

October 1, 1998

Mr. Joseph V. Sipek
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Clinton, IL 61727

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SUBJECT: ISSUANCE OF AMENDMENT NO. 116 TO FACILITY OPERATING LICENSE
NO. NPF-62 - CLINTON POWER STATION, UNIT 1 (TAC NO. MA1925)

Dear Mr. Sipek:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 116 to Facility Operating License No. NPF-62 for the Clinton Power Station, Unit 1. The amendment is in response to your application dated May 20, 1998, as supplemented July 17 and August 6, 1998.

The amendment allows automatic operation of a new emergency reserve auxiliary transformer to provide power to the plant 4.16-kV buses from the offsite 138-kV transmission network.

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,
Original Signed by
Jon B. Hopkins, Senior Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-461

- Enclosures: 1. Amendment No.116 to License No. NPF-62
- 2. Safety Evaluation

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DOCUMENT NAME: G:\CLINTON\MA1925.AMD

OFFICE	LA:PDIII-3	E	PM:PDIII-3	E	OGC		
NAME	EBarnhill <i>EB</i>		JHopkins <i>JH</i>				
DATE	09/17/98		09/18/98		09/24/98		

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

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Sincerely,

A handwritten signature in black ink, appearing to read "Jon B. Hopkins".

Jon B. Hopkins, Senior Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-461

Enclosures: 1. Amendment No. 116 to
License No. NPF-62
2. Safety Evaluation

cc w/encls: See next page

Joseph V. Sipek
Illinois Power Company

Clinton Power Station, Unit 1

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

ILLINOIS POWER COMPANY

DOCKET NO. 50-461

CLINTON POWER STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

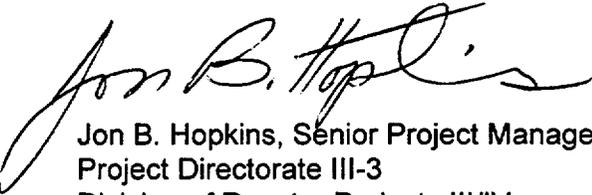
Amendment No. 116
License No. NPF-62

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Illinois Power Company (the licensee), dated May 20, 1998, supplemented July 17 and August 6, 1998, 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. 116, the license is amended to authorize revision of the Updated Safety Analysis Report (USAR) as set forth in the application for amendment by Illinois Power dated May 20, 1998, as supplemented by letters dated July 17 and August 6, 1998. Illinois Power shall update the USAR to reflect the revised description authorized by this amendment in accordance with 10 CFR 50.71(e).

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3. This license amendment is effective as of its date of issuance and shall be implemented within 45 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Jon B. Hopkins, Senior Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Date of Issuance: October 1, 1998



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 116 TO FACILITY OPERATING LICENSE NO. NPF-62

ILLINOIS POWER COMPANY

CLINTON POWER STATION, UNIT 1

DOCKET NO. 50-461

1.0 INTRODUCTION

By letter dated May 20, 1998, Illinois Power requested amendment of Facility Operating License NPF-62 for Clinton Power Station (CPS) by requesting NRC approval of a proposed modification to the CPS offsite power system and associated changes proposed to the CPS Updated Safety Analysis Report (USAR). The purpose of the proposed modification is to replace the emergency reserve auxiliary power transformer (ERAT), which provides power to the plant 4.16 kV safety buses from the 138 kV transmission network, with a new transformer having a larger capacity and an automatic load tap changing capability in order to satisfy the requirements of 10 CFR 50 General Design Criterion (GDC)17, "Electric Power Systems." Since the malfunction of the load tap changer (LTC) controller in the automatic mode could create over voltage or under voltage conditions on the safety buses, such conditions were not previously analyzed in the safety analysis report. Therefore, the proposed change involves an unreviewed safety question.

This modification is also part of the modifications currently being pursued to provide the short-term, as well as long-term, solution to the degraded voltage problem at CPS. Other modifications include the installation of 480/120 V regulating transformers to replace selected existing non-regulating transformers used in the CPS auxiliary power system, the installation of static VAR compensators on the secondary side of the ERAT and reserve auxiliary transformer (RAT) and potentially replacing the existing RAT with a new transformer with a load tap changer.

Supplemental letters dated July 17 and August 6, 1998, provided additional information and did not change the requested action or affect the proposed no significant hazards consideration determination.

2.0 BACKGROUND

The offsite power system for CPS consists of two immediate sources of offsite power circuits. These offsite sources are associated with the 345 kV and 138 kV offsite power transmission systems. The 138 kV and the 345 kV transmission lines are on separate rights of way and are electrically independent. The onsite Class 1E system consists of three electrically and

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physically independent divisions. Each of these three divisions is supplied with preferred power from the 138 kV and 345 kV transmission lines. The 345 kV system provides power to the 4.16 kV safety buses via the RAT, and the 138 kV circuit provides power to the 4.16 kV safety buses via the ERAT.

During the 1997 summer, CPS experienced intermittent low grid voltage condition during periods of peak load demand, when one or both offsite power sources intermittently could not support the minimum required voltage value established for CPS to satisfy the requirements of 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 17. The load growth without the addition of new generation capacity coupled with high load demands during peak hours have resulted in these variations in voltage. CPS Technical Specification (TS) 3.8.2, "AC Sources-Shutdown," requires that at least one fully capable offsite source be operable during Modes 4 and 5.

3.0 EVALUATION

The proposed modification is to replace the existing ERAT, which provides offsite power to both 4.16 kV safety buses from the 138 kV transmission network, with a new transformer having a larger capacity and automatic load tap changing capability. Installation of the ERAT LTC will ensure that an operable offsite power source can be maintained during the current outage such that the TS requirements for having at least one operable offsite source operable during shutdown conditions (Modes 4 and 5) can be met. The new ERAT with LTC will regulate voltage from the 138 kV offsite source while the plant is in its current shutdown condition and only one offsite power source is required to be operable per the TS.

The new ERAT is rated at 18/24/30 MVA OA/FA/FA @ 65 C rise, as compared to the current ERAT which is rated at 15.12 MVA, OA @ 65 C rise. The new ERAT also has an automatic load tap changer capability. That is, the number of effective primary windings can be varied over a range of 1.06 per unit (pu) to 0.81 pu to provide a consistent 4160 V output. Thus the LTC will accommodate higher and lower voltages than previously allowed from the 138 kV system as it regulates voltage to the plant auxiliary system.

The tap changer mechanism for the LTC is located in a separate enclosure alongside and attached to the transformer. A drive motor charges a spring-loaded mechanism to rotate the tap changer to increase or decrease the number of transformer windings in service. In the automatic mode, the tap changer is given commands to raise or lower the tap setting by the tap changer controller located on the transformer. The controller monitors load and source voltage to create an "error" signal based on load demand, which changes the tap setting when required so that voltage is controlled to within the desired bandwidth. The tap changer can also be operated in a manual control mode locally at the ERAT, for which the drive motor is still utilized. Otherwise (in the event of drive motor failure or a loss of power to the drive motor), a hand crank can be utilized to mechanically effect a tap change via the spring-loaded mechanism.

The licensee has evaluated the potential failure modes of the LTC and its control system. Of greatest concern is the possibility for the controller to fail in a manner that could cause the tap changer to suddenly run voltage up to an unacceptable level, especially under light load conditions. There are other LTC failure modes or malfunctions that could lead to an over

voltage condition that results in the tap changer failing to change the setting when expected, i.e., the tap changer setting remains "as is." This could result from a failure of the controller when the LTC is operating in the automatic mode, or from a failure of the drive motor within the LTC when the LTC is operating in either the automatic or manual mode. In either case an over voltage condition could be created if grid voltage changed subsequent to the failure. Of various failure modes, the fail "as-is" failure mode is the most likely, compared to the controller failure that causes the tap setting to be run up (or down) to an undesirable setting. This was based on the survey conducted by the licensee of various utilities employing LTC's at their nuclear power plants. Such failure modes are easily mitigated, slowly evolving, and/or their consequences are minimal. The survey revealed no reported instances of an LTC controller spuriously running voltage to an extreme value. Instances of LTCs failing "as is" were reported, but in many cases, either voltage did not reach levels that demanded immediate action, or operator action was able to be taken to mitigate the situation. There were no reported instances of equipment failures resulting from LTC failure.

In consideration of the potential malfunction of the LTC, a backup control unit is supplied for the LTC. The backup control unit prevents the LTC tap changer control, in the unusual event of a failure, from running the secondary voltage outside the desired upper and lower limits. It also prevents the line drop compensator from raising the voltage too high under full or overload conditions. This feature significantly reduces the probability of a spurious, sustained high voltage condition that could result from a malfunction of the LTC controller, since such a condition would have to involve a failure of both the LTC controller and the backup controller. The number of effective primary windings can be varied over a range 1.06 pu to 0.81 pu by the LTC which is mounted on the ERAT to provide consistent 4160 V output.

The ERAT LTC post-modification acceptance testing will be conducted in accordance with vendor recommendations. The procedures that will be used to conduct this testing were developed in cooperation with the ERAT LTC vendor and are consistent with industry standards typically used to validate proper steady-state and dynamic response characteristic of large industrial power transformers. Most of the testing to be performed is consistent with surveillance testing of testing originally performed under the startup test program for the auxiliary power system.

The testing of the automatic load tap changer will involve loading the Division 3 safety bus through operation of the high pressure core spray system, and then having the dispatch center effect a small voltage change in the 138 kV system such that a tap change will be performed by the load tap changer. Such a voltage change in the 138 kV system will be within the variations normally experienced and permitted on the system.

In the course of our review, several telephone conference calls were conducted with the licensee and a number of requests for additional information were identified. The licensee provided the additional information by letters dated July 17, 1998, and August 6, 1998. Specifically, the staff requested the licensee to quantify more clearly the degree of the voltage problem expected this summer (1998) and explain how the ERAT LTC will help to resolve the problem and to address the following:

- (a) What are the expected voltage swings on the 138 kV system this summer?

(b) Is there any over voltage alarm capability at Clinton?

(c) What is response time (how fast is the LTC in effecting a tap change), and the range of the LTC?

(d) In the event of a voltage dip, how responsive will the LTC be in preventing a trip of the degraded voltage relays?

In response to item (a) above, the licensee stated that prediction of the 138 kV line voltages this summer required consideration of certain contingencies as well as planned outages of certain lines. From the results of the analyses, the worst-case minimum expected voltage is 92.7% of nominal (with both Kincaid units off line and Line 1372 out of service). The maximum expected voltage for the 138 kV system is evaluated to be 103.3% of nominal. The results of the above analysis provided input to the analysis required to establish an appropriate setting for the fixed-tap (no-load) tap changer and the voltage control band for the load tap changer. The intent of this analysis was to avoid over voltage conditions at the Class 1E buses and, at the same time, ensuring that at the minimum voltage, a LOCA block start sequence can be accomplished without the need for the load tap changer to effect an additional tap change to reset the degraded voltage relays. A conservative value of 105% of nominal voltage was used for the maximum expected 138 kV grid voltage in determining the fixed tap setting for the LTC. The staff finds this response acceptable.

In response to item (b), the licensee stated that an alarm is provided in the control room to alert operators of a high voltage condition on the 4.16 kV safety buses. The alarm set point is currently set at 4230 V (approximately 102% of nominal) which is below the maximum expected voltage of 103.3% (4300 V) of nominal. This set point for the alarm takes instrument accuracy into account and includes additional margin to allow operators to take action as needed before the high voltage limit is reached. The staff finds this response acceptable.

In response to item (c), the licensee stated that the overall range of the ERAT LTC is determined by both a fixed-ratio (no-load) tap changer and the automatic load tap changer. Each tap setting of the load tap changer, which operates while the ERAT is energized, corresponds to a voltage difference of approximately 1.6%. The load tap changer is designed to operate over a range of 0.8 pu to 1.06 pu of the fixed tap setting. The fixed-ratio/no-load tap changer, which can only be changed when the ERAT is de-energized, has five taps or positions. Each tap corresponds to a voltage difference of 2.5%, from -5% to +5% of nominal. The no-load tap setting is set at Position 2 (+2.5% of the primary voltage). This setting would provide the minimum required voltage for the 4.16 kV safety buses, without creating potential over voltage under lightly loaded conditions.

The LTC is capable of effecting a tap change within approximately 3 seconds of a demand. However, a timer is provided for the voltage regulating relay (VRR) which controls the LTC. The VRR delay timer will be set to a 5-second delay with an accuracy of ± 2 seconds, for an overall delay of up to 7 seconds. The time delay accommodates transients and prevents excessive switching of the LTC. In the event of a demand that requires more than one tap change at a time, the first tap change will occur within approximately 10 seconds, and each

subsequent tap change will occur within 3 seconds following the previous change. The above discussion demonstrates that the LTC will boost the safety bus voltage within the intended control band in sufficient time before the degraded grid relays transfer the safety loads to the emergency diesel generators (EDGs). Therefore, the staff finds the above response acceptable.

In response to item (d), the licensee stated that the analysis for operation of the ERAT LTC for summer 1998 conditions takes into account the worst-case configuration with both Kincaid units off line and Line 1372 out of service. Analysis shows that at this worst case condition, the load tap changer will maintain ERAT secondary voltage to within the intended control band. With voltage at the minimum point of the control band, a LOCAL block start could be accommodated such that the degraded voltage relays would reset with no tap change required. That is, although bus voltage during the block start will be drawn to a level that trips the degraded voltage relays, it will recover to above the reset point within the time delay of the relays.

Additionally, with voltage relays at the minimum point of the voltage band, the loss of any single line of generation unit would not result in a trip of the degraded voltage relays and no transfer of plant loads to the standby emergency diesel generators would occur, with no tap change required. The staff finds this response acceptable.

4.0 FINDING

Based on the information provided by the licensee, the staff concludes that the proposed modification to replace the existing ERAT with a new transformer having a larger capacity and an automatic LTC and the associated changes to the Updated Safety Analysis Report are acceptable. The proposed design will accommodate higher and lower voltages than previously allowed from the 138 kV system as the ERAT regulates voltage to the plant auxiliary system. Since the ERAT LTC also incorporates a backup control unit, the proposed design reduces the probability of a malfunction of the LTC controller. The licensee has demonstrated that even during the worst case condition (when the grid is at its minimum voltage), the LTC can maintain the ERAT secondary voltage to within the intended control band to ensure that at least one operable offsite power source that satisfies the requirements of GDC 17 is available while CPS is in its current shut down condition.

5.0 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.

6.0 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 or changes a surveillance requirement. 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 (63 FR 30519). 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.

7.0 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 Contributor: O. Chopra

Date: October 1, 1998