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DMB

July 1, 1986

Mr. James G. Keppler
Regional Administrator
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: LaSalle County Station Units 1 and 2
Response to Confirmatory Action Letter
Regarding the LaSalle Unit 2 Reactor
Water Level Transient on June 1, 1986
NRC Docket Nos. 50-373 and 50-374

Reference: J. G. Keppler letter to Cordell Reed
dated June 2, 1986.

Dear Mr. Keppler:

The referenced letter transmitted the NRC Confirmatory Action Letter (CAL) regarding the LaSalle Unit 2 reactor water level transient and anomalous behavior of differential pressure switches on June 1, 1986. The CAL stated that we would provide information regarding the event and take certain specified actions.

The enclosure provides our response to each of the CAL items.

Please direct any additional questions regarding this matter to Nuclear Licensing.

Very truly yours,

Cordell Reed

Cordell Reed
Vice President

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Enclosure

cc: Dr. A. Bournia - NRR
Region III Inspector - LSCS

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ENCLOSURE

1. Determine the cause of the feedwater pump transient

An investigation into the cause of the feedwater system transient is in progress. Three system performance deficiencies have been identified, which are as yet unexplained. These deficiencies are as follows:

a) The transient was initiated by the "A" TDRFP control valve opening 5-10% during a 5% closure of the "A" TDRFP stop valve in accordance with LOS-BO-W1, "Balance of Plant Weekly Surveillance".

b) Following opening of the "A" TDRFP control valve, both the "A" and "B" TDRFPs locked out.

c) During the operating staff's response to the transient, the "B" TDRFP lockout was reset. Due to the fact that the "B" TDRFP was in 3-element control and a large mismatch between demand and output, the "B" TDRFP decreased to zero output and went into negative saturation. When subsequently called upon to increase output, the "B" TDRFP would not come out of negative saturation.

The investigation has included a review of the TDRFP design, troubleshooting the turbine control circuitry, and attempts to get the problems to recur by duplicating the conditions which existed at the time of the transient to the extent possible. The turbine controls vendor as well as two former Startup Test Engineers involved with initial startup testing of the feedwater system have assisted in this effort.

To date, these efforts have not identified the root cause of the performance deficiencies noted. It is possible that the cause may not be identified prior to Unit 2 startup. In this case, testing will be required following Unit 2 startup, either to confirm the problems have been corrected, or to assist in identifying the root cause.

2. Conduct a thorough review to determine if water level decreased to or below the scram setpoint.

The station has conducted a thorough review of all available water level data and determined that reactor water level may have decreased to +4 inches. This conclusion is based on an indication of +6 1/4 inches on the Startup Transient Test Recorder (STARTREC) and subsequent accuracy checks that indicated STARTREC was indicating 2 inches higher than actual water level. Additional information regarding water level is provided in item #5.

3. If water level decreased below the scram level, determine if a scram signal was received by the reactor protection system (RPS).

A complete valid scram signal was not received by the reactor protection system. Reactor protection system channel B-2 received a scram signal from level instrument 2B21-N024D. This is a half scram signal and is not sufficient to initiate a reactor scram.

A thorough evaluation of available data has revealed no indication that other RPS channels received a trip signal. Testing conducted prior to and subsequent to the event indicates that the RPS system will initiate a reactor scram when the proper trip signals are received.

4. If such a signal was received, determine why the reactor did not scram.

A complete valid scram signal was not received by the reactor protection system.

5. If such a signal was not received, or if water level did not decrease below the scram level, determine if any instrumentation indicated a low water level.

The Reactor Operator and the Station Control Room Engineer were monitoring reactor water level on the narrow and wide range control room indicators and did not believe this instrumentation indicated reactor water level decreased below the Technical Specification allowable value.

The following tabulation represents the lowest indications received on the various reactor water level recorders:

EPN	NOMENCLATURE	RANGE	LOWEST READING	
2C34-R608	Narrow Range Water Level	0 to 60"	+5" to 12"	(a)
2C34-R608	Upset Range Water Level	0 to 180"	+2"	(b)
2B21-R884A	Post Accident Wide Range	-150" to +60"	0"	(c)
2B21-R884B	Post Accident Wide Range	-150" to +60"	0"	(c)
N/A	Startrec	0 to 60"	+6 1/4"	(d)

(a) The recorder pen did not ink below +12". The Shift Engineer and the SCRE on the shift following the feedwater transient believe they observed an indentation in the recorder paper indicating reactor water level got as low as +5".

(b) The Upset Range Level Instrument was designed to provide level indication above the Narrow Range. Below approximately 50" reactor water level, this instrument reads lower than actual level.

(c) Typically reads 6-10" below actual level due to design for use with the recirculation pumps not running.

(d) Not available to the operator

6. Maintain all affected equipment related to the event, including the RPS, in such a manner that it can easily be kept or placed in the "as found" condition. Therefore, minimize any actions which would destroy or cause to be lost (other than necessary to protect the health and safety of the public) any evidence which would be needed to investigate or reconstruct the event.

   Complied with this CAL item.

7. Advise the AIT team leader, Mr. Geoffrey Wright, of this office prior to conducting any troubleshooting activities. Such notification will be soon enough to allow time for the team leader to assign an inspector to observe the activities.

   Complied with this CAL item.

8. Make available to the AIT all relevant written material related to the installation, testing, and/or modifications to the reactor level switches and the RPS.

   Complied with this CAL item.

9. Review operator and shift personnel actions following the event and determine if these actions were in accordance with your procedures and policies. Specifically, determine:

   (a) What actions the on-duty operations staff took following the event.

   The Event was initially classified as a Feedwater transient, during which reactor water level appeared to momentarily drop to the Technical Specification scram setpoint of 12.5" (Technical Specification allowable value is 11.0").

The on-duty operations staff immediately took the proper action to terminate the feedwater transient. This included:

- Reset the cleared 1/2 scram signal
- Inserted Control Rods to clear the APRM Hi alarms, caused by loss of feedwater heating following manual reduction of recirulation flow and automatic downshift of the reactor recirculation pumps during the transient.
- Restore feedwater heaters to a stable condition

Subsequent operator actions were to:

- Troubleshoot and return the 'B' TDRFP to normal
- Upshift the reactor recirculation pumps
- Withdraw control rods for reestablishment of a normal rod sequence
- Restore reactor recirculation flow control valve (FCV) to normal
- Increase recirculation flow (fuel preconditioning and thermal-hydraulic stability)
- Continue control of feedwater heating

The on-duty shift's actions were appropriate for their diagnosis of the event and were in accordance with the LaSalle County Station's procedures and policies, particularly LOA-FW-01 (Loss of FW heating). This conclusion is based on the observation that a low water level condition occurred, but no setpoint limit was exceeded. The performance of the Shift Engineer and Station Control Room Engineer in executing their job functions was in accordance with Corporate Policy and Station Procedures.

b) When and by whom was the event first identified?

The event was identified by the oncoming Shift Engineer shortly after shift turnover. He re-classified the event as a reactor level transient. When reviewing the charts, he believed level may have dropped below the scram setpoint. He initiated a detailed investigation to determine if reactor water level had decreased below the Technical Specification allowable value.

c) If the event was identified during shift turnover reviews or by some other method.

The event was identified shortly after shift turnover. (Initial assessment by the day shift was from shift turnover through 0650 hrs). The on-coming Shift Engineer, Station Control Room Engineer (SCRE) and Shift Foreman reviewed all Control Room level recorder traces for the time period of the transient and utilized the information about the feedwater transient that was supplied by the off-going shift (during shift turnover). They identified that the 'B' narrow range reactor water level recorder appeared to drop briefly below the level corresponding to the Tech Spec scram setpoint (+ 12.5" on the Static-O-Ring Switches). The recorder chart paper only showed a crease. The Shift Engineer ordered the reactor power ascension stopped. These actions were in accordance with Station and Corporate policies regarding conservative operating practices.

d) Why event classification and notification took about 12 hours.

Event classification took several hours due to the time required to stabilize the plant and complete problem assessment activities.

The length of time required to complete problem assessment was influenced by the following factors:

- Instrument Maintenance personnel were called in to the site to verify the accuracy of the reactor water level instrumentation.

- Initial perception of the Operating and Station Management personnel based on the direct observations of the operators on the control panels was that level could not have gone below the Technical Specification limit without a reactor scram. Additionally, the indication that prompted the investigation was only a crease in the recorder paper. No inking of the pen could be found below 12.5 inches.

- The first order of priority was to recalibrate the level switches (Safety-Related) in both RPS trip channels. It was expected that recalibration would find one of the 'B' channel level switches (B or D) drifted high.

- When recalibration results were available and no excessive drift was noted, the reliability of the level switches was questioned. Shortly thereafter, an orderly shutdown was initiated due to uncertainty with respect to the reliability of the reactor water level scram switches.

- After the shutdown was ordered, the decision was made to check calibration of the 'B' narrow range level indication and to conduct a comparison test to validate the accuracy of Startrec.

The calibration process was delayed because the plant shutdown was at the point in time when a manual downshift of the recirculation pumps was required as part of normal plant shutdown activities. Since this evolution normally affects reactor water level, it was decided not to disable the narrow range level indication at that time, and wait until after the recirculation pump downshift evolution. After the calibration results showed that the 'B' narrow range instrumentation was accurate (indicated +5" to +12" during transient), and that the Startrec trace was indicating 2" higher than actual level (indicated +6-1/4" during transient). This was considered confirmation that reactor water level had decreased below the Technical Specification allowable value without a reactor scram and resulted in declaration of a GSEP Alert.

No specific procedure covers the above events/conditions. However, the policies established in the Conduct of Operations procedure (LAP-1600-2) were followed. Furthermore, all actions taken by the operating staff and by plant management are considered to be in a conservative direction based on the information available to them at the time. Declaration of an Alert based on unconfirmed information is not considered to be a good practice.

10. Determine if this problem is unique to Unit 2 or if similar problems could occur on Unit 1.

The investigation determined that the LaSalle Unit 2 reactor protection system functioned as designed. The problem has been determined to be unusual setpoint variation with the Static-O-Ring differential pressure switches. Efforts are in progress to characterize and bound this setpoint variation in order to continue reactor operations with the Static-O-Ring differential pressure switches.

The problem with Static-O-Ring differential pressure switches is believed to also be applicable to Unit 1.