

ILLINOIS POWER

CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727-0678, TELEPHONE (217) 935-8881

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May 11, 1990

10CFR50.73

Docket No. 50-461

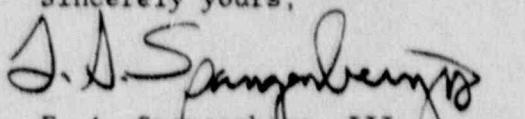
U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: Clinton Power Station - Unit 1
Licensee Event Report No. 90-008-00

Dear Sir:

Please find enclosed Licensee Event Report No. 90-008-00:
Failure to Follow Procedures During Reactor Startup Results in Control
Rod Withdrawal with Main Turbine Bypass Valves Open and Reactor Power
Above the Low Power Setpoint. This report is being submitted in
accordance with the requirements of 10CFR50.73.

Sincerely yours,



F. A. Spangenberg, III
Manager - Licensing and Safety

RSF/ahlh

Enclosure

cc: NRC Resident Office
NRC Region III, Regional Administrator
INPO Records Center
Illinois Department of Nuclear Safety
NRC Clinton Licensing Project Manager

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)

Clinton Power Station

DOCKET NUMBER (2)

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PAGE (3)

TITLE (4)

Failure to Follow Procedures During Reactor Startup Results in Control Rod Withdrawal with Main Turbine Bypass Valves Open and Reactor Power Above the Low Power Setpoint

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEGMENT NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0	4	1	1	9	0	0	0	8	None	0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)								
POWER LEVEL (10)	0 2 2	20.402(b)		20.406(c)		50.73(e)(2)(iv)			73.71(b)	
		20.406(e)(1)(ii)		50.36(e)(1)		50.73(e)(2)(iv)			73.71(c)	
		20.406(e)(1)(iii)		50.36(e)(2)		50.73(e)(2)(vii)				
		20.406(e)(1)(iv)	X	50.73(e)(2)(ii)		50.73(e)(2)(viii)(A)			OTHER (Specify in Abstract Below and in Text, NRC Form 366A)	
		20.406(e)(1)(v)		50.73(e)(2)(iii)		50.73(e)(2)(viii)(B)				
		20.406(e)(1)(vi)		50.73(e)(2)(iii)		50.73(e)(2)(ix)				

LICENSEE CONTACT FOR THIS LER (12)

NAME _____ TELEPHONE NUMBER _____

D. R. Morris, Director - Plant Operations, extension 3205

AREA CODE

2 1 7 9 3 5 - 8 8 8 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NRPDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NRPDS	

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If you complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

ABSTRACT (Limit to 1400 words, i.e., approximately fifteen single space typewritten lines) (16)

On April 8, 1990, the plant was in POWER OPERATION and power ascension was in progress. During the increase in reactor power from 25 to 35 percent, a Control Room Operator (CRO) made 14 control rod withdrawals while main turbine bypass valve(s) were open and reactor power was greater than the low power setpoint of the rod pattern control system. Withdrawal of control rods under these conditions is prohibited by Technical Specification (TS) 3.1.4.1. Additionally, TS 4.1.4.1 was not met because a required second individual did not prevent the control rod withdrawal. The cause of this event is attributed to the failure of the CRO to adequately monitor all available control room instrumentation and maintain a proper setting of the main generator Load Set control, as required by procedures, as reactor power was increased. Numerous corrective actions were performed including: shutting the reactor down to ensure the causes of this event were understood and station personnel understand these types of occurrences cannot be tolerated; briefing and training shift crews on the details of the event, the "lessons learned", reactivity management, procedural compliance, and equipment configuration monitoring; and revising numerous plant procedures.

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TEXT IF MORE SPACE IS REQUIRED, USE ADDITIONAL NRC FORM 388A 8/1/77

DESCRIPTION OF EVENT

On April 11, 1990, the plant was in Mode 1 (POWER OPERATION) at twenty-two percent reactor [RCT] power and power ascension was in progress.

At approximately 0640 hours, with the Line Assistant Shift Supervisor (LASS) performing control rod [ROD] verifications, the "A" Control Room Operator (CRO) began withdrawing control rods to achieve twenty-five percent of rated thermal power (RTP). Additionally, the Shift Supervisors (SSs) began their shift relief process during this time.

At approximately 0650 hours, the Staff Assistant Shift Supervisor (SASS) replaced the LASS as the control rod verifier so the LASS could begin his shift turnover.

At approximately 0705 hours, the oncoming shift began their pre-shift brief in the Technical Support Center. This brief was completed at approximately 0720 hours and the oncoming shift then began their shift turnover.

At approximately 0725 hours, the LASS was relieved and the oncoming Shift Technical Advisor (STA) replaced the SASS as the control rod verifier. Relief of the "A" CRO was delayed so control rod withdrawal could continue.

As a result of the above shift turnover activities, shift personnel's attention was diverted to those activities. Specifically, the LASS was distracted from supervising the control rod withdrawal activity.

At approximately 0728 hours, reactor power reached twenty-five percent. Reactor power increase continued toward thirty-five percent by further control rod withdrawals.

At approximately 0730 hours the SS was relieved.

At approximately 0738 hours, although not noted by the shift crew, the "A" main turbine [TRB] bypass valve[V] started to open as power was increased toward thirty-five percent of RTP by withdrawing control rods.

At approximately 0740 hours, the STA identified to the "A" CRO that main generator [TG] output indications had not increased above 198 megawatts (MWe) as reactor power was increased above twenty-five percent. The "A" CRO stopped control rod withdrawals and he and the STA discussed the STA's comment. The "A" CRO determined slow computer [CPU] display response was the probable cause of output indications not increasing.

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TEXT IF MORE SPACE IS REQUIRED, USE ADDITIONAL NRC FORM 366A'S (17)

At approximately 0744 hours, also not noted by the shift crew, the "B" main turbine bypass valve began opening as the "A" main turbine bypass valve reached full open.

At approximately 0747 hours, when the target level of thirty-five percent power had been reached, control rod withdrawals were stopped. At this time, the STA again questioned the "A" CRO as to why generator load indications had not increased. The "A" CRO again stopped control rod withdrawals and he and the STA discussed the STA's comment. The "A" CRO assumed slow computer display response and possible buildup of Xenon as causes.

At approximately 0750 hours, the "A" CRO began his relief process which included a walkdown of Main Control Room (MCR) panels [PL]. The "B" CRO relief, which had been in progress, continued in the MCR.

At approximately 0830 hours, the "A" CRO was relieved.

At Approximately 0834 hours, as he began his walkdown of the MCR panels, the oncoming "B" CRO identified that two main turbine bypass valves were open.

At approximately 0836, the shift crew realized that the main generator Load Set control associated with the steam bypass and pressure control system [JI] was set too low causing the main turbine bypass valves to be open. The position of the Load Set determines whether control valves or bypass valves open to accept increasing steam from the reactor. As generator load approaches the Load Set value, load on the generator is limited since control valves stop opening. If reactor power is further increased, bypass valves will open to accommodate the increased steam load necessary to control reactor pressure without adding additional load to the generator. In response to the discovery that the main turbine bypass valves were open, the "A" CRO shut the bypass valves by increasing the Load Set to 100 MWe above the indicated main generator load.

At 0927 hours, through an investigation of stored computer data recorded during the power increase, Illinois Power (IP) determined that fourteen control rod withdrawals had been performed over a nine-minute period with the bypass valves open, and the bypass valves had been open for fifty-eight minutes, from 0738 hours to 0836 hours. IP determined that the main turbine bypass valves had opened because the Load Set control had not been maintained approximately 200 MWe above generator output as recommended by plant procedures.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 6/31/98

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TEXT IF MORE SPACE IS REQUIRED, USE ADDITIONAL NRC FORM 366A'S (17)

Withdrawing control rods with main turbine bypass valves open is a violation of Technical Specification 3.1.4.1 which prohibits the withdrawal of control rods when the main turbine bypass valves are not fully closed and reactor power is greater than the low power setpoint (LPSP) of the rod pattern control system (RPCS) [AA] (approximately twenty-four percent of RTP). Additionally, Technical Specification surveillance requirement 4.1.4.1 was not performed. This surveillance requires that a second licensed operator, or other technically qualified member of the unit technical staff, prevent control rod withdrawal when the main turbine bypass valves are not fully closed and thermal power is greater than the low power setpoint of the RPCS.

The requirements of Technical Specification 3.1.4.1 are based on the fact that the reactor power input signal to the rod withdrawal limiter system originates from the main turbine first stage pressure. When operating with the steam bypass valves open, this signal indicates a reactor power level which is less than the true reactor power. The function of the rod withdrawal limiter system is to limit continuous control rod withdrawals based upon reactor power level. Consequently, near the low power setpoint and high power setpoint (approximately seventy percent of RTP) of the RPCS, potential exists for nonconservative control rod withdrawals if the bypass valves are not fully closed. Control rod withdrawals during this event, however, were within the restraints of the rod withdrawal limiter system since continuous control rod withdrawals were not performed.

Between 0927 hours on April 11 and 1600 hours on April 12, 1990, reactor power was held at thirty-five percent for performance of surveillances and repair of steam leaks.

At approximately 1600 hours on April 12, 1990, the Supervisor - Plant Operations suspended further control rod withdrawal pending further investigation of the event.

On April 13, 1990, the Vice President directed the reactor be brought to a cold shutdown condition. (This direction is further discussed in the CORRECTIVE ACTION section of this LER.) Operators began inserting control rods at 1934 hours on April 13 and the plant entered Mode 4 (COLD SHUTDOWN) at 0545 hours on April 15, 1990.

During this event, the main generator load meter [MTR] was out of service. (This is further discussed in the CORRECTIVE ACTION Section of this LER.) No other equipment or components were inoperable at the start of this event such that their inoperable condition contributed to this event.

No manually initiated safety system responses were necessary to place the plant in a safe and stable condition.

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CAUSE OF EVENT

The cause of this event is attributed to personnel error as a result of failure to follow procedures.

The "A" CRO, a licensed utility operator, failed to adequately monitor all available Main Control Room instrumentation important to the proper manipulation of control rods. The CRO did not believe the main generator load indications but did not verify them to be faulty by alternate independent means as required by procedure. Additionally, the CRO did not properly consider the STA's questions of why generator load indications were not increasing following control rod withdrawals. Although main generator load indication is immediately available on a computer display, a contributing factor to this inadequate monitoring was the main generator load meter mounted above the "A" CRO's generator control panel was out of service during this event. Notwithstanding, main turbine bypass valve position indication is provided in three separate locations visible to the "A" CRO. These indications were not adequately monitored by the "A" CRO.

The "A" CRO failed to maintain Load Set approximately 200 MWe above generator load as required by procedure as reactor power was increased following generator synchronization. This caused main turbine bypass valves to unnecessarily open.

As a result of the above, fourteen control rods were withdrawn while main turbine bypass valves were open and reactor power was greater than the LPSP.

Performing control rod withdrawal during the shift turnover period when personnel's attention was divided was a significant factor contributing to the CRO's errors. Shift supervision elected to proceed with power ascension without sufficient measures in place to assure proper control and supervision of the evolution.

Additional factors which contributed to the cause of this event are:

- The "B" CRO was not in the MCR during some of this event due to shift turnover and because he was investigating a problem associated with equipment drains overflowing in the turbine building. This contributed to the work load on the "A" CRO.
- The "A" CRO did not take adequate time to perform self-checking during the manipulations of the control rods because he was told to complete reactor power increase to thirty-five percent of RTP before shift turnover.

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TEXT (If more space is required, use additional NRC Form 386A's (1/17))

- The "A" CRO did not fully understand the significance of generator load not increasing as reactor power was increased when identified by the STA. Both the "A" CRO and the STA were relatively inexperienced in the startup evolutions that occurred during this event.
- All pertinent parameters of plant status were not reviewed during the shift turnover process.
- Turbine bypass valve opening when reactor power is greater than the LPSP is not alarmed in the Main Control Room. However, indication is provided.
- Guidance for control of the generator load set was addressed in one location of integrated operating procedure 3004.01, "Turbine Startup and Generator Synchronization" rather than in specific steps corresponding to the increase in reactor power.
- Operator training does not reinforce how generator load set operates in the plant because the simulator does not exactly duplicate the plant setpoint.
- The wording in Technical Specification 3.1.4.1 is not clear.
- There was no surveillance procedure that implemented the surveillance requirements of Technical Specification 4.1.4.1.

In addition, Plant Management determined the significant aspects of this event were not communicated to them in a timely manner following identification of those aspects during a critique of this event.

IMMEDIATE CORRECTIVE ACTIONS

The following corrective actions were implemented immediately following the event.

- A requirement for the "A" CRO to verify that main turbine bypass valves are closed prior to control rod withdrawal at and above the Low Power Setpoint was established. This verification was documented by initialing the comments section of data sheet 9000.09D002 of Surveillance Procedure 9000.09, "CPS Control Rod Manipulation Logs." This requirement was noted in the Control Room Operator Logs daily until 9000.09 could be revised.
- A caution tag was placed on the Load Set meter to warn personnel the Load Set meter setpoint and generator load indications are not consistent with each other. The Load Set meter reads higher than the generator load indication by approximately 100 MWe.

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U.S. NUCLEAR REGULATORY COMMISSION

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EXPIRES: 6/31/98

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TEXT IF MORE SPACE IS REQUIRED. USE OF UNTIL NRC FORM 306A 5/1/97

- The use of the LASS, Nuclear Engineer, and STA as control rod verifiers is no longer permitted because performing the verifier function takes these personnel away from their overview responsibilities.
- The shift turnover routine was changed such that personnel in the Main Control Room have their turnover at the same time. Operation Standing Order (OSO) - 72, "Dedicated Turnover Time", was issued on April 12, 1990, to provide guidance on implementing this turnover routine and to stress that the turnover time should be dedicated to shift turnover. Future shift turnovers will be conducted when the plant is stable and reactivity or power changes are not in progress.
- A briefing sheet describing the event was issued to shift personnel.

ADDITIONAL CORRECTIVE ACTIONS

Although this event was not safety significant and had no safety consequences, IP considers this event to be serious both in terms of procedural compliance and attentiveness issues that caused the event and the appropriateness of the Clinton Power Station (CPS) response to the event. Therefore, to ensure that the causes of this event were understood and that CPS personnel understand these types of occurrences cannot be tolerated, on April 13, 1990, the Vice President directed that CPS be brought to a cold shutdown condition.

As directed by the Vice President, the following corrective actions were completed prior to plant restart.

- As they came on shift, each shift crew was briefed on the details of this event and the "lessons learned". The brief included a review of the indications that should be monitored during control rod manipulations.
- Active licensed operators, Shift Supervisors and Shift Technical Advisors (STAs) received approximately 12 hours of retraining on: reactivity management procedures; the importance of procedure compliance; and the responsibilities of personnel working in the Main Control Room, including the importance of performing thorough equipment status checks during shift turnover, as well as monitoring equipment configuration while on shift.

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TEXT OF THIS SHEET IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY AND IS NOT A SUBSTITUTE FOR THE OFFICIAL NRC FORM 306A (2-117).

Operations shift crews received a briefing on the theory and operation of the Steam Bypass and Pressure Control system with respect to Load Set. The simulator was utilized to recreate the April 11, 1990, event and to demonstrate that these licensed individuals and STAs fully understand the proper checks to be performed and procedures to be utilized during reactivity changes and plant startup.

A written examination was administered to each individual to evaluate his understanding of the principles of reactivity management and related issues. Each individual received a passing grade.

- The Plant Manager and the Vice President met with those individuals who underwent the retraining discussed above, to discuss the causes of the April 11, 1990, event and reinforce the lessons presented in the retraining.
- On April 20, 1990, the Vice President met with the CPS Managers and Directors and discussed the importance of prompt recognition of and response to potential problems and the need for prompt reporting of problems to the appropriate level of management.
- An experienced senior-level individual, reporting directly to the Vice President, has been assigned to monitor and assess Plant Staff-Operations performance to ensure problems are recognized promptly and responded to appropriately. This individual is also providing guidance and instruction to senior Plant Staff-Operations personnel and will continue to do so until such time that performance monitoring of Plant Staff-Operations is determined no longer required.
- Eight director-level individuals were assigned to monitor performance on each shift from restart of the reactor through ascension to 100% reactor power. These directors were responsible for observing reactivity changes and shift turnovers, ensuring procedural compliance, ensuring problems which occur on shift were reported to upper management, ensuring the Technical Specification requirements were met, and observing that the STAs' recommendations received appropriate attention.

In addition to requiring the actions discussed above be completed prior to commencing plant restart, a number of procedure revisions, to increase operator control of reactivity changes, were also completed.

- Surveillance procedure 9000.09 was revised to require the second individual verifying control rod withdrawals also verify that prior to withdrawing control rods with reactor power greater than the

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TEXT IF more space is required, use additional NRC Form 306A's (17).

LPSF, the main turbine bypass valves are closed. Additionally, this revision requires this second individual be a licensed operator.

- Integrated operating procedure 3004.01, "Turbine Startup and Generator Synchronization," was revised to include specific steps for positioning the Load Set as power is increased.
- Administrative procedure 1401.01, "Conduct of Operations" was revised to: limit activities in the MCR during planned manipulation of reactivity controls; clarify the duties of the STA as an independent evaluator assuring procedure limitations are not being challenged during normal plant conditions; add a requirement for operators to perform panel walkthroughs during shift turnovers; and require the oncoming CRO to understand plant/system status prior to assuming shift duties. Additionally, the revision requires the CRO to monitor, as a minimum, the appropriate parameters listed on an operator aid that has been posted on the P-680 panel. This operator aid provides the "A" CRO with guidance on the appropriate plant parameters to be monitored prior to and during manipulation of reactivity controls.

Additionally, the following integrated operating procedures have been revised to limit activities in the MCR during planned manipulation of reactivity controls and to require the control room operator to monitor, as a minimum, the appropriate plant parameters listed on the P-680 panel operator aid prior to and during manipulation of reactivity controls.

- 3001.01, "Approach to Critical"
- 3002.01, "Heatup and Pressurization"
- 3003.01, "Heatup and Pressurization, Condenser Isolated and Condenser Recovery"
- 3004.01, "Turbine Startup and Generator Synchronization"
- 3005.01, "Unit Power Changes"
- 3006.01, "Unit Shutdown" (revised on May 7, 1990)

Illinois Power believes the completed corrective actions adequately raised Operations personnel awareness of the need for procedural compliance and attentiveness, in routine and infrequently performed operations, most notably reactivity changes. Based upon satisfactory completion of the corrective actions directed by the Vice President, CPS commenced reactor startup on April 21, 1990.

In addition, a plant modification request will be submitted to request improvements to the Display Control System (DCS) display for the main turbine bypass valve position. The request will include the addition of an annunciator [ANN] to warn operators when main turbine bypass valves are open.

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The main turbine generator MWe load meter (which was out of service during this event) has been repaired in accordance with Maintenance Work Request D13826. This repair was completed on April 30, 1990.

The Sentinel Log of the General Electric Transit Analysis Recording System (GETARS) has been changed so the opening of the first turbine bypass valve to five percent will cause a trip of the GETARS Sentinel trip annunciator (5009-5B). This change will provide another indication that main turbine bypass valves are open.

The plant simulator has been reprogrammed to duplicate the plants characteristic of opening bypass valves about 100 MWe below the Load Set value. The original plant modification for matching the generator Load Set value with the generator load had been disapproved by the Modification Review Committee. As a result, the simulator and the plant did not operate the same. For this reason, IP performed a review of other disapproved plant design changes to determine if any identified plant operating characteristics that are procedurally controlled may need to be modeled on the simulator. This review did not identify any other disapproved plant design changes that would have an impact on operator training on the simulator.

Further, a Human Performance Evaluation was performed on this event and will be presented to appropriate Operations personnel during the next requalification training cycle.

With regard to the concern expressed that the wording of Technical Specification 3.1.4.1 is unclear, IP is currently working with the Boiling Water Reactor (BWR) Owners Group to improve Technical Specification 3.1.4.1 and other Technical Specifications through participation in the Technical Specification Improvement Program.

To ensure that IP had a full understanding of the ramifications of this event and had taken appropriate action in response to it, IP also brought experienced personnel to CPS to independently review the causes of this event and IP's corrective action. The independent review was performed by a team including a representative from Stone and Webster Engineering Corporation and two representatives from the Davis-Besse Power Station. The results of their review were reported directly to the Vice President.

The results of their independent assessment confirmed IP's conclusion that the cause of the event was failure to comply with procedures. The team concurred with IP's decision to complete the six corrective actions directed by the Vice President and the procedure revisions as discussed above prior to commencing plant startup. The team also made a number of additional recommendations including:

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TEXT OF FORM NUMBER 306A IS FOLLOWS. SEE INSTRUCTIONS NRC Form 306A 8/1/77

- Performing a review of the critique administrative process to improve the efficiency of writing and publishing operational critique reports;
- Publishing formal guidance for performing briefs on upcoming work or events; and
- Reviewing the plan and resources for achieving procedure improvement goals.

IP will complete its evaluations of these recommendations by May 15, 1990. Following completion of these evaluations, those recommendations determined to be appropriate will be implemented.

The independent assessment team also recommended operators be continually encouraged to verify through all available means that the plant is responding to their actions as expected. This recommendation will be incorporated into Plant Staff, Quality Assurance and Nuclear Training Department programs by September 15, 1990.

ANALYSIS OF EVENT

This event is reportable under the provisions of 10CFR50.73 (a)(2)(i)(B) because the plant was operated in a condition prohibited by the Technical Specifications. Specifically, the requirements of Technical Specification 3.1.4.1 were not met and Technical Specification surveillance requirement 4.1.4.1 was not performed.

Review of stored computer data determined that fourteen control rod withdrawals had been performed over a nine-minute period with the main turbine bypass valves open, and the bypass valves had been open for fifty-eight minutes, from 0738 hours to 0836 hours on April 11, 1990.

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U.S. NUCLEAR REGULATORY COMMISSION

APPROVED DMB NO. 3150-0104

EXPIRES: 8/31/86

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TEXT IF MORE SPACE IS REQUIRED, USE ADDITIONAL NRC FORM 308A'S (17)

Assessment of the safety consequences and implications of this event has determined this event is not nuclear safety significant. The requirement to maintain turbine bypass valves closed when reactor power is greater than the LPSP, ensures the Rod Withdrawal Limiter (RWL) is in effect at the proper reactor power level. As discussed in CPS Updated Safety Analysis Report Section 7.6.1.7, the RWL limits continuous control rod withdrawal to prevent excessive change in the heat flux rate in the event of a control rod withdrawal error. This event is assumed to occur as the result of an operator error in which a single control rod or gang of control rods is withdrawn continuously until the RWL blocks further withdrawal. Since only single-notch control rod withdrawals were being performed at the time of this event, the constraints of the RWL were being satisfied regardless of main turbine bypass valve position. Additionally, this event would not have been significant at any other power level since control rod movements are controlled by plant technical procedures.

ADDITIONAL INFORMATION

No similar events involving a control rod withdrawal while main turbine bypass valves were open and reactor power was greater than the LPSP have been reported as LERs at CPS.

No components failed during this event.

For further information regarding this event, contact D. R. Morris, Director - Plant Operations, at (217)935-8881, extension 3205.