December 4, 1996

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Mr. Paul J. Telthorst
Director - Licensing
Clinton Power Station
P. O. Box 678
Mail Code V920
Clinton, IL 61727

SUBJECT: ISSUANCE OF AMENDMENT NO. 110TO FACILITY OPERATING LICENSE NO. NPF-62 - CLINTON POWER STATION, UNIT 1 (TAC NO. M94886)

Dear Mr. Telthorst:

The U. S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 110to Facility Operating License No. NPF-62 for the Clinton Power Station (CPS), Unit No. 1. The amendment is in response to your application dated February 22, 1996 (U-602554), and as supplemented by letters dated July 24 (U-602613), October 4 (U-602635), November 19 (U-602657) and November 25, 1996 (U-602669).

The amendment changes CPS Technical Specification (TS) 3.3.8.1, "Loss of Power Instrumentation," and TS 3.8.1, "AC Sources-Operating," by revising the setpoint for the degraded voltage protection instrumentation and modifying or deleting other Loss of Power Instrumentation TS requirements. In addition, changes were also made to the minimum required diesel generator voltage specified for certain diesel generator surveillances.

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:

Douglas V. Pickett, 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.110 to NPF-62
2. Safety Evaluation
cc w/encls: See next page
DOCUMENT NAME: G:\CLINTON\CLI94886.AMD

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DATE	11/27/96		12/4/96		12/2/96		11/25/96	

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*See JCalvo to GMarcus Memorandum dated November 25, 1996

CP-1

December 4, 1996

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NAME	DFoster-Curseen		DPickett DVP				JCalvo*	
DATE	11/27/96		12/4/96		12/2/96		11/25/96	

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*See JCalvo to GMarcus Memorandum dated November 25, 1996

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

December 4, 1996

Mr. Paul J. Telthorst
Director - Licensing
Clinton Power Station
P. O. Box 678
Mail Code V920
Clinton, IL 61727

SUBJECT: ISSUANCE OF AMENDMENT NO. 110 TO FACILITY OPERATING LICENSE NO. NPF-62 - CLINTON POWER STATION, UNIT 1 (TAC NO. M94886)

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Douglas V Pickett

Douglas V. Pickett, 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.110 to NPF-62
2. Safety Evaluation

cc w/encls: See next page

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

ILLINOIS POWER COMPANY, ET AL.

DOCKET NO. 50-461

CLINTON POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 110
License No. NPF-62

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Illinois Power Company* (IP), and Soyland Power Cooperative, Inc. (the licensees) dated February 22, 1996 and supplemented by letters dated July 24, October 4, November 19 and November 25, 1996, 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:

---

*Illinois Power Company is authorized to act as agent for Soyland Power Cooperative, Inc. and has exclusive responsibility and control over the physical construction, operation and maintenance of the facility.

(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. 110 , are hereby incorporated into this license. Illinois Power 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.

FOR THE NUCLEAR REGULATORY COMMISSION

Douglas V Pickett

Douglas V. Pickett, Project Manager
Project Directorate III-3
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: December 4, 1996

ATTACHMENT TO LICENSE AMENDMENT NO. 110

FACILITY OPERATING LICENSE NO. NPF-62

DOCKET NO. 50-461

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages	Insert Pages
3.3-78	3.3-78
3.3-79	3.3-79
3.3-80	3.3-80
3.8-4	3.8-4
3.8-6	3.8-6
3.8-8	3.8-8
3.8-9	3.8-9
3.8-10	3.8-10
3.8-13	3.8-13
3.8-14	3.8-14

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Function in Table 3.3.8.1-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
When the associated diesel generator (DG) is required to be OPERABLE by LCO 3.8.2, "AC Sources—Shutdown."

ACTIONS

-----------------------------------NOTE-----------------------------------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more channels inoperable.	A.1	Place channel in trip.	1 hour
	AND		
	A.2	--------NOTE--------- Only applicable for Functions 1.c, 1.d, 1.e, 2.c, 2.d, and 2.e after Release for Operations (RFO) of the corresponding plant modification. --------------------	
		Restore channel to OPERABLE status.	7 days
B. Required Action and associated Completion Time not met.	B.1	Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

------------------------------------NOTES------------------------------------

1. Refer to Table 3.3.8.1-1 to determine which SRs apply for each LOP Function.

2. When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 2 hours provided the associated Function maintains DG initiation capability.

SURVEILLANCE		FREQUENCY
SR 3.3.8.1.1	Deleted	
SR 3.3.8.1.2	Perform CHANNEL FUNCTIONAL TEST.	31 days
SR 3.3.8.1.3	Perform CHANNEL CALIBRATION.	18 months
SR 3.3.8.1.4	Perform LOGIC SYSTEM FUNCTIONAL TEST.	18 months

Table 3.3.8.1-1 (page 1 of 1)
Loss of Power Instrumentation

FUNCTION	REQUIRED CHANNELS PER DIVISION	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Divisions 1 and 2 – 4.16 kV Emergency Bus Undervoltage			
a. Loss of Voltage – 4.16 kV basis	6	SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 2345 V and ≤ 3395 V
b. Loss of Voltage – Time Delay	6	SR 3.3.8.1.3 SR 3.3.8.1.4	≤ 10 seconds
c. Degraded Voltage Reset – 4.16 kV basis	2	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 3876 V and ≤ 3901 V (a)
d. Degraded Voltage Drop-out – 4.16 kV basis	2	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 3848 V and ≤ 3876 V (b)
e. Degraded Voltage - Time Delay	1	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 14 seconds and ≤ 16 seconds
2. Division 3 – 4.16 kV Emergency Bus Undervoltage			
a. Loss of Voltage – 4.16 kV basis	4	SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 2345 V and ≤ 2730 V
b. Loss of Voltage – Time Delay	1	SR 3.3.8.1.3 SR 3.3.8.1.4	≤ 3.0 seconds
c. Degraded Voltage Reset – 4.16 kV basis	2	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 3876 V and ≤ 3901 V (a)
d. Degraded Voltage Drop-out – 4.16 kV basis	2 (c)	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 3848 V and ≤ 3876 V (b)
e. Degraded Voltage – Time Delay	1	SR 3.3.8.1.2 SR 3.3.8.1.3 SR 3.3.8.1.4	≥ 14 seconds and ≤ 16 seconds

(a) This value is to be used after RFO of the corresponding plant modification. Prior to RFO this Function is not applicable.

(b) This value is to be used after RFO of the corresponding plant modification. Prior to RFO of the corresponding plant modification the Degraded Voltage Drop-out – 4.16 kV basis Allowable Value shall be ≥ 3762 V and ≤ 3832 V.

(c) This value is to be used after RFO of the corresponding plant modification. Prior to RFO of the corresponding plant modification the Degraded Voltage Drop-out – 4.16 kV basis Required Channels Per Division shall be 3.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Three or more required AC sources inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each offsite circuit.	7 days
SR 3.8.1.2	-------------------NOTES------------------- 1. Performance of SR 3.8.1.7 satisfies this SR. 2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. 3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.7 must be met. --- Verify each DG starts from standby conditions and achieves steady state voltage $\geq$ 3870 V and $\leq$ 4580 V and frequency $\geq$ 58.8 Hz and $\leq$ 61.2 Hz.	As specified in Table 3.8.1-1

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.7	-------------------NOTE------------------ All DG starts may be preceded by an engine prelube period. --- Verify each DG starts from standby condition and achieves, in ≤ 12 seconds, voltage ≥ 3870 V and ≤ 4580 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	184 days
SR 3.8.1.8	------------------NOTE-------------------- This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. --- Verify automatic and manual transfer of unit power supply from the normal offsite circuit to the alternate offsite circuit.	18 months
SR 3.8.1.9	-----------------NOTES------------------- 1. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. 2. If performed with DG synchronized with offsite power, it shall be performed at a power factor ≤ 0.9. --- Verify each DG rejects a load greater than or equal to its associated single largest post accident load and following load rejection, the engine speed is maintained less than nominal plus 75% of the difference between nominal speed and the overspeed trip setpoint or 15% above nominal, whichever is lower.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.11	------------------NOTES------------------ 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. --	
	Verify on an actual or simulated loss of offsite power signal: a. De-energization of emergency buses; b. Load shedding from emergency buses for Divisions 1 and 2; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 12 seconds, 2. energizes auto-connected shutdown loads, 3. maintains steady state voltage ≥ 3870 V and ≤ 4580 V, 4. maintains steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies permanently connected and auto-connected shutdown loads for ≥ 5 minutes.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.12	-------------------NOTES------------------- 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. --- Verify on an actual or simulated Emergency Core Cooling System (ECCS) initiation signal each DG auto-starts from standby condition and: a. In ≤ 12 seconds after auto-start and during tests, achieves voltage ≥ 3870 V and ≤ 4580 V; b. In ≤ 12 seconds after auto-start and during tests, achieves frequency ≥ 58.8 Hz and ≤ 61.2 Hz; and c. Operates for ≥ 5 minutes.	18 months
SR 3.8.1.13	------------------NOTE-------------------- This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. --- Verify each DG's automatic trips are bypassed on an actual or simulated ECCS initiation signal except: a. Engine overspeed; b. Generator differential current; and c. Overcrank for DG 1A and DG 1B.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.14	------------------NOTES------------------ 1. Momentary transients outside the load and power factor ranges do not invalidate this test. 2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. --- Verify each DG operating at a power factor ≤ 0.9 operates for ≥ 24 hours: a. For ≥ 2 hours loaded ≥ 4256 kW for DG 1A, ≥ 4263 kW for DG 1B, and ≥ 2420 kW for DG 1C; and b. For the remaining hours of the test loaded ≥ 3869 kW for DG 1A, ≥ 3875 kW for DG 1B, and ≥ 2200 kW for DG 1C.	18 months
SR 3.8.1.15	------------------NOTES------------------ 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ 1 hour loaded ≥ 3869 kW for DG 1A, ≥ 3875 kW for DG 1B, and ≥ 2200 kW for DG 1C. Momentary transients outside of the load range do not invalidate this test. 2. All DG starts may be preceded by an engine prelube period. --- Verify each DG starts and achieves, in ≤ 12 seconds, voltage ≥ 3870 V and ≤ 4580 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.19	------------------NOTES------------------ 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. --- Verify, on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ECCS initiation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses for Divisions 1 and 2; and c. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ 12 seconds, 2. energizes auto-connected emergency loads, 3. achieves steady state voltage ≥ 3870 V and ≤ 4580 V, 4. achieves steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.20	------------------NOTE------------------- All DG starts may be preceded by an engine prelube period. -- Verify, when started simultaneously from standby condition, each DG achieves, in $\leq$ 12 seconds, voltage $\geq$ 3870 V and $\leq$ 4580 V and frequency $\geq$ 58.8 Hz and $\leq$ 61.2 Hz.	10 years

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 110 TO FACILITY OPERATING LICENSE NO. NPF-62

ILLINOIS POWER COMPANY, ET AL.

CLINTON POWER STATION, UNIT NO. 1

DOCKET NO. 50-461

1.0 INTRODUCTION

By letter dated February 22, 1996, Illinois Power Company (the licensee) proposed an amendment to the Clinton Power Station Technical Specifications to revise the setpoint of the degraded voltage protection, and modify or delete other Loss of Power Instrumentation Technical Specifications. They also proposed a change to the minimum required diesel generator voltages in certain diesel generator surveillances. In response to staff questions, the licensee provided additional information in a letter dated July 24, 1996. In subsequent letters dated October 4, 1996, November 19, 1996, and November 25, 1996, the licensee provided revised versions of the proposed amendment as well as more additional information.

Degraded voltage protection is provided in the plant to ensure that adequate voltage is provided to all plant electrical safety equipment. If voltages are not adequate, the degraded voltage protection will separate the equipment from the degraded voltage source and allow it to be transferred to an alternate power source. In addition to the degraded voltage protection changes, changes were also proposed to the minimum required diesel generator voltages in certain diesel generator surveillances. The following evaluation details the staff's findings on each of the proposed changes.

2.0 EVALUATION

2.1 SR 3.3.8.1.1

The licensee is proposing to delete surveillance requirement SR 3.3.8.1.1. This surveillance specifies that a CHANNEL CHECK of the degraded voltage instrumentation be performed every 12 hours. A CHANNEL CHECK is a requirement typically specified for emergency core cooling and reactor protection system instrumentation. For this instrumentation the surveillance generally consists of a qualitative comparison of one channel against another channel which is measuring the same parameter. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value.

In the case of the degraded voltage instrumentation there is no instrument reading to verify against other channels. The surveillance, therefore, is typically conducted by taking a voltage measurement using an installed meter that is reading the same point the degraded voltage instrumentation is reading, and verifying whether the degraded voltage instrumentation status (tripped or not tripped) is correct for that voltage level. At Clinton specifically, the licensee states that this verification is based on bus voltage level and circuit breaker alignment, which are also required to be monitored by SR 3.8.9.1 or SR 3.8.10.1 (operating and shutdown distribution system surveillances) as applicable. The licensee also states that the trip setting of these relays is outside the normal operating voltage range, and ineffective information relevant to plant operations or operability of the degraded voltage relays can be gathered from the channel check alone.

In a letter dated July 24, 1996, in response to staff questions, the licensee also stated that there is local indication of trip status (i.e., a flag) for each individual degraded voltage relay at the electrical panel where the relay is installed, and while there is no TS surveillance requirement for checking these trip flags, they are routinely checked by operators each shift during operator rounds as currently required by plant procedures. The licensee further stated that the failure of a single relay will neither cause an inadvertent trip to occur nor prevent a valid trip from occurring, and the probability of a relay failure within a 31-day period is small. (Note: 31 days is the time between a CHANNEL FUNCTIONAL TEST of these relays which verifies that the relay is functioning properly. This is the next most frequent surveillance of these relays following the 12-hour CHANNEL CHECK the licensee is proposing to delete.)

The staff agrees that the CHANNEL CHECK surveillance for the degraded voltage instrumentation as currently performed at Clinton provides no additional information beyond that already provided by the distribution system surveillances SR 3.8.9.1 or SR 3.8.10.1. Also, the routine check of the relay trip flags performed on a once-per-shift basis as currently required by the licensee's procedures more closely meets the intent of the CHANNEL CHECK surveillance. The staff therefore finds the deletion of the CHANNEL CHECK surveillance SR 3.3.8.1.1 to be acceptable.

2.2 Table 3.3.8.1-1

Table 3.3.8.1-1 of the Clinton Technical Specifications specifies the allowable value, applicable surveillance requirements, and required number of channels per division, for the loss of power instrumentation associated with the Clinton Power Station safety-related electrical distribution system. The requirements for the degraded voltage instrumentation the licensee is proposing to modify are contained in that table. The licensee is proposing to delete surveillance SR 3.3.8.1.1 from the list of applicable surveillance requirements identified in the table for the degraded voltage instrumentation. That change is addressed above.

The licensee is also proposing to replace the single allowable value specified in items 1.c and 2.c of the table with two allowable values which will be identified as items 1.c, 1.d, and 2.c, 2.d, respectively (item 1 is for division 1 and 2 instrumentation and item 2 is for division 3 instrumentation). Consistent with these changes, currently existing items 1.d and 2.d in the table will be relabeled as items 1.e and 2.e respectively. The changes that relate to the new items 1.c, 1.d, 2c, and 2.d in the amended technical specifications are addressed in the following sections. The licensee has added some new footnotes to the table which are also addressed in the following sections.

2.2.1 Table 3.3.8.1-1 Allowable Values

The allowable values specified in Table 3.3.8.1-1 establish the required degraded voltage relay setpoints that must be found on the relays when they are checked, in order for the relays to be considered operable. Because the allowable values are directly related to the setpoints of the relays, they must be revised whenever the relay setpoints are revised.

The licensee has stated in his February 22, 1996, letter that the need for revised setpoints was identified in Clinton Power Station Licensee Event Report (LER) 94-005 dated June 3, 1994. Illinois Power personnel at that time recognized, from a review of calculations in response to Electrical Distribution System Functional Inspection (EDSFI) findings at other plants, that the degraded voltage relays were not sufficient to ensure proper operation of all equipment. They determined that more accurate relays were required for the degraded voltage function. As a result the licensee developed a plant modification to provide for more accurate relays and to revise the associated setpoints.

The proposed allowable values specified for the degraded voltage relays in Table 3.3.8.1-1 of the revised Clinton Technical Specification is based on the relay dropout setpoint and the relay reset setpoint (also called pickup for an undervoltage relay). The current Clinton Technical Specification only specifies the allowable value for the dropout setpoint of the existing relays. The dropout value of an undervoltage relay is the value at which the relay will change state on a decreasing sensed voltage. The reset value is the point at which the relay will revert back to its original state when that voltage recovers.

The new undervoltage relays (27N manufactured by Asea Brown Boveri) being installed at Clinton have an adjustable dropout/reset tolerance. The dropout/reset tolerance for the relays will be set so that the relays dropout at approximately 99.3 percent of their reset value. The relays also have an adjustable time delay of 0.1 to one second. At Clinton this will be set to the minimum value of approximately 0.1 second. In the Clinton design these relays will actuate a separate time delay that will be set between 14 and 16 seconds (the time delay is not being changed in this amendment).

During a design basis LOCA event at Clinton with offsite power available, the accident loads will all (with the exception of the RHR pumps) be simultaneously loaded (no intentional time delay except five seconds for RHR pumps) onto the offsite power source available at that time. As a result there will be a large initial voltage sag due to the simultaneous starting inrush currents of the accident loads (motors). This voltage sag will cause the degraded voltage relays to drop out. Following the initial inrush current transient, however, the voltage should recover to a value that will allow the safety loads to start and run and reset the degraded voltage relays, before the separate timer times out and separates the loads from offsite power.

Licensee calculation 19-AQ-02 has determined that 3870 volts is an adequate value for the voltage to recover to following the starting transient, in order for the safety loads to start and run acceptably. This is the value that was used as the analytical limit in licensee calculation 19-AN-19 to establish the degraded voltage relay reset setpoint and corresponding technical specification allowable value. The reset allowable value is specified in item 1.c and 2.c of Table 3.3.8.1-1 of the amended Clinton Technical Specifications. The value being proposed in that table is ≥ 3876 volts and ≤ 3901 volts. If the degraded voltage relay reset value is found to be within that range prior to its 18-month calibration, the relay can be considered to have been operable over the preceding 18-month interval relative to the reset setpoint. The staff finds the values specified to be acceptable.

Calculation 19-AQ-02 also has calculated the voltage that would allow safety loads to continue to operate properly during steady state operation following a LOCA. This value is 3832 volts and was used in calculation 19-AN-19 as the analytical limit to establish the degraded voltage relay dropout setpoint. In the licensee's initial submittal, no corresponding dropout allowable value was specified in the proposed Clinton Technical Specifications. Following discussions with the staff however, the licensee provided a revised amended technical specification in a letter dated November 19, 1996, which included the dropout allowable value. The dropout allowable value is specified in item 1.d and 2.d of Table 3.3.8.1-1 of the amended Clinton Technical Specifications. The value being proposed in that table is ≥ 3848 volts and ≤ 3876 volts. If the degraded voltage relay dropout value is found to be within that range prior to its 18-month calibration, the relay can be considered to have been operable over the preceding 18-month interval relative to the dropout setpoint. The staff finds the values specified to be acceptable.

2.2.2 Setpoint Reset Logic and New Required Action A.2

In the determination of the degraded voltage relay setpoints, calculation 19-AN-19 considered the degraded voltage logic applicable to reset of the relay and dropout of the relay. For the relay dropout function, the logic is two-out-of-two (i.e., both relays must sense a degraded voltage condition before a signal is sent to the timer to begin the degraded voltage time delay sequence). For the relay reset function, the logic is one-out-of-two (i.e., if either of the two relays which have previously tripped subsequently reset, the signal to the degraded voltage timer will be interrupted and the timer will reset). The one-out-of-two reset logic is a direct result of the two-out-of-two dropout logic.

Calculation 19-AN-19 took the combined uncertainties (temperature, drift, calibration, etc.) associated with a single degraded voltage relay reset setpoint and calculated the degree to which those uncertainties would be reduced when two of the relays were combined in the one-out-of-two reset logic. The number calculated (0.76) was that which would provide approximately 95 percent confidence that at least one of the relays would reset. The basis behind this approach is that it is unlikely that the uncertainties which would cause the reset point of the relay to move in the nonconservative direction would be identical for both relays if the uncertainties are random. Therefore there is some likelihood that the setpoint of one of the two relays will be less marginal than that calculated for the single relay, and that relay will reset first to reset the timer as the voltage recovers in the upward direction.

The same calculation was done for the two-out-of-two logic for the dropout setpoint. However, because both relays must drop out before the associated timer begins timing, this case is the converse of the previous case, and a factor (1.96) which increases the calculated uncertainties of a single relay results.

The staff agreed with the licensee that this was a valid approach for calculating the uncertainties associated with the degraded voltage relays on a two-relay system basis; however, there were some problems with the degraded voltage relay action statements in the original proposed Clinton Technical Specifications. The action statements had not been changed from the previous version, and with one channel (relay) inoperable, only called for placing the inoperable channel in the tripped state within one hour. This would result in the degraded voltage logic reverting to a single relay (one-out-of-one) logic. Because calculation 19-AN-19 calculated the reset setpoint and associated technical specification allowable value on a two-relay system basis, the allowable value would be nonconservative for the relay reset setpoint of the single relay system. This could result in the remaining relay being outside the technical specification reset allowable value.

As a result of the above, the licensee submitted a revised amended technical specification in a letter dated October 4, 1996. In LCO 3.3.8.1 of that technical specification, a new required action A.2 was added which required that an inoperable channel be restored to operable status within seven days. This would limit operation in the single relay mode to seven days. This required action and seven day completion time is reasonable because a single relay is still available, although its setpoint would be less likely than the two relay system to cover the entire range of potential undervoltage conditions. The staff therefore finds this change acceptable.

A note is also added to the new required action A.2 that clarifies that the action is only applicable for certain functions in Table 3.3.8.1-1 of the Technical Specifications after release for operations (RFO) of the corresponding plant modifications. This note is necessary because the modifications (new relays) will be installed on one electrical division at a time during separate refueling outages. Following the modification, new required action A.2 will become applicable to that division. The staff finds this note acceptable.

2.2.3 Allowable Value Upper Limit

The current Clinton Technical Specification specifies both an upper and lower limit for the degraded voltage relay allowable value. The technical specification initially proposed by the licensee in its letter dated February 22, 1996, only specified a lower limit for the allowable value. In its subsequent discussions with the licensee the staff stated that the upper limit on the degraded voltage relay allowable value is necessary to ensure that the relay does not separate safety equipment from the offsite power source when the offsite source is capable of supplying the equipment. If the relay setpoint was permitted to be in a range that would allow the above to occur, this would be a violation of the 10 CFR 50, Appendix A, General Design Criterion 17 requirement that an offsite system of sufficient capability be provided to permit functioning of structures, systems, and components important to safety.

In their letter of October 4, 1996, the licensee provided a revised version of the proposed technical specification amendment that included the upper limit for the degraded voltage relay in Table 3.3.8.1-1. The value specified has been chosen based on the steady-state 4160 volt safety bus voltage during a LOCA event with the 345 kV switchyard at its minimum expected value. The value specified was also based on the appropriate degraded voltage instrument loop inaccuracies and calibration inaccuracies, along with some additional margin based on engineering judgement. The staff finds the allowable value specified to be acceptable.

2.2.4 Setpoint Uncertainties

In their letter of July 24, 1996, the licensee provided the staff with calculation 19-AN-19, which establishes the new degraded voltage relay setpoints and technical specification allowable values, based on the analytical limits established in a separate calculation (19-AQ-02). The analytical limits established in calculation 19-AQ-02 are based on the minimum required voltage necessary to assure proper operation of electrical safety equipment. Calculation 19-AN-19 takes the analytical limit and combines it with all applicable instrument loop uncertainties and calibration loop uncertainties, in order to establish a setpoint that will provide confidence the degraded voltage relays will operate within the analytical limit.

The largest individual uncertainty identified in the calculation is the repeatability of the undervoltage relay over a +10 to +40 degree C operating ambient temperature range. The staff had discussions with the licensee about whether this uncertainty should be treated as a random or nonrandom error.

The licensee pointed out that the Type Test Certificate (RC-6004) of the relay indicates that over the +10 to +40 degree C temperature range, the relay pickup and dropout voltage error shows no direct relationship to temperature. Over a wider temperature range, however, the data does indicate a relationship between temperature and the relay pickup and dropout voltages. The staff agrees with the licensee that the temperature error can be treated as a random variable over the +10 to +40 degree C temperature range the relay will be operating under.

2.2.5 Analytical Limit Calculation

The analytical limits used in calculation 19-AN-19 to establish the relay setpoints and technical specification allowable values are: 3870 volts (93 percent of nominal) for the lower limit reset values, 3832 volts (92 percent of nominal) for the lower limit dropout values, and 3908 volts (94 percent of nominal voltage) for the upper limit reset values. This last value was chosen to be 0.75 percent less than the minimum expected LOCA steady-state voltage at Bus 1A1 (3938 volts) when the 345 kV switchyard is at its minimum expected value. The above analytical limits represent the calculated worst case minimum voltage the 4160 volt safety buses must recover to during a LOCA event, the worst case minimum steady-state voltage that must be maintained on the 4160 volt safety buses during a LOCA event, and the minimum expected steady-state voltage on the 4160 volt safety buses during a LOCA event. The relay setpoints and their associated tech spec allowable values must be set between the minimum expected and minimum required voltages calculated during the LOCA event. The LOCA event is used in the calculation because it produces the worst case minimum voltages.

Because there was so little margin (approximately 1.6 percent of nominal) between the minimum expected and minimum required voltages during a LOCA, in which to set the relays, the staff examined a portion of calculation 19-AQ-02. Calculation 19-AQ-02 calculated the lower analytical limits on which the relay reset setpoint and dropout setpoint were based. The staff examined the text portion of the calculation in order to obtain some confidence that there was a real 1.6 percent margin between the minimum expected and minimum required voltages. The staff also asked for some indication that the analytical models used in the calculation had been appropriately verified.

In a letter dated October 4, 1996, the licensee provided the text portion of calculation 19-AQ-02 and a copy of a letter from Sargent and Lundy Engineers dated June 23, 1986, dealing with verification of the analytical models. The stated purpose of calculation 19-AQ-02 is to determine if loads receive adequate terminal voltage to allow continuous duty motors to accelerate, and to determine if steady-state motor terminal voltages for continuous duty LOCA initiated loads are at least 90 percent of motor rated voltages. The calculation also determined motor terminal voltages for motor-operated valves (MOVs) that were used as input to separate MOV thrust and torque switch calculations. Separate calculations were also performed for MCC contactor protection (fuse blowing). The separate MOV and fuse blowing calculations were not part of calculation 19-AQ-02 and were not examined by the staff for this review.

2.2.5.1 Analytical Limit Calculation - Model Verification and Testing

With regard to verification and testing of the analytical model, the Sargent and Lundy letter submitted by the licensee states that the calculated values of the analytical models are consistently lower than the test values and are therefore conservative. The staff noted however that the Sargent and Lundy letter is dated June 23, 1986; whereas Clinton LER 94-005-00 indicates that the licensee developed a new LOCA block-start voltage model and transient calculation in 1991. The staff therefore asked the licensee to clarify this apparent discrepancy.

In a letter dated November 25, 1996, the licensee provided additional information relative to the validation of the analytical model used in calculation 19-AQ-02 as well as some of the conservatism used in the application of that model. The letter stated that, as described in LER 94-005, the calculations prepared in 1984 to establish the second-level undervoltage relay setpoint were performed using the Sargent and Lundy Auxiliary Block mainframe computer program. The model at that time was limited by the number of buses it could model and as a result, only voltages down to the 480 volt substations were evaluated using the program. From the substation down to the 120 volt level a voltage drop was approximated using a generalized hand calculation. The analysis at that time did not evaluate the LOCA block start transient in detail nor did it consider the influence of motor-operated valves or evaluate in detail the voltages at the end devices.

The licensee states that the model described above was validated using pre-operational testing done in accordance with the NRC Branch Technical Position (BTP) PSB-1. He states that the testing indicated that the voltage analysis using Auxiliary Block analytical techniques with the specific test plant loading resulted in a conservative representation of the bus voltages down to the 480 volt level, and that voltage calculations for the most limiting 120 volt buses were also conservative.

The licensee further stated that the new LOCA block-start voltage model and transient calculation developed in 1991 as described in LER 94-005 uses the same Auxiliary Block analytical techniques and assumptions as the 1986 analysis. However, the modeling of 480 volt buses and buses lower than 480 volts has been expanded; rather than modeling the loads in a grouped manner, the loads have been separated. The licensee indicated that the data that was used to represent the more accurately defined loads was based on plant data and vendor data including actual cable lengths, cable impedances, and detailed motor starting and running impedances (for smaller motors, information based on vendor or industry NEMA standards was used; for MOVs, motor specific data from the GL 89-10 program based on extensive MOV motor testing was used). The licensee's November 25, 1996, letter further states that the integrity of the model has been maintained as validated through verification and validation programs required by the software control program of the licensee and the licensee's contractors.

The staff agrees that the verification of the model by the testing performed in 1986 is still applicable and satisfactory to the degree required by BTP PSB-1 in the NRC Standard Review Plan. This is based on the fact that the analytical techniques used in the 1986 and the 1991 analytical models are identical, and the additional data used in the 1991 analysis is suitably representative of the actual plant configuration.

2.2.5.2 Analytical Limit Calculation - Accuracy of Calculation

As stated above, the staff found that the verification by testing of the 1991 analytical model was satisfactory to the degree required by BTP PSB-1. The guidance provided in BTP PSB-1, however, was primarily intended to address verification of steady state analyses available at the time. The staff was concerned that the testing prescribed in the BTP may not be sufficient to provide a high level of confidence in the accuracy of a dynamic model used to analyze multiple simultaneous motor starts at very low voltages with some motors initially in a stalled condition as is the case at Clinton. The staff therefore asked the licensee to respond to this concern.

The licensee stated that the computer model used in the most recent analysis is not a dynamic model, but a static computer model used in a piece-wise fashion. Calculation 19-AQ-02 utilizes the model in a piece-wise linear fashion to analyze the LOCA motor starting transients at several intervals from t = 0 seconds through t = 13 seconds. The voltage changes between each interval are the result of motor loads shifting from locked rotor to running. The total time for a motor to come up to speed and the electrical load to shift from locked rotor to running was determined by applying the voltage at the start of the time interval. The motor was then evaluated to determine if the motor had reached running speed. If the motor could be shown to have reached running speed by the end of the interval, its load was shifted from locked rotor to running for the next interval. If the motor had not reached running speed during the interval, it was considered as a locked rotor load for the next interval. The use of locked rotor current for the entire interval results in a step voltage as motors shift from locked rotor to running current. This approach used by the licensee is conservative.

The licensee stated in his November 25, 1996, letter that MOVs are analyzed from two viewpoints, the voltage analysis and the required torque (or thrust) analysis. The voltage analysis conservatively calculates the voltage drop assuming the MOVs are drawing locked rotor current for the entire voltage transient from t = 0 to t = 13 seconds. The staff agrees that this assumption assures that the node voltages are calculated in a conservative manner.

With regard to the torque (or thrust) calculations, the licensee indicates that MOVs that go from closed to open are the most limiting case and could be operating at locked rotor for the entire transient. The licensee states that, for these valve motors, the MOV thrust calculations show that there is margin between the calculated thrust value and the thrust that can be developed by the MOV motor at t = 13 seconds, even after taking into consideration the locked rotor heating that would occur during the 13-second transient.

Based on the licensee's discussion in the November 25, 1996, letter and the staff's own examination of the text portion of the 19-AQ-02 calculation, the staff has been able to understand how the analytical computer model was used in the overall 19-AQ-02 calculation. The staff finds that the assumptions made in the calculation are suitably conservative and provide confidence in the accuracy of the calculation. This resolves the staff's concerns in this area.

2.2.5.3 Analytical Limit Calculation - Additional MOV Issues

The staff also pursued some additional questions with the licensee relative to operation of MOVs during the initial motor starting transient period of the LOCA scenario.

During the initial period of the LOCA there are four normally closed MOVs that are required to open. Calculation 19-AQ-02 assumed that the operator motors for these valves may be in a locked-rotor condition for the entire 13 seconds of the block start transient. This is not typical because generally sufficient starting voltage is applied to valve motors such that they begin spinning immediately. In lost motion MOVs the spinning motor spins up to some speed before the valve gear train impacts the valve with some force due to the spinning inertia of the motor. This action which is typically called the hammer blow effect helps in developing the necessary forces to unseat the valve. The staff was concerned that if a very low voltage is initially applied to the valve motor, the valve may or may not begin turning immediately, but in either case will accelerate in a more gradual manner as the voltage across it slowly recovers. As a result the valve motor mechanism will more softly impact the valve, possibly not moving it off its seat.

In an attachment to their letter of October 4, 1996, the licensee stated that their MOV thrust calculations did not take credit for the momentum that is due to the hammer blow effect, but rather considered only the motor torque capability under degraded conditions. The staff accepts this explanation as resolving its question on this issue.

The staff also questioned the protective relay/overload relay evaluation contained in calculation 19-AQ-02, in which it appeared that a circuit breaker to a particular MOV (1E22-F004) would trip open due to the valve motor locked-rotor current. The calculation indicated that the circuit breaker size for MOV 1E22-F004 is adequate if the valve unseats in approximately 7 seconds. The calculation however assumed the valve to be in the stalled condition for the entire 13 seconds of the LOCA block start transient. As indicated above in Section 2.2.5.2 of this evaluation, the 13 second stall time was an assumption made in the calculation to assure node voltages are calculated in a conservative manner. In their letter of October 4, 1996, the licensee explained that data from the MOV thrust calculation which models valve 1E22-F004, indicates that the MOV motor develops sufficient torque to unseat the valve if the voltage is above 78% of rated voltage. This includes considerable conservatism, e.g., reduced torque due to motor heating caused by locked rotor current at rated voltage. Calculation 19-AQ-02 shows that the

MOV will receive approximately 80% of rated voltage just over 4 seconds into the transient and will unseat at that time. Therefore, the valve will begin to move in less than 7 seconds. This satisfactorily resolves the staff's question on this item.

2.2.6 Table 3.3.8.1-1, Item 2

The licensee made the same changes to the requirements under item 2 of Table 3.3.8.1-1 as in item 1, with one addition; the required number of channels (relays) has been changed from 3 to 2 in the item 2 requirements. The licensee is modifying the division 3 degraded voltage protection logic, whose requirements are addressed under item 2 of the table, by replacing the existing voltage protection logic with the same undervoltage relays that will be used in divisions 1 and 2. The licensee wishes to make the degraded voltage protection logic the same as in divisions 1 and 2 (two-out-of-two logic). Because the existing division 3 degraded voltage protection logic utilizes 3 channels (as reflected in the technical specifications) in lieu of the two channels used in divisions 1 and 2, the technical specification change is necessary. Because this change simply makes the division 3 undervoltage protection logic the same as that previously approved for divisions 1 and 2, the staff finds this acceptable.

The staff noted that the allowable values specified for the division 3 degraded voltage setpoints in under item 2 of Table 3.3.8.1-1, were identical to those specified for divisions 1 and 2 in item 1. This was the case even though the HPCS division 3 electrical distribution system is substantially different from divisions 1 and 2. The staff therefore questioned the licensee on this matter.

In their letter of July 24, 1996, the licensee stated that, while the Division 3 distribution system is different from Divisions 1 and 2, the present and proposed setpoint were both determined by a calculation that is based on the worst case with all divisions considered. They further stated that the current setpoint for the Division 3 degraded voltage trip function is different solely due to a different type of relay used in Division 3 from those used in Division 1 and 2.

It is now clear from these statements that the same analytical limit was used to establish the current degraded voltage relay setpoints of all three safety divisions. This is also the case for the proposed setpoints. Further, the analytical limit is the worst case for all three divisions, resulting in some additional conservatism on some of the divisions as compared to others. The staff finds this acceptable since the minimum voltage requirements are met on all divisions.

2.2.7 Footnotes to Table 3.3.8.1-1

Because the licensee is planning to install the new undervoltage relays for each electrical division in separate refueling outages, three footnotes at the end of Technical Specification Table 3.3.8.1-1 have been proposed.

Footnote (a) is applied to the degraded voltage reset allowable value of divisions 1 and 2, and division 3. The footnote states that this function is to be used after release for operations (RFO) of the corresponding plant modification, and prior to RFO of the corresponding plant modification this function is not applicable. The footnote is consistent with the new use of the relay reset function and its allowable value (addressed in Section 2.2.1 of this evaluation) that will be specified in the Clinton Technical Specifications following installation of the new degraded voltage relays with their corresponding setpoints. This item is therefore acceptable.

Footnote (b) is applied to the degraded voltage dropout allowable value of divisions 1 and 2, and division 3. The footnote states that this value is to be used after RFO of the corresponding plant modification, and specifies the pre-amendment values as the values to be used prior to the RFO of the corresponding plant modification. Because the footnote is consistent with the changes made to the allowable values as they correspond to the new relays and their setpoints, the footnote is acceptable.

Footnote (c) is applied to the required channels per division of the division 3 degraded voltage relays. The footnote addresses the required number of relay channels that must be available following the installation of the new relays, versus the number of relay channels that must be available prior to the installation. The footnote is consistent with the discussion of this topic in Section 2.2.6 of this evaluation and is acceptable.

2.3 Diesel Generator Surveillances

In their submittal the licensee also proposed changing the minimum required steady state voltage in diesel generator surveillances SR 3.8.1.2, SR 3.8.1.7, SR 3.8.1.11, SR 3.8.1.12, SR 3.8.1.15, SR 3.8.1.19, and SR 3.8.1.20. The currently specified minimum voltage in these surveillances is 3740 volts (approximately 90 percent of nominal) and the licensee is proposing to increase it to 3870 volts (approximately 93 percent of nominal). The licensee indicates that, as a result of calculations performed for this amendment request, it is necessary to increase the minimum required voltage to this level to ensure that the voltage at the emergency buses will be sufficient to supply the required loads. The staff agrees that the currently specified minimum diesel generator voltage must be increased to ensure acceptable operation of the safety loads. This change is therefore acceptable.

In summary, the staff finds the licensee's proposed changes to be acceptable, as detailed in Section 2 (Evaluation) of this safety evaluation.

3.0 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.

4.0 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 (61 FR 18168). 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.

5.0 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: James J. Lazevnick

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