July 15, 1993

Docket No. 50-461

Mr. Richard F. Phares
Director - Licensing
Clinton Power Station
P. O. Box 678
Mail Code V920
Clinton, Illinois 61727

Dear Mr. Phares:

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SUBJECT: ISSUANCE OF AMENDMENT (TAC NO. M83246)

The U. S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 78 to Facility Operating License No. NPF-62 for the Clinton Power Station, Unit No. 1. The amendment is in response to your application dated April 16, 1992 (U-601960).

The amendment changes Clinton Power Station Technical Specification Figure 3.1.5-1, "Weight Percent Sodium Pentaborate Solution as a Function of Net Tank Volume," to show the reduction in net tank volume that results from raising the Standby Liquid Control System storage tank level instrument zero to prevent potential air entrainment in the pump suction piping due to vortexing. Additionally the Technical Specification Bases which describe this curve have been revised to reflect the changes.

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-2
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 78 to NPF-62
2. Safety Evaluation

cc w/enclosures:
see next page

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 78 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 April 16, 1992, the Illinois Power Company (IP, the licensee), requested an amendment to Facility Operating License No. NPF-62 for the Clinton Power Station (CPS). The proposed amendment would modify Clinton Power Station Technical Specification Figure 3.1.5-1, "Weight Percent Sodium Pentaborate Solution as a Function of Net Tank Volume," to show the reduction in net tank volume that results from raising the Standby Liquid Control System storage tank level instrument zero to prevent potential air entrainment in the pump suction piping due to vortexing. Additionally, the Technical Specification Bases which describe this curve would be revised to reflect the changes.

2.0 BACKGROUND

The CPS Standby Liquid Control (SLC) system consists of two positive displacement pumps each rated at 43 gpm and 1220 psig. The SLC system is designed to assure reactor shutdown from full power operation to a cold, subcritical condition without control rod movement by mixing a neutron absorber solution with the primary coolant. Based on the original design of the system, each pump was to provide 100% of the required capacity.

Subsequent to initial plant design, the Anticipated Transient Without Scram (ATWS) Rule (10 CFR 50.62) was issued. This rule requires each Boiling Water Reactor (BWR) to have an SLC system with a minimum flow capacity and boron concentration to achieve a reactivity control capability equivalent to 86 gpm of 13 weight-percent sodium pentaborate solution injected into a 251-inch reactor vessel. As this required capability exceeded the original design requirements of the SLC system for most BWRs, implementation of this rule was generally achieved by either using an enriched boron solution or an increased injection rate. The licensee chose to increase the injection rate by using both pumps. As a result of issuance of the ATWS Rule requirements, the CPS SLC system operating procedure was revised to initiate both pumps in the event operation of the system was required. Although as originally designed the system met the single-failure criterion, it is not required to meet the redundancy and single-failure criteria as a system since it is a diverse means

ATTACHMENT TO LICENSE AMENDMENT NO. 78

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. The corresponding overleaf pages, as indicated by asterisks, are provided to maintain document completeness.

Remove Pages	Insert Pages
3/4 1-21	3/4 1-21
B 3/4 1-3*	B 3/4 1-3*
B 3/4 1-4	B 3/4 1-4
B 3/4 1-5	B 3/4 1-5

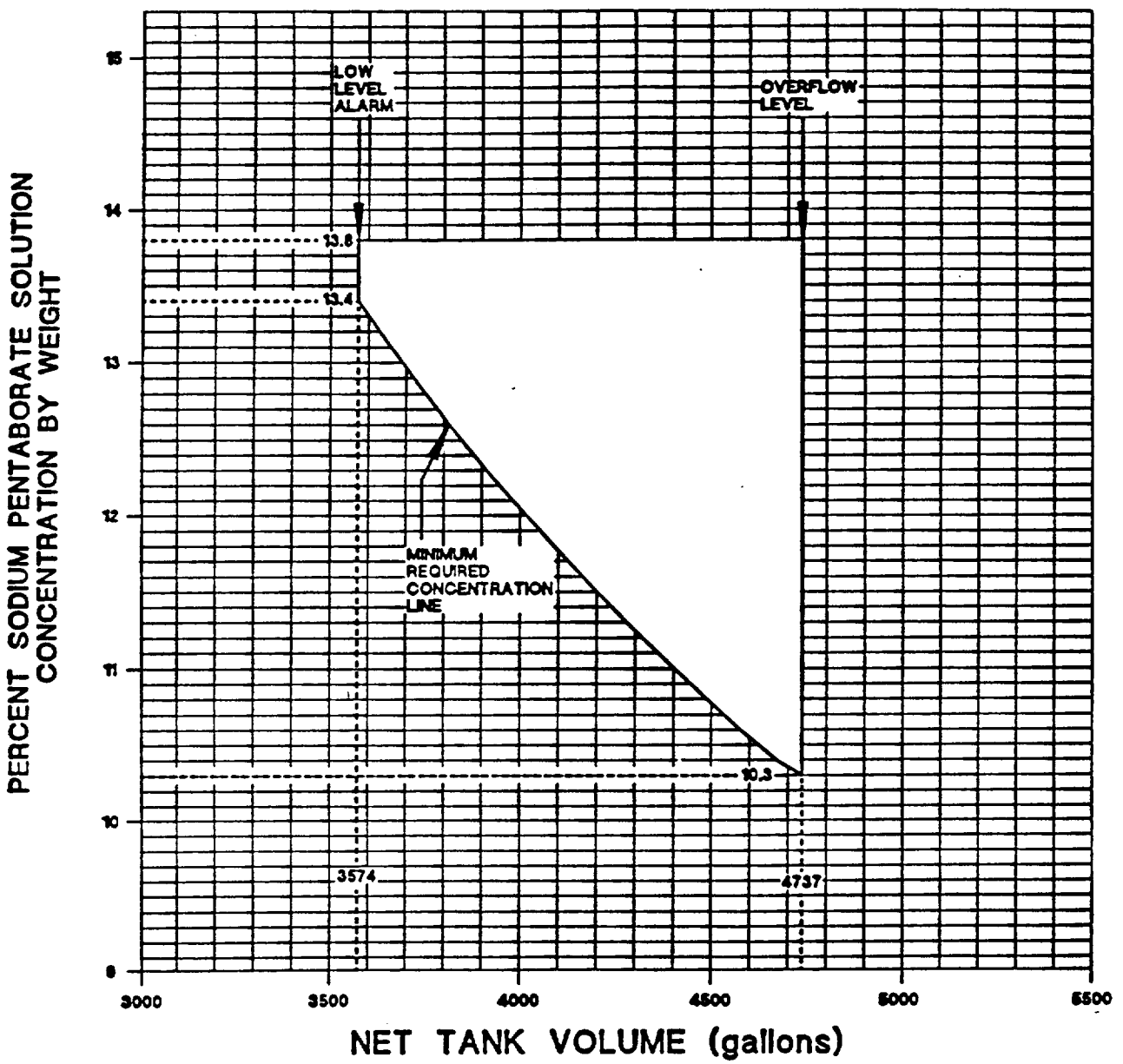

Figure 3.1.5-1 Weight Percent Sodium Pentaborate Solution as a Function of Net Tank Volume

3/4.1.3 CONTROL RODS (Continued)

CORE ALTERATIONS that could have affected the control rod coupling integrity. The subsequent check is performed as a backup to the initial demonstration.

In order to ensure that the control rod patterns can be followed and therefore that other parameters are within their limits, the control rod position indication system must be OPERABLE.

The control rod housing support restricts the outward movement of a control rod to less than 3 inches in the event of a housing failure. The amount of rod reactivity which could be added by this small amount of rod withdrawal is less than a normal withdrawal increment and will not contribute to any damage to the primary coolant system. The support is not required when there is no pressure to act as a driving force to rapidly eject a drive housing.

The required surveillance intervals are adequate to determine that the rods are OPERABLE and not so frequent as to cause excessive wear on the system components.

3/4.1.4 CONTROL ROD PROGRAM CONTROLS

The rod withdrawal limiter system input power signal orginates from the first stage turbine pressure. When operating with the steam bypass valves open, this signal indicates a core power level which is less than the true core power. Consequently, near the low power setpoint and high power setpoint of the rod pattern control system, the potential exists for nonconservative control rod withdrawals. Therefore, when operating at a sufficiently high power level, there is a small probability of violating fuel Safety Limits during a licensing basis rod withdrawal error transient. To ensure that fuel Safety Limits are not violated, this specification prohibits control rod withdrawal when a biased power signal exists and core power exceeds the specified level.

Control rod withdrawal and insertion sequences are established to assure that the maximum insequence individual control rod or control rod segments which are withdrawn at any time during the fuel cycle could not be worth enough to result in a peak fuel enthalpy greater than 280 cal/gm in the event of a control rod drop accident. The specified sequences are characterized by homogeneous, scattered patterns of control rod withdrawal. When THERMAL POWER is greater than 20% of RATED THERMAL POWER, there is no possible rod worth which, if dropped at the design rate of the velocity limiter, could result in a peak enthalpy of 280 cal/gm. Thus requiring the RPCS to be OPERABLE when THERMAL POWER is less than or equal to 20% of RATED THERMAL POWER provides adequate control.

The RPCS provide automatic supervision to assure that out-of-sequence rods will not be withdrawn or inserted.

3/4.1.4 CONTROL ROD PROGRAM CONTROLS (Continued)

The analysis of the rod drop accident is presented in Section 15.4 of the USAR and the techniques of the analysis are presented in a topical report, Reference 1, and two supplements, References 2 and 3.

The RPCS is also designed to automatically prevent fuel damage in the event of erroneous rod withdrawal from locations of high power density during higher power operation.

A dual channel system is provided that, above the low power setpoint, restricts the withdrawal distances of all non-peripheral control rods. This restriction is greatest at highest power levels.

3/4.1.5 STANDBY LIQUID CONTROL SYSTEM

The standby liquid control system provides a backup capability for bringing the reactor from full power to a cold, xenon-free shutdown, assuming that the withdrawn control rods remain fixed in the rated power pattern. To meet this objective it is necessary to inject a quantity of sodium pentaborate solution which produces a concentration of 660 ppm in the reactor core and other piping systems connected to the reactor vessel. To allow for potential leakage and imperfect mixing this concentration is increased by 25%. The required concentration is achieved by having a minimum available quantity of 3574 gallons of sodium pentaborate solution containing a minimum of 4246 lbs. of sodium pentaborate. This quantity of solution is a net amount which is above the storage tank level instrument zero. (The instrument zero is based on ensuring sufficient net positive suction head and includes additional margin to preclude air entrainment in the pump suction piping due to vortexing during two-pump operation.) The pumping rate of 41.2 gpm per pump provides a negative reactivity injection rate over the permissible pentaborate solution volume range, which adequately compensates for the positive reactivity effects due to temperature and xenon during shutdown. The temperature requirement is necessary to ensure that the sodium pentaborate remains in solution.

The sodium pentaborate solution is required to be maintained within the boundaries of Figure 3.1.5-1. The boundaries of this figure are based on system design limits. Maintaining the sodium pentaborate solution within the boundaries of Figure 3.1.5-1 ensures sufficient solution is available to bring the reactor to shutdown in accordance with the system design basis.

With redundant pumps and explosive injection valves and with a highly reliable control rod scram system, operation of the reactor is permitted to continue for short periods of time with the system inoperable or for longer periods of time with one of the redundant components inoperable.

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1. C. J. Paone, R. C. Stirn and J. A. Woolley, "Rod Drop Accident Analysis for Large BWR's," G. E. Topical Report NEDO-10527, March 1972

2. C. J. Paone, R. C. Stirn and R. M. Young, Supplement 1 to NEDO-10527, July 1972

3. J. M. Haun, C. J. Paone and R. C. Stirn, Addendum 2, "Exposed Cores," Supplement 2 to NEDO-10527, January 1973

3/4.1.5 STANDBY LIQUID CONTROL SYSTEM (Continued)

Surveillance requirements are established on a frequency that assures a high reliability of the system. Once the solution is established, sodium pentaborate concentration will not vary unless more sodium pentaborate or water is added, thus a check on the temperature and volume once each 24 hours assures that the solution is available for use.

Replacement of the explosive charges in the valves at regular intervals will assure that these valves will not fail because of deterioration of the charges.

of manually achieving cold shutdown instead of using the control rod drive system.

On February 15, 1991, the NRC issued Information Notice No. 91-12, "Potential Loss of Net Positive Suction Head (NPSH) of Standby Liquid Control System Pumps." The Information Notice stated that, depending on the SLC system pump suction piping configuration, the simultaneous operation of both SLC pumps may create NPSH issues not included in the original design. Therefore, as a result of this concern, the Information Notice was issued to alert licensees of potential problems with the adequacy of NPSH for SLC system pumps under conditions of minimum SLC storage tank level and maximum sodium pentaborate solution temperature in the tank.

In response to the Information Notice, IP performed an analysis to determine if adequate NPSH would be available with two-pump operation and the SLC storage tank at the most limiting conditions for NPSH (i.e., minimum storage tank level and maximum temperature). The analysis indicated that, based on preoperational testing, the system design provides adequate NPSH for dual-pump operation under the worst case conditions. However, the analysis indicated the SLC system storage tank level instrument zero should be raised 9.38 inches to prevent potential air entrainment in the pump suction piping due to vortexing. As this change in instrument zero results in a larger volume of sodium pentaborate solution below instrument zero (i.e., "unavailable" volume), Technical Specification Figure 3.1.5-1, "Weight Percent Sodium Pentaborate Solution as a Function of Net Tank Volume," must be revised due to the reduction in net tank volume.

3.0 EVALUATION

CPS Technical Specification (TS) 3/4.1.5, "Standby Liquid Control System," identifies and prescribes the requirements for determining the operability of the SLC system. The surveillance requirements necessary to demonstrate system operability include verification of the available volume of sodium pentaborate solution in the SLC system storage tank. The available volume of sodium pentaborate solution is required to be within the limits of TS Figure 3.1.5-1 which specifies the minimum quantity of solution (at a particular weight-percent concentration) required to meet the system's safety basis as required by the ATWS Rule. Figure 3.1.5-1 currently identifies the storage tank volume associated with the low-level alarm, the high-level alarm, and the overflow level, as well as the minimum required sodium pentaborate solution concentration.

The analysis that IP did in response to Information Notice 91-12 showed that the SLC system storage tank level instrument zero should be raised 9.38 inches to prevent potential air entrainment in the pump suction piping due to vortexing. As a result of this analysis, IP is proposing the following changes to TS 3/4.1.5:

(1) Figure 3.1.5-1 is being revised to identify the change in net tank volume associated with the overflow level as well as to remove the

specified high-level alarm setpoint volume and to remove the notes which do not aid the operator in maintaining system operability in compliance with 10 CFR 50.62.

The bases for TS 3/4.1.5 state that a minimum available quantity of 3574 gallons of sodium pentaborate solution is adequate to bring the reactor from full power to a cold, xenon free, shutdown assuming the withdrawn control rods remain fixed in the rated-power pattern. The volume of sodium pentaborate solution below instrument zero is assumed to be unavailable for injection. After raising the instrument zero for the storage tank level instrumentation, it will be necessary to recalibrate the low-level alarm such that the corresponding level continues to be equivalent to a net volume of 3574 gallons of sodium pentaborate solution available in the storage tank. Additionally, the high-level alarm will be recalibrated such that its corresponding level continues to be equivalent to a net volume of 4526 gallons of sodium pentaborate solution available in the storage tank. These changes will result in an increase in the required gross volume of solution in the storage tank, thus, reducing the expansion volume.

The expansion volume within the tank is the volume between the high-level alarm and the overflow level. The high-level alarm is an administrative limit intended to notify the operator that the tank level is approaching the overflow level and to provide sufficient time for any required action. The high-level alarm setpoint does not define a limit required to maintain system operability in compliance with 10 CFR 50.62 nor does reducing the expansion volume impact the operability of the system. The expansion volume provides space for level changes as a result of heating and mixing of the sodium pentaborate solution. Although the proposed change will reduce the expansion volume, it has been determined that the reduced expansion volume will continue to provide adequate space for heating and mixing of the solution.

To reduce potential confusion and aid in operator understanding of the acceptable region for operation of the system, IP's proposal includes the deletion of the high-level alarm setpoint line and its supporting notes from the curve. As discussed above, the line on the figure indicating the net volume associated with the high-level alarm setpoint is provided only for information and does not define a limit required to maintain system operability in compliance with 10 CFR 50.62.

These proposed changes do not affect the net quantity of sodium pentaborate solution that is available for injection. There is no change to the system operation and the design basis for the system remains unchanged. Additionally, the SLC system is still in compliance with the ATWS Rule, and raising the instrument zero by the determined amount has no impact on the system's safety basis or its ability to perform its required function. The staff, therefore, finds these TS changes acceptable.

(2) The bases for TS 3/4.1.5 are being revised to provide additional clarification and documentation of the boundaries identified in the proposed Figure 3.1.5-1.

In support of the proposed TS changes discussed above, IP is proposing revising the Bases for TS 3/4.1.5 to provide additional documentation and clarification of how the boundaries of the acceptable region for operation were developed. The staff has reviewed these proposed TS bases and since they accurately reflect the proposed TS changes discussed above and provide additional clarification, they are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a surveillance requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (58 FR 25856). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

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

Principal Contributor: R. Laufer

Date: July 15, 1993

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

ILLINOIS POWER COMPANY, ET AL.

DOCKET NO. 50-461

CLINTON POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 78
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 April 16, 1992, 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. 78 , 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

James E. Dyer

James E. Dyer, Director
Project Directorate III-2
Division of Reactor Projects - III/IV/V
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 15, 1993

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

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Docket No. 50-461

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Director - Licensing
Clinton Power Station
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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,

Douglas V. Pickett

Douglas V. Pickett, Project Manager
Project Directorate III-2
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

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July 15, 1993

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Original Signed By:

Douglas V. Pickett, Project Manager
Project Directorate III-2
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Mr. Richard F. Phares
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