Illinois Power Company
Clinton Power Station
P.O. Box 678
Clinton, IL 61727
Tel 217 935-8881

Joseph V. Sipek
Director - Licensing

ILLINOIS POWER
An Illinova Company

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Docket No. 50-461

10CFR50.90

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Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Clinton Power Station Additional/Clarifying Information Regarding Proposed Amendment of Facility Operating License No. NPF-62 (LS-98-001)

Dear Madam or Sir:

By Illinois Power (IP) letter U-602972 dated May 4, 1998, IP requested amendment of the Clinton Power Station (CPS) Operating License (License No. NPF-62) pursuant to 10CFR50.90. That application, which is currently under review by the NRC staff, concerns the static VAR compensators (SVCs) currently being installed for connection to the CPS auxiliary power system, as part of an overall effort to resolve degraded voltage concerns at CPS. Specifically, an SVC is being installed for each of the two independent offsite source connections to CPS. One SVC is being installed for connection to the reserve auxiliary power transformer (RAT) (associated with the offsite 345-kV transmission system), and the other SVC is being installed for connection to the emergency reserve auxiliary power transformer (ERAT) (associated with the offsite 138-kV transmission system), as described in IP's license amendment application.

IP's license amendment application consists of proposed changes to the Technical Specifications to incorporate a Limiting Condition for Operation (LCO) and associated Surveillance Requirements for the SVC protection systems under a new Technical Specification in the Electrical Power Systems section of the CPS Technical Specifications. (Appropriate proposed changes for the Technical Specification Bases are also included in the submittal in support of the amendment.) Although the proposed Technical Specification changes are focused on the SVC protection systems (vice the SVCs themselves), the overall subject of the application is the SVCs.

Accordingly, an extensive "SVC Design Report" describing the design and intended operation of the SVCs (including their protection systems) was provided as Attachment 6 to IP's May 4, 1998 letter. Little information was provided, however, regarding preoperational testing of the SVCs since a test plan was still being developed at the time of IP's submittal.

Subsequent to IP's May 4, 1998 submittal, several minor errors or corrections to the submittal, including the SVC Design Report, were identified. Additionally, the test plan for the SVCs has been developed. Therefore, this letter is being submitted as a follow-up to IP's May 4 submittal to provide a description of the testing program developed for the SVCs, and to provide the minor corrections identified for IP's May 4 submittal. This information is provided in Attachments 1 and 2 to this letter, respectively. The information provided in the Attachments 1 and 2 involves no changes to the proposed license amendment itself.

With respect to testing of the SVCs and the information provided in Attachment 1, IP's expectation is that the NRC staff will include testing of the SVCs in the scope of its review of the associated license amendment, as well as in the safety evaluation issued in support of the license amendment. This will preclude any potential unreviewed safety question that could otherwise be identified regarding testing of the SVCs, as further explained in Attachment 1.

Sincerely yours,

Joseph V. Sipek
Director-Licensing

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Attachments

cc: Regional Administrator, Region III, USNRC
NRC Clinton Licensing Project Manager
NRC Resident Office, V-690
Illinois Department of Nuclear Safety

SVC Test Program

Description of Proposed Testing

Testing of the SVCs primarily consists of tests to be performed on SVC components and associated/supporting subsystems prior to connecting the SVCs to the plant auxiliary power system, as well as tests to be performed with the SVCs connected to the auxiliary power system. A listing of all the tests to be performed with the SVCs isolated from the plant electrical busses is provided on page 2 of this attachment. The listed tests are to be performed for each SVC (i.e., the ERAT SVC and the RAT SVC).

Testing to be performed with the SVCs connected to the auxiliary power system consists of an initial energization test and an integrated test, for each SVC. The initial energization test is to be done with SVC(s) connected to its associated auxiliary transformer but with the plant busses isolated from the SVC and transformer. For the integrated test, the SVC(s) will be connected to the plant busses with the associated auxiliary transformer providing power to the busses. This test is outlined in greater detail on pages 3 and 4 of this attachment. A brief note on the initial energization test is included.

Review of Test Procedures Pursuant to 10CFR50.59

The test procedures under the SVC testing program are all subject to licensee review with respect to the requirements of 10CFR50.59. A determination by Illinois Power that no unreviewed safety question exists appears to be straightforward for procedures involving testing of the SVCs with the SVCs *not* connected to the plant electrical busses. However, for the integrated procedure (when the SVCs *will* be connected to plant safety busses while being energized from the associated auxiliary power transformer), a 10CFR50.59 review could lead to the determination that an unreviewed safety question exists. This is due to the fact the SVCs are new components not previously described in the plant updated safety analysis report (USAR), and therefore, testing of these devices may involve testing not previously described in the USAR. Thus, although NRC review of the design and operation of the SVCs will be a part of the NRC's review of IP's amendment request, it is important that the NRC's review of the associated license amendment (for the SVC protection systems) include consideration of the testing to be performed for the SVCs, particularly the integrated test. This is the basis for providing more detailed information concerning the integrated test.

Regarding integrated/on-line testing of the SVCs, it should be noted that such testing will be done in accordance with vendor recommendations. Further, testing of the SVCs will be such that test parameters and operation will be within the design and operation as described in IP's amendment request. Prior to connecting the SVCs to the plant electrical busses, satisfactory operation of the SVCs and their protection systems will first be confirmed to the fullest extent possible by performance of the many tests described on page 2.

SVC Test Procedures with SVCs Not Connected to Plant Electrical Busses

SVC Low Voltage Energization Test

SVC Thyristor Valve & Control System Test

SVC Harmonic Filter Bank Resonance Frequency Test

SVC Thyristor Valve Cooking System Test

SVC 48-VDC Battery Charger/Battery A Functional Test

SVC 48-VDC Battery Charger/Battery B Functional Test

SVC 4160-V Breaker 52-1 Functional Test

SVC 4160-V Breaker 52-2 Functional Test

Automatic Transfer Switch (ATS) Functional Test

SVC Building Fire Detection System Functional Test

SVC Harmonic Filter Bank Resonance Frequency Test

SPAJ-160C Functional Test

SVC Distribution Protection Unit (A&B) (DPU-2000R)

SVC Control Panel Power Supply Verification and System Initialization

SVC Programmable High Speed Controller Binary Input/Output and Protection System Test

SVC Programmable High Speed Controller Analog Input/Output and Protection System Test

ABB Type 60Q Phase Unbalance Relay (A&B) Functional Test

SVC Freeze Test

TEST OUTLINE

STATIC VAR COMPENSATOR INTEGRATED TEST

Test Objectives

The test objective is to demonstrate, for each SVC, proper SVC response to transferring plant 4-kV busses, synchronizing and closing of diesel generator output breaker to its respective 4-kV bus, and simultaneous starting of several large 4-kV bus loads.

Note: The test outline below is for the RAT SVC. The test for the ERAT SVC is performed identically, except for the following differences:

1) Only loads on the safety-related 4-kV busses will be started,
2) 138-kV voltage may be varied to assist in providing a transient to the ERAT SVC.

Prerequisites and Initial Conditions

1. 4-kV safety-related busses 1A1, 1B1, and 1C1 aligned to the ERAT.

2. 4-kV non-safety related busses 1A and 1B aligned to the unit auxiliary transformer (UAT) via backfeed.

3. Special Test Procedure 28Z5.17, "Energization of the SVC," has been performed.

4. IP's amendment application regarding the SVCs and their protection systems has been approved by the NRC.

5. 4-kV non-safety related bus not under test shall have the associated component cooling water (CCW) pump and station air compressor either running or in a standby condition.

Test Procedure

Section 8.1: 4-kV Non-Safety Related Bus 1B Transfer and SVC Transient

a. Transfer non-safety related 4-kV bus from UAT backfeed to RAT/SVC, and observe plant/SVC operation.

b. Start medium-size load (control rod drive pump or main condenser vacuum pump), and observe plant/SVC operation.

c. Transfer non-safety related 4-kV bus from RAT/SVC to UAT, and observe plant/SVC operation.

Section 8.2: Plant Service Water Pump Starts

a. Transfer non-safety related 4-kV bus from UAT backfeed to RAT/SVC.

b. Start plant service water (WS) pump, and observe plant/SVC operation.

c. Transfer non-safety related 4-kV bus from RAT/SVC to UAT, and observe plant/SVC operation.

Section 8.3: 4-kV Plant SVC Transient

a. Observe SVC/plant response to the following: Transfer of 4-kV bus 1A1 from ERAT to RAT, transfer of 4-kV bus 1C1 from ERAT to RAT, and transfer of 4-kV non-safety related bus from UAT to RAT/SVC.

b. Simultaneously start shutdown service water (SX) pump 1A (bus 1A1), low pressure core spray (LPCS) pump (bus 1A1), residual heat removal (RHR) pump 1A (bus 1A1), high pressure core spray (HPCS) pump (Bus 1C1), condensate booster pump (4-kV bus 1B), service air compressor (4-kV bus 1B) and WS pump 1B (4-kV bus 1B), and observe plant/SVC response.

c. Observe SVC/plant response to the following: Transfer of 4-kV bus 1A1 from RAT/SVC to ERAT, transfer of 4-kV bus 1C1 from RAT/SVC to ERAT, and transfer of 4-kV non-safety related bus from RAT/SVC to UAT.

Section 8.4: Diesel Generator (DG) 1A Operation While Paralleled to the RAT

a. Transfer 4-kV bus 1A1 from ERAT to RAT.

b. Start DG 1A, synchronize and tie to 4-kV Bus 1A1.

c. Transfer 4-kV bus 1A1 from RAT/SVC to ERAT.

Acceptance Criteria

1. 4-kV bus 1A1 bus voltage shall not drop and remain below the setpoint of the second-level undervoltage relay for a period greater than 15 seconds when loads are started.

2. 4-kV bus 1C1 bus voltage shall not drop and remain below the setpoint of the second-level undervoltage relay for a period greater than 15 seconds when the HPCS Pump is started.

* * * * *

Note: Prior to performance of the integrated test for each SVC (as described above), an initial energization test (under a separate procedure for each SVC) will be conducted. For this test, each SVC will be energized from the associated reserve auxiliary transformer (RAT or ERAT), but will not be connected to the plant electrical busses, since the associated disconnect switch will be open during the test.

Corrections to Information Provided in Amendment Application (IP Letter U-602972)

(1) Corrections to SVC Design Report (Attachment 6 to U-602972)

(a) Page 21, Sections 2.9.1.6 and 2.9.1.7 should be changed as shown on the attached marked-up page from the report. (Reason: The Dropout Analytical Limit for the SVC undervoltage trip is intended to be less than the analytical limit of the DGR [degraded grid (or 2nd-level bus undervoltage) relay] trip setpoint. This puts the DGR setpoint band within the range of operation of the SVC. Also, the reference to a 4.16-kV bus overvoltage relay and associated delay time is incorrect, as there is no such relay.)

(b) Some of the data presented on Table 2, "4 kV and 6.9 kV Bus Information," should be corrected as shown on the attached marked-up page (page 33) of the report. (Reason: Some of the noted continuous current and close-and-latch ratings were incorrectly incorporated into the table within the SVC Design Report.)

(2) Correction to Proposed Text for Technical Specification Bases

In the "LCO" section of the proposed Bases for Technical Specification 3.8.11 (proposed Bases page B 3.8-94), the following sentence should be changed: "An SVC Protection System is considered OPERABLE when both SVC protection subsystems are capable of automatically opening its associated SVC main circuit breaker in response to postulated SVC failures that could potentially degrade or damage ESF equipment." This sentence should be changed to read as follows: "An SVC Protection System is considered OPERABLE when each of both SVC protection subsystems is capable of automatically opening the associated SVC main circuit breakers in response to postulated SVC failures that could potentially degrade or damage ESF equipment." This change is indicated on the attached marked-up page (Bases page B 3.8-94).

The above change is an editorial change to more clearly describe the fact that each protection subsystem (of an SVC Protection System) opens both circuit breakers for the associated SVC in the event of a trip. This is consistent with the description provided in the text of IP's May 7, 1998 submittal.

2.9.1.6 Undervoltage (27)

The Dropout Analytical Limit shall be less than or equal to the analytical limit of the PHSC trip setpoint, ~~greater~~ less than the analytical limit of the existing trip setpoint of the DGR.

The Pickup Analytical Limit shall be less than or equal to the analytical limit of the PHSC undervoltage pickup, and greater that the analytical limit of the DGR undervoltage pickup.

The Time Delay Analytical Limit shall be Greater than the PHSC undervoltage time delay, and greater than the existing 4.16kV undervoltage time delay.

2.9.1.7 Overvoltage (59)

The Pickup Analytical Limit shall be greater than or equal to the analytical limit of the PHSC pickup setpoint, less than the analytical limit of the existing trip setpoint of 4.16kV bus overvoltage, and less than the maximum acceptable 4.16kV bus voltage of 4,300V.

The Dropout Analytical Limit shall be greater than or equal to the analytical limit of the PHSC dropout setpoint, and less than the analytical limit of the maximum acceptable SVC voltage

The Time Delay Analytical Limit shall be greater than the PHSC overvoltage delay time, and greater than the existing 4.16kV overvoltage delay time.

2.9.2 Voltage Phase Unbalance Protection (46)

Redundant voltage phase unbalance protections are included in the SVC back-up protection scheme to detect and protect against unbalances due to SVC miss-operation. The protection is implemented in a type ABB 60Q phase unbalance relay. Unbalanced voltage conditions may cause significant overheating in rotating equipment, even at relatively small voltage unbalances. The phase with the highest current due the voltage unbalance will experience a temperature rise of approximately twice the square of the percent voltage imbalance. (reference 5.5.1).

2.9.3 Harmonic Protection

The SVCPS provides redundant harmonic protection with two independent Square D Power Monitor Type CM-2350 . They monitor the total harmonic distortion (THD) in current and voltage will generate alarm and trip signals for excessive THD.

Harmonic currents can cause (1) overheating of rotating equipment, transformers, and current-carrying conductors, (2) premature failure or operation of protective devices (such as fuses), (3) harmonic resonance conditions on the electric power system, which can further deteriorate electrical system operation, and (4) metering inaccuracies.

TABLE 2: 4 KV AND 6.9 KV BUS INFORMATION

BUS	SAFETY CLASSIFICATION	CONTINUOUS CURRENT RATING	CLOSE & LATCH RATING	NORMAL SOURCE	BACKUP SOURCE
6.9 kV Bus 1A	Non-Class 1E	~~1200~~ 2000 A	80 kA	UAT 1A	RAT
6.9 kV Bus 1B	Non-Class 1E	~~1200~~ 2000 A	80 kA	UAT 1B	RAT
4.16 kV Bus 1A	Non-Class 1E	~~1200~~ 3000 A	80 kA	UAT 1A	RAT
4.16 kV Bus 1B	Non-Class 1E	~~1200~~ 3000 A	80 kA	UAT 1B	RAT
4.16 kV Bus 1A1	Class 1E	1200 A	80 kA	RAT	ERAT
4.16 kV Bus 1B1	Class 1E	1200 A	80 kA	RAT	ERAT
4.16 kV Bus 1C1	Class 1E	1200 A	~~80~~ 78 kA	RAT	ERAT