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November 16, 1995

PGHLTR 95-0031

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

Licensee Event Report 95-005, Docket 50-249, Revision 1 is
being voluntarily submitted.

This supplemental report provides clarification to
corrective actions for the event and does not include any
new commitments.

Sincerely,

A handwritten signature in cursive script that reads "Peter G. Holland".

Peter G. Holland
Regulatory Assurance Supervisor

PGH/CD:pt

Enclosure

cc: H. Miller, Regional Administrator, Region III
NRC Resident Inspector's Office
File/NRC
File/Numerical

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NRC FORM 366 (5-92)			U.S. NUCLEAR REGULATORY COMMISSION						APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95		
LICENSEE EVENT REPORT (LER)									ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.		
FACILITY NAME (1) Dresden Nuclear Power Station, Unit 3						DOCKET NUMBER (2) 05000249		PAGE (3) 1 OF 10			
TITLE (4) Limiting Conditions for Operation for Local Transient Linear Heat Generation Rate was Exceeded Due to Informal Control of Planned Reactivity Changes											
EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME None	DOCKET NUMBER	
03	22	95	95	-- 005 --	01	11	16	95	FACILITY NAME	DOCKET NUMBER	
OPERATING MODE (9)		N		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		097		20.2201(b)		20.2203(a)(3)(i)		50.73(a)(2)(iii)		73.71(b)	
				20.2203(a)(1)		20.2203(a)(3)(ii)		50.73(a)(2)(iv)		73.71(c)	
				20.2203(a)(2)(i)		20.2203(a)(4)		50.73(a)(2)(v)		<input checked="" type="checkbox"/> OTHER	
				20.2203(a)(2)(ii)		50.36(c)(1)		50.73(a)(2)(vii)		(Specify in Abstract below and in Text, NRC Form 366A) Voluntary Report	
				20.2203(a)(2)(iii)		50.36(c)(2)		50.73(a)(2)(viii)(A)			
				20.2203(a)(2)(iv)		50.73(a)(2)(i)		50.73(a)(2)(viii)(B)			
				20.2203(a)(2)(v)		50.73(a)(2)(ii)		50.73(a)(2)(x)			
LICENSEE CONTACT FOR THIS LER (12)											
NAME Carlos de la Hoz, Plant Engineering						Ext. 2997		TELEPHONE NUMBER (Include Area Code) (815) 942-2920			
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
SUPPLEMENTAL REPORT EXPECTED (14)						EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR	
YES (If yes, complete EXPECTED SUBMISSION DATE).				X NO							

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On March 22, 1995, at approximately 1722, during Control Rod Drive Scram Testing, it was determined that the Limiting Condition for Operation for Local Transient Linear Heat Generation Rate was exceeded. The Maximum Fuel Design Limiting Ratio for Centerline Melt (MFDLRC) was greater than 1.000 for approximately 5 minutes. Control rod D-6 was scrammed from notch position 48 at approximately 1727 in accordance with the surveillance procedure. This terminated the condition. No Technical Specification violation occurred. Two other occurrences, of short duration (10 minutes), were identified. Cause of the event was the informal control of planned reactivity changes. Contributing causes of this event were that the QNE was dividing his attention between reactivity management and System responsibilities, QNE was focused on preconditioning margins, and failure of previous corrective actions. Corrective actions include formalizing planned reactivity changes, briefing/training of on-coming shift personnel and nuclear engineers on the event, reassigning the Unit QNEs' System responsibilities. This LER is being voluntarily submitted because of a similar previous event.

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At 0000 on March 22, 1995, the Powerplex Core Monitoring case showed that MFDLRC was 0.872. This loss in margin for MFDLRC was a result of the xenon burnout that was occurring due to the power reduction from the day before. The xenon burnout was causing a shift in the core power distribution. The shift in power distribution caused a reduction in margin for MFDLRC.

At 0754 on March 22, 1995, the Powerplex Core Monitoring case showed that MFDLRC was 0.888. This value of MFDLRC was noted by the QNE during the performance of the Nuclear Engineer Walkdown Checklist at approximately 0900. As a normal practice for monitoring the core during scram timing, QNE's periodically run Predicts to verify adequate margin to fuel limits. The 0754 Powerplex case was utilized by the QNE as the basis for a Predict case which he initiated at 0816 in order to confirm adequate margin to the preconditioning envelope with the limiting rod being withdrawn for scram timing purposes. This Predict case showed adequate margin to the preconditioning envelope. Seeing this margin, the QNE believed no further actions were required in order to ensure fuel limits were not challenged. However, the investigative team reviewed this Predict and identified that it showed a MFDLRC value of greater than 1.00. In questioning the QNE as well as other QNE's, it appears, in this instance, that they were focused on margin to the preconditioning envelope instead of MFDLRC. Consequently, margin for MFDLRC was not specifically being monitored by the QNE (on the Predict).

During the day shift of March 22, 1995, the NE group was informed of plans to perform Main Steam Isolation Valve testing upon the completion of DTS 0300-02. This test would require a further power reduction from the current power level. The power reduction would have to be done by control rod insertions. The QNE spent a significant amount of time on day shift developing plans for these control rod insertions.

At approximately 1500 on March 22, 1995, the xenon burnout had caused reactor core power to increase to approximately 475 MWe, which was marginally acceptable for the current line up of two Condensate/Condensate Booster pumps. To ensure the condensate system could provide the necessary condensate to the feedwater system, Operations requested the QNE provide recommendations for reducing core power. The QNE instructed Operations to insert the control rods per the sequence. However, the QNE did not perform a rigorous re-evaluation of the reactivity change (e.g., no new Predict case) prior to, or after performing the rod move.

At 1700 on March 22, 1995, Operations had completed the load reduction for the Condensate/Condensate Booster pump concern. The QNE verified margins to thermal limits and the preconditioning envelope were acceptable at this time. The control rod insertions resulted in a further decrease in margin to the MFDLRC limit. The MFDLRC value was now 0.921. It is evident that the QNE recognized the reduction in margin at this time because he recorded the value in the QNE log book and he discussed this fact with the Unit Supervisor, however, he did not run a new Predict case. The QNE believed the margins were adequate and authorized scram timing to continue. The Unit Supervisor relied on the guidance of the QNE to assure that the margins were adequate for scram time testing. The QNE then left the control room to return to his office.

Meanwhile, the Lead Nuclear Engineer (LNE) observed the Unit 3 thermal limits via the computer at his desk. He questioned whether there would be sufficient

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margin to scram time the most limiting control rod (D-6). The LNE did not expect the scram time testing to begin immediately and initiated a Predict case to model the most limiting control rod being withdrawn.

The QNE returned from the control room and the LNE asked him whether there was sufficient MFDLRC margin to perform scram timing on the rods that were left to scram. The QNE believed that sufficient margin still existed, but agreed with the LNE that a Predict calculation run should be made to verify that sufficient margin did exist. The LNE informed him that he had already initiated the Predict. The QNE then called the Unit 3 Nuclear Station Operator (NSO) desk to ask about the status of scram timing. He talked to the extra NSO who told him that control rod D-6 had been withdrawn from 12 to 48 and they were getting ready to scram the rod. This control rod was one of 3 rods in question. He told the NSO to continue testing (which would result in the control rod D-6 being scrambled). No further restrictions were placed on testing at this time. The reason the QNE told the NSO to continue was that he believed that sufficient margin still existed and he knew scrambling control rod D-6 would reduce the value of MFDLRC to below 1.000 if it had exceeded 1.000 and, therefore, Technical Specification action requirements would be met. The QNE did not, however, communicate to the NSO that a potential MFDLRC problem existed.

At the time of the call to the extra Unit NSO, the LNE and QNE were not sure if there was a problem with the FDLRC value being exceeded. However, it was known if there was not sufficient margin it would be with the D-6 rod because it was one of the limiting rods. Since D-6 had already been withdrawn and about to be scrambled the test could continue. Upon completion of the Predict that was submitted by the LNE, further evaluation was performed to determine if a limit had actually been exceeded and the significance of that exceeded limit.

Review of the alarm typer [IB] printout shows that control rod D-6 was withdrawn at 1722 and subsequently scrambled at 1727. When the Predict case completed, after control rod D-6 was subsequently scrambled, it showed MFDLRC to be greater than 1.000 with the limiting rod fully withdrawn. No official core monitoring case was requested while the suspected MFDLRC violation existed, so no alarm was received by the Operator. The core monitoring code is not capable of continuous thermal limit calculation.

The LNE and QNE then determined that they should not allow scram timing of the two rods (F-10 & M-12) that were at notch position 00 for maintenance. They contacted the scram timing test director and told him not to scram time those rods until they had evaluated the core conditions further. They also contacted the Unit Supervisor and informed him of the hold on scram timing those two control rods. Later the QNE informed him that they would be initiating a Problem Identification Form (PIF) because they believed that MFDLRC had possibly been greater than 1.0 during withdrawal of control rod D-6. However, the notification of the Unit Supervisor should have occurred when the QNE realized that there was a concern with the margin being exceeded.

The LNE and QNE evaluated the conditions further and determined that one of the rods, control rod M-12, could be scram timed with no further control rod maneuvers. However, some rod moves would be necessary to allow for scram timing of control rod F-10. The necessary rod maneuvers were determined by the LNE and

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QNE. The LNE left a message for the Reactor Engineer at approximately 1900, the Reactor Engineer contacted the LNE at 2115.

At 1900 on March 22, 1995, DTS 0300-02 was completed except for control rods F-10 and M-12.

The QNE discussed this event with the Unit Supervisor at approximately 1830, and with the Shift Manager later in the shift. The Shift Manager, shift 3, March 22, 1995, was concerned with exceeding the MFDLRC limit. He ensured that the core was in a safe condition and that actions were being taken to ensure a similar event would not occur. The Shift Manager confirmed that there was not a violation of Technical Specification action requirements and that there were no Reportability requirements. A PIF was initiated by the QNE, so the Shift Manager did not believe any other notifications were necessary at this time.

However, the PIF was rejected by the Shift Manager, shift 1, March 23, 1995, on the basis that clearer wording needed to be added to it. The Shift Manager followed all reportability and notification guidelines available to him at the time. The guidelines and criteria considered by the Shift Manager included the Reportability Manual, previous events, information provided by the QNEs and the priority of issues he was addressing at the time. Based on those considerations the Shift Manager did not believe that the Senior Managers needed to know of the occurrence immediately. The Shift Manager realized that the occurrence was significant; he noted the occurrence in his log and left that message on the Station Morning Message call.

The QNE revised the PIF and gave it to the shift during shift 3, March 23, 1995. The shift 3 Shift Manager held the PIF over for the shift 1 Shift Manager to review, to ensure his comments were addressed. The PIF was signed during shift 1, March 24, 1995, by the Shift Manager.

At 2230 on March 22, 1995, the QNE provided instructions for control rod maneuvers to allow for scram time testing of control rod F-10. The QNE then released the hold on scram time testing for control rod F-10.

At 0552 on March 23, 1995, DTS 0300-02 was completed for control rods F-10 and M-12.

Senior Station Management were notified of the exceeded MFDLRC limit during the 0650 meeting on March 23, 1995.

C. CAUSE OF EVENT:

This LER is being voluntarily submitted because of a similar previous event.

Root Cause: The cause of this event is informal control of planned reactivity changes. The process for making reactivity changes did not provide a means for verification of assumptions and decisions made by a single individual. Consequently, misjudgment by the Qualified Nuclear Engineer (QNE) resulted in putting the reactor core in a configuration that allowed for inadvertently exceeding the Technical Specification LCO.

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Contributing Causes:

1. The QNE was distracted by other activities.
2. The QNE was assigned other systems beyond the reactor core management duties. This divided his attention from the most important duty of reactivity management.
3. Corrective actions from previous occurrences of the FDLRC value being exceeded (LER 93-020, Docket 50-237) did not provide sufficient corrective action to prevent recurrence.
4. The QNE was focused on preconditioning margins, instead of all thermal limits during scram testing.
5. Licensed Operations personnel have overly relied on the QNEs to plan, authorize, and monitor reactivity changes. In addition, the team ownership of reactivity management by Licensed Operators and the Nuclear Engineers has been weak.

D. SAFETY ANALYSIS:

MFDLRC is a transient LHGR limit calculated for each fuel node (one six inch segment of one fuel bundle) which is designed to protect the fuel in the event of an overpower transient up to 120 percent of rated core thermal power. Operation with the maximum value of FDLRC less than its limit of 1.0 provides assurance that, in the event of an overpower transient, centerline melt of the fuel pellets in all nodes of the core will be avoided and 1 percent of plastic strain on the cladding will not be exceeded.

Technical Specification 3.5.K requires one of two possible courses of action in the event that MFDLRC is found to exceed its limit. The first is to adjust the Average Power Range Monitor (APRM) scram and rod block settings by a factor of 1/MFDLRC. This is generally accomplished by increasing the APRM gains by a factor of MFDLRC, which effectively produces the same result and is an option presented in the action statement. The second option is to adjust the core power distribution such that MFDLRC no longer exceeds its limit. There is no time limit given for completion of either action.

The Station provided Corporate Nuclear Fuel Services (NFS) relevant data in order to perform an off-line Powerplex run to verify initial Station Predicts that identified the MFDLRC limit had been exceeded. NFS determined that the MFDLRC value with control rod D-6 at position 48 was 1.04. Scramming the rod as required by the testing procedure effectively accomplished the required corrective actions.

During the investigation, the potential for additional instances where MFDLRC exceeded 1.0 was identified. The review identified two other instances where MFDLRC exceeded 1.0 during this scram timing evolution. The first of these instances occurred on March 22, 1995, at approximately 1059. Control rod F-4 was withdrawn for 10 minutes with a MFDLRC of 1.017. The second instance occurred on March 22, 1995, at approximately 1119. Control rod F-6 was withdrawn for 3 minutes with a MFDLRC of 1.005. These results were obtained through the Predict option of Powerplex. Although the accuracy may not be as

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good as an on-line Powerplex case, the accuracy is sufficient for the purposes of this review.

Taken by itself, the safety significance of this event is minimal. However, the informal administrative controls which allowed this event to occur leave the potential for more significant events to occur. This event initiated an examination of the informal control of planned reactivity changes at Dresden and the over-reliance on personnel skill without appropriate support from supervision and procedures. This event has also initiated an examination of the roles and responsibilities of the Reactor Operators and Unit Supervisors in authorizing, executing, and monitoring of planned reactivity changes.

The safety significance of this event was minimal. In all instances, the MFDLRC value was greater than 1.0 for a short period of time (a maximum of 10 minutes) and the unit did not experience any other transient during the condition. In addition, no other thermal or preconditioning limits were violated at any time during the event and fuel integrity was not challenged. If a transient which caused core thermal power to reach 120 percent of rated core thermal power had occurred with the MFDLRC over 1.0, fuel integrity may have been challenged for the nodes in violation. However, such a transient is not credible with the core conditions existing during the event and the mechanical and electrical stops installed on the Unit 3 Reactor Recirculation Motor Generator Sets.

E. CORRECTIVE ACTIONS:

Immediate Corrective Actions:

1. On Thursday, March 23, 1995, at approximately 0830, Station Management directed Nuclear Engineering Management to halt all reactivity changes while Station Management commenced a preliminary review of the event. After the preliminary review, at approximately 1300 on March 23, 1995, Unit 3 was allowed to begin ramping up.
2. The results of the preliminary investigation were communicated to the Plant Engineering Department in a stand-down on March 23, 1995.
3. Discussed the event with each QNE before they assumed watch.
4. During the afternoon of March 23, 1995, Senior Station Management evaluated the occurrence and based on reactivity concerns, determined the event to be significant and decided to elevate the issue to a Level II investigation.
5. On the morning of March 24, 1995, Senior Station Management imposed a requirement for Station Manager approval of all planned reactivity changes until the full circumstances of the event were evaluated, including delay of Unit 2 startup until the Level II investigation was complete.

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Corrective Actions:

1. Dresden Station created a Reactivity Maneuver Approval Form (RMA), which was generated for all planned reactivity changes. The purpose of the RMA is to:
 - a. document and control the overall evolution and important plant conditions for the planned reactivity change including potential interactions among multiple procedures,
 - b. communicate to Operations Personnel the information necessary to authorize, execute and monitor the planned change,
 - c. provide a consolidated list of activities in progress which affect reactivity,
 - d. require two QNEs to complete and review along with Unit Supervisor authorization.
2. A memorandum from the investigation team and signed by the Dresden Reactor Engineer, dated March 24, 1995, was sent to the Operating Shift Personnel. The memorandum describes the RMA and utilization of the RMA as a communication of critical technical information to assure that reactor and plant conditions will remain within the assumptions necessary to ensure conservative execution of the planned activity.
3. Dresden Station created a new interim procedure, IP 95-23, to formalize planning, execution and monitoring of reactivity changes utilizing the RMA. The interim procedure requires planned reactivity changes that are not specifically addressed by an approved site procedure be prepared by a QNE and reviewed by a second QNE prior to authorization by the Unit Supervisor. As evolution-specific procedures are enhanced to include reactivity management guidance and as experience is gained on the use of the RMA, the interim procedure will be revised to define which evolutions require this level of planning and review.
4. Following approval and prior to the implementation of the interim procedure, Operations personnel were trained on the interim procedure.
5. Dresden has developed an improved method for performing scram timing.
6. Provided Powerplex overview monitoring screen at NSO console.
7. Operators were trained on the event and conducted thermal limit review.
8. On March 27, 1995, the Nuclear Engineering Group was placed on probation until March 31, 1995, when the engineers had completed retraining on the appropriate core parameters to monitor during scram testing and major Xenon transients. Managements' expectations on notification requirements were communicated to the Nuclear Group.
9. Reiterated Managements' expectation that a QNEs' primary responsibility is reactivity management. The QNE involved in this event presented a review and analysis to emphasize this expectation to the NE Group.

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10. System responsibilities currently assigned to the Unit QNEs were reassigned to a new Nuclear Group Engineer.
11. An effectiveness review of the two previous corrective actions (LER 93-020, Docket 50-237) was performed, the actions were deemed ineffective and a PIF was written in accordance with DAP 02-29, Corrective Action Effectiveness Review and a supplement to the LER was submitted.
12. The Reactor Engineer has reiterated to the QNEs that they shall notify the Operations Shift immediately when reactivity management events occur.

F. PREVIOUS OCCURRENCES:

CDE 2-94-530, No Call to QNE for Typer Alarms,

During Nuclear Engineer daily control room rounds at approximately 0900 on 3/10/94, it was discovered that during the normal shutdown of Unit 3, several warnings for high FDLRC, with instructions to contact the QNE, were printed on the Unit 3 alarm and PRIME typers; yet a QNE was not contacted. The alarms printed on both typers when POWERPLEX core monitoring cases ran between 0112 and 0332 on the morning of 3/10/94. The determination was made by the shift that no Tech Specs were exceeded. Operators were aware of the alarms, discussed the response with the ex-LNE (then on operations staff), and the decision was made not to call the QNE on call.

Upon discovery, the active LNE verified that no Tech Spec Limits were exceeded. The NSO alarms were tested on Unit 2 to verify that the audible thermal limits action level alarms functioned properly, as well as the typer alarms. It was not possible to verify the audible alarms on Unit 3 since the Unit had been shutdown and POWERPLEX was not running.

A memo was issued to all operations personnel, "Clarification of Thermal Limits Alarms from POWERPLEX," dated 4/6/94, giving examples of the alarm and PRIME typer outputs and the procedural requirements of DAP 14-14 with respect to Thermal Limit Action Levels.

LER 93-020, Docket 50-237, FDLRC Limit Greater Than 1 Went Unnoticed,

On September 12, 1993, the FDLRC thermal limit was violated during a xenon transient which resulted from an earlier load drop and subsequent recovery. The violation went unnoticed at the time and as a result appropriate actions as specified by the Technical Specifications were not taken. The violation condition existed for a period of nearly two and one half hours during the evening of September 12. The maximum value of the FDLRC thermal limit was exceeded by 0.4%. Discovery of the event did not occur until the following morning during routine review of computer output by the Nuclear Engineers. The primary cause of the unnoticed violation was the failure of the Qualified Nuclear Engineer (QNE) responsible for monitoring the unit to periodically review core conditions during the xenon transient following the load recovery. Corrective actions include a review of the event with the responsible QNE to define expectations, training for other members of the station Nuclear Group on the event.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.	
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

The corrective actions taken in response to this event did not prevent recurrence. The actions address a root cause of human error, but not the true cause of informal control of planned reactivity changes.

The LER also lists as a contributing cause the failure of a newly installed alarm to notify the NSO of a thermal limit violation level being reached (e.g., FLDCR). However, upon further review, it was determined that this was not an actual contributing cause because the QNE involved was not relying on this new undocumented function. The QNE understood it to be his responsibility to monitor the ramp rate to assure no limits were violated, but he did not. The LER will be supplemented to correct this issue. In addition, because of the short duration of the exceeded FLDCR limit, the alarm function would not have notified the NSO of the March 22, 1995, event.

CDE 1-3-92-206, Procedural Discrepancy During DTS 0300-02 (downgraded from Level III),

On December 30, 1992, at approximately 0300, during DTS 300-2, Scram Testing, FDLRC exceeded the TS limit of 1 with Reactor power greater than 25% but less than 40%. The QNE made no mention of this to the SCRE or NSOs on duty. Scram testing was completed by 0355. The reviewer of this event made a recommendation that scram testing be performed between 20-25% power to avoid a future problem. All QNEs received training on expectations for reporting suspected problems with reactor operations to the Shift Supervisor. In addition, a memo was sent the Shift Engineers explaining the occurrence and the operational philosophy.

G. COMPONENT FAILURE DATA:

No component failed in this event.