a postulated design-basis accident is minimized. During core alterations or movement of irradiated fuel assemblies, the most severe radiological consequences would result from a FHA.

The licensee submitted a radiological consequence analyses resulting from a FHA with the containment equipment hatch and the two containment airlocks open during core alterations and movement of irradiated fuel in the primary and secondary containment, and concluded that the release of fission products will result in doses that are well within the acceptable dose criteria specified in 10 CFR 50.67 for the exclusion area boundary (EAB) and for control room operator.

The licensee reached this conclusion:

- (1) assuming the fission product inventory for a fuel burnup of 42 GWd/MT which represents that the reactor has operated at 3542 MWt (120 percent of rated power plus an additional 2 percent power to account for uncertainty) for 1605 days,
- (2) using the most limiting high burnup fuel type (GE14) that has a radial peaking factor of 1.7,
- (3) resulting 172 fuel rods are damaged by a 34-foot drop of a GE14 fuel bundle onto the reactor core releasing its entire fission products in the fuel gap,
- (4) using fraction of fission product inventory in gap provided in Regulatory guide 1.183,
- (5) using a fission product decay period of 24 hours (time period from the reactor shutdown to the first fuel movement),
- (6) using an overall effective decontamination factor of 200 for the iodine isotopes in the containment water with minimum water depth of 23 feet,
- (7) assuming the primary and secondary containment are not isolated,
- (8) taking no fission product removal credit by the SGTS,
- (9) taking no credit for atmospheric dilution or mixing in the primary or secondary containment, and
- (10) taking no fission product removal credit by the control room air intake and recirculation filters.

For the atmospheric relative concentrations values (χ/Q) for the EAB and control room air intake, the licensee used the design-basis χ/Q values in the CPS updated safety analysis report. The licensee proposed no new χ/Q values. The χ/Q values used by the licensee and by the staff for its confirmatory dose calculations are listed in Table 2.

For the control room habitability assessment, the licensee evaluated four different control room operational scenarios following a design-basis accident. The four scenarios were analyzed to assess the sensitivity of the control room operator dose to various control room ventilation system operation and filtration levels and to determine the most conservative scenarios for the postulated FHA. All four operational scenarios resulted in doses that are well within the acceptable dose criteria specified in 10 CFR 50.67 for the EAB and for control room operator.

Among the four operational scenarios, the most conservative scenario assumes 4400 cfm normal control room air intake and 660 cfm of unfiltered air inleakage without the control room makeup air and recirculation filters. This scenario is the same as the control room operation with no isolation (open) for the entire 30 day period used for the control room operator dose

assessment. The staff confirmed the licensee's dose calculation for this scenario by performing an independent dose calculation. The staff's acceptance of this scenario is limited to the postulated design-basis FHA.

The licensee assumed in its dose calculation that the two containment personnel airlocks and the containment equipment hatch are open at the time of the postulated FHA, i.e., no credit is taken for containment closure during the event. In its response dated December 28, 2001, the licensee stated the following:

- (1) the licensee will administratively implement the provisions of Section 11, "Assessment of Risk Resulting From Performance of Maintenance Activities," subsection 3.6.5 of Nuclear Utilities Management and Resources Council (NUMARC) document NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 3, pertaining to the capability to restore secondary containment following a design-basis accident.
- (2) Clinton Station Procedure 4979.07, "Dropped Fuel Bundle," an off-normal procedure, provides the required actions following a dropped fuel bundle. This procedure contains both automatic actions as well as required operator actions. The current revision of this procedure contains requirements to take appropriate actions necessary to isolate the area, to reduce or redirect the released radioactivity, to stop the degradation of conditions and mitigate their consequences, and to initiate actions to verify or re-establish Secondary Containment, and if needed, Primary Containment, following a dropped fuel bundle.
- (3) During a typical refueling outage, a Drywell Coordinator is stationed at the drywell access control point, which is located in very close proximity to the equipment hatch, to coordinate work activities inside the drywell. A dropped fuel bundle warning system is required to be installed in the drywell prior to starting any refueling activities. The system has alarms that are responded to by the radiation protection personnel and the Drywell Coordinator at the access control point located near the 737-0" elevation. The Drywell Coordinator is responsible for ensuring that actions are initiated in a timely manner, including notifying the control room, to quickly restore primary or secondary containment in the event of a fuel handling accident. All of the Drywell Coordinators receive training on the actions associated with a dropped fuel bundle.
- (4) The proposed license amendment is consistent with the guidance provided in TSTF -51, Revision 2, "Revised Containment Requirements During Handling Irradiated Fuel and During core alterations."

Based on the above statements, the staff finds that the licensee meets the guidance provided in Regulatory Guide 1.183 concerning administrative controls to close the airlock, hatch, or open penetrations following a FHA in a timely manner.

The staff reviewed the licensee's analyses and finds that the major parameters and assumptions used for the radiological consequence analyses for the postulated FHA are consistent with those provided in the Standard Review Plan (SRP) Section 15.0.1, "Radiological

Consequence Analyses Using Alternative Source Terms,” and Regulatory Guide 1.183. Table 1 summarizes the results of the licensee’s radiological consequence analyses for the EAB and control room. Table 2 lists the major assumptions and parameters used by the licensee in its radiological consequence calculations and by the staff in its confirmatory dose calculations.

To verify the licensee’s analyses, the staff performed a confirmatory radiological consequence calculation. In its dose calculation, the staff assumed all fission products are released to the environment within 2 hours without retention by the containment. The staff’s analysis confirmed the licensee’s conclusion that the radiological consequences would be well within the dose guideline values specified in 10 CFR 50.67. Although the staff performed independent calculations to confirm the licensee’s results, the staff’s acceptance is based on the licensee’s analyses.

The licensee proposes to delete “During CORE ALTERATIONS” from the TS Applicability statement and the TS Required Actions. In addition, the licensee is proposing to add the term “recently” in front of “irradiated” in the statement “During movement of irradiated fuel assemblies in the primary or secondary containment.”

The FHA is the only event during CORE ALTERATIONS that is postulated to result in fuel damage and radiological release. The Limiting Condition for Operation and Required Actions will remain applicable during activities which could result in a FHA with fuel damage and radiological release. Therefore, the deletion of CORE ALTERATIONS is acceptable. The term “recently” when used in this context represents the decay period for the reduction of radionuclide inventory available for release in the event of a FHA. The proposed TS changes are consistent with the FHA analysis and TSTF-51. Also, the licensee committed to the containment closure guidelines located in NUMARC 93-01. Therefore, the proposed changes to the TS, including the TS Bases, are acceptable.

Based on the above evaluation, the staff concludes that the proposed changes are acceptable. This acceptance is based on the staff’s confirmation of the licensee’s conclusion that the radiological consequences of a fuel handling accident are within the dose acceptance criteria specified in SRP 15.0.1 and well within the dose criteria given in 10 CFR 50.67.

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

This amendment changes a requirement 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 (66 FR 64286). 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 staff 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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: J. Lee
D. Cullison

Date: April 3, 2002

TABLE 1

Radiological Consequences
for
Fuel Handling Accident
(rem TEDE⁽¹⁾)

Exclusion Area Boundary	0.45
Control Room	0.80
Dose Acceptance Criteria:	
Exclusion area boundary	6.3 ⁽²⁾
Control Room	5.0 ⁽³⁾

⁽¹⁾ Total effective dose equivalent

⁽²⁾ From SRP 15.0.1

⁽³⁾ From 10 CFR 50.67

Table 2

**Parameters and Assumptions Used in
Radiological Consequence Calculations
Fuel Handling Accident**

<u>Parameter</u>	Value
Reactor power level	3542 MWt
Radial peaking factor	1.7
Fission product decay period	24 hours
Number of fuel rod failed	172
Fuel pool water decontamination factor	
Iodine	200
Noble gases	1
Fuel gap fission product inventory	
Noble gases excluding Kr-85	5%
Kr-85	10%
Iodine except I-131	5%
I-131	8%
Control room	
Unfiltered infiltration	660 cfm
Unfiltered air intake flow	4400 cfm
Recirculation flow through charcoal adsorber	0
Fission product removal filter efficiency	0
Atmospheric relative concentrations (sec/m ³)	
Exclusion area boundary	
0 to 2 hours	1.8E-4
Control room	
0 to 2 hours	4.61E-4
2 to 8 hours	4.61E-4
8 to 24 hours	2.73E-4
1 to 4 days	9.03E-5
4 to 30 days	1.61E-5
Duration of fission product release	2 hours