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March 10, 1993

CWS LTR #93-0020

U.S. Nuclear Regulatory Commission
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Licensee Event Report 92-021-01, Docket 0505249 is being submitted as required by Technical Specification 6.6, NUREG 1022 and 10 CFR 50.73(a)(2)(iv). This supplement updates corrective action status, and corrects typographical errors in Nuclear Tracking System (NTS) code numbers.

for 3-10-93
Charles W. Schroeder
Station Manager
Dresden Station

CWS\slb

Enclosure

cc: A. Bert Davis, Regional Administrator, Region III
NRC Resident Inspector's Office
File/NRC
File/Numerical

170057

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IE22

LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)	Docket Number (2)	Page (3)
Dresden Nuclear Power Station, Unit 3	0 5 0 0 0 2 4 9	1 of 0 14

Title (4) Reactor Scram Due to 3B Condensate/Condensate Booster Pump Motor Failure and Subsequent Events

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 Names	Docket Number(s)
									N/A	0 5 0 0 0
1 0	1 3	9 2	9 2	0 2 1	0 1	0 3	0 1	9 3		0 5 0 0 0

OPERATING MODE (9): N

POWER LEVEL (10): 0 9 7

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

___ 20.402(b)	___ 20.405(c)	X 50.73(a)(2)(iv)	___ 73.71(b)
___ 20.405(a)(1)(i)	___ 50.36(c)(1)	___ 50.73(a)(2)(v)	___ 73.71(c)
___ 20.405(a)(1)(ii)	___ 50.36(c)(2)	___ 50.73(a)(2)(vii)	___ Other (Specify in Abstract below and in Text)
___ 20.405(a)(1)(iii)	___ 50.73(a)(2)(i)	___ 50.73(a)(2)(viii)(A)	
___ 20.405(a)(1)(iv)	___ 50.73(a)(2)(ii)	___ 50.73(a)(2)(viii)(B)	
___ 20.405(a)(1)(v)	___ 50.73(a)(2)(iii)	___ 50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

Name	TELEPHONE NUMBER (AREA CODE)
Ronald Jackson, Technical Staff BOP Group Leader Ext. 2483	8 1 5 9 4 2 - 2 9 2 0

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
X	S J	M 0	G 0 8 0	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

___ Yes (If yes, complete EXPECTED SUBMISSION DATE) X NO

Expected Submission Date (15): Month | Day | Year

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

At approximately 22:49 hours on October 13, 1992, while Unit 3 was operating at 97% thermal power, an automatic Unit 3 Reactor Scram on low Reactor water level (Technical Specification setpoint of eight inches above instrument zero) signal occurred. The 3B Condensate/Condensate Booster pump (C/CBP) failed due to an internal motor fault prior to the scram, precipitating an automatic trip of the running Reactor Feed Pumps on low suction pressure and thus resulting in reduction of reactor water level to the low level scram setpoint.

A comprehensive root cause investigation was immediately initiated for all component performance problems and corrective actions implemented. The root cause of this event was due to an electrical failure of the 3B C/CBP motor. The safety significance of this transient was mitigated by the fact that Reactor water level was maintained well above the automatic emergency core cooling system initiation setpoint at all times, and multiple systems were available for reactor pressure control including the Isolation Condenser, the High Pressure Coolant Injection System and the Main Steam Relief Valves. Previous events involving Condensate/Condensate Booster Pump Motor failures are reported by LER 87-011-0/050249 and LER 90-002-1/050237.

TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor - 2527 MWt rated core thermal power

Nuclear Tracking System (NTS) tracking code numbers are identified in the text as (XXX-XXX-XX-XXXXX)

EVENT IDENTIFICATION:

Reactor Scram Due to 3B Condensate/Condensate Booster Pump Motor Failure and Subsequent Events

A. CONDITIONS PRIOR TO EVENT:

Unit: 3 Event Date: October 13, 1992 Event Time: 2249 Hours

Reactor Mode: N Mode Name: Run Power Level: 97%

Reactor Coolant System (RCS) Pressure: 992 psig

B. DESCRIPTION OF EVENT:

At 22:48:51 hours on October 13, 1992, while Unit 3 was operating at 97% thermal power, a Condensate Trouble Alarm annunciated. Main Control Room (MCR) personnel immediately responded. They reviewed the plant status, including the Condensate/Condensate Booster Pumps (C/CB Pp) [SJ] (at the time there were no trip lights). Approximately two seconds later, at 22:48:53, the running 3A and 3C Reactor Feed Pumps (RFP) [SJ] tripped, apparently on low suction pressure, and the 3B RFP (which was in standby), automatically started. An automatic low reactor water level scram then occurred at 22:49:02. All control rods fully inserted. Primary Containment Group II and Group III Isolation Valve closure occurred as designed at the low reactor water level condition. At 22:49:04 it was noted by the operator that only the Channel "B" Reactor Scram backlit red annunciator alarm was received. The Reactor Mode switch was placed in Shutdown per procedure. Feedwater control shifted from level control to flow control. With the Safety Parameter Display System (SPDS) indicating Reactor Vessel water level at -14 inches, the 3A RFP was restarted by the operator. However, four seconds later at 22:49:42, both the 3A and 3B RFPs tripped on low suction pressure. One second after the trip, the 3B RFP (which was still in standby) automatically restarted, and reactor vessel water level continued to increase.

At 22:50:06 the 345 KV switchyard Output Circuit Breakers (OCB) [FK] 9-10 and 10-11 tripped as designed. The Main Turbine [TA] and the Generator [TB] tripped at 22:50:07, and 4 KV Buses 31 and 33 automatically transferred from the Unit Auxiliary Transformer (TR) [EA] 31 to the Reserve Auxiliary TR 32. A high reactor vessel water level alarm was received at 22:50:18, and at 22:50:29 the 3B RFP tripped. At approximately 22:51 all Intermediate Range Monitors (IRM) [IG] except IRM 17 were inserted into the Core. At 22:56, the Unit 3 control room operator took IRM 15 out of bypass as a result of IRM 17 not driving in. IRM 15 had been previously bypassed due to spiking problems. At 23:00:56, the 3B Feedwater Regulating Valve (FWRV) [SK] actuator trouble alarm was received. A 3B RFP "FLOW ON" alarm was received at 23:02:44 by the operator. At 23:05:59 the reactor protection system Channel "A" was reset. At 23:06:07 a Channel "B" manual half scram was inserted with all-rods-in due to concerns with IRMs 15 and 17. At 23:07 the unit operator noticed indication that some of the 3-302-126 and 3-302-127 scram pilot valves remained open for both the east and west Hydraulic Control Units (HCU) [AA] banks. At 23:08:38 the reactor manual Channel "B" half scram was reset to allow the scram valves to close.

Approximately 60 to 90 seconds later it was verified that all scram valves were closed. At 23:10 a Channel "B" reactor manual half-scram was inserted by the operator. A smoke detector alarmed for the Reactor Water Clean Up (RWCU) [CE] heat exchanger area. Investigation revealed no fire in the area. Contamination was found on the second floor of the Reactor Building (RB) [NG] during a subsequent survey.

The Scram Investigation Committee was assembled in accordance with Dresden Administrative Procedure (DAP) 7-15, Scram/Engineered Safety Feature Action Investigation. Refer to Attachment 1 for a detailed sequence of events during the scram. Also, refer to Attachment 2 for Feedwater events which occurred during the scram. Note that the event times listed throughout this report are approximate, based on computer output data, operator log books, chart recorder traces, etc. The following apparent problems were initially identified and are discussed in this Report:

1. The 3B Condensate/Condensate Booster Pump Motor Failure.

2. The First-Out Alarm on Channel "A".

3. The performance of the Feedwater flow control system, and the 3B Feedwater Regulating Valve sluggish response and lockout alarm.

4. The IRM 15 and 17 problems.

5. The Failure of HCU Scram Valves to close on Scram Reset.

6.. Contamination Event.

C. <u>APPARENT CAUSE OF EVENT:</u>

This report is submitted in accordance with Title 10 of the Code of Federal Regulations Part 50 Section 73 (a) (2) (iv), which states that any event that results in unplanned manual or automatic actuation of any Engineered Safety Feature, including the Reactor Protection System (RPS) [JE] must be reported. As stated previously, the automatic low reactor water level scram was precipitated by failure of the 3B Condensate/Condensate Booster Pump Motor, and subsequent trip of the running RFPs on low suction pressure.

A summary of the root causes for each of the identified concerns is provided below. Also refer to section E of this report for further information.

1. The 3B Condensate/Condensate Booster Pump Motor Failure.

   On October 20, 1992 Dresden received a report from Westinghouse which indicated that the failure was probably caused by dirty conditions of the stator. The air vents were 50% blocked with oil soaked dirt, and the interior surfaces in the air flow path were coated with a light colored paint. A hipot test indicated that the stator insulation failed to ground between the forth and fifth core stack from the connection end.

There have been four previous events involving C/CB Pp motor failures of which two resulted in Reactor Scrams. These events occurred on July 24, 1981, May 12, 1987, January 16, 1990, and May 22, 1992.

The Station implemented the following corrective actions as a result of the 2D C/CB Pp motor failure on January 16, 1990. 1) The Technical Staff established a thermography program for taking exhaust temperature readings once per year of the C/CB Pp motor, 2) The maintenance staff developed a periodic polarization index trending program that is performed on a refueling outage basis.

It has been determined that the thermography trending program was inappropriate since its frequency for data collection was too long. In addition, the thermography program for motor exhaust temperature does not provide accurate indication of motor winding temperatures due to masking by the cooler temperatures from other internal motor components. Also, the 1990 investigation did not determine if the North Turbine Building Ventilation System contributed to the dirty environment for the motors.

During a walkdown on October 19, 1992 of the North Turbine Building Ventilation System, the filter system on both Units were found not functioning. Also one of the two Unit 2 filter media were torn down half way from the filtering unit, probably due to filter runout. A walkdown was conducted of the C/CBP room area and it was found that the ventilation supply and exhaust ducts were excessively dirty. In addition, both rooms had dust/dirt buildup around various components.

The May 22, 1992 event involved an internal fault on the 2A C/CBP motor. The failed motor was shipped to Westinghouse for rebuild and root cause determination. Dresden received the Westinghouse report on June 2, 1992, which indicated that the motor failure was probably caused by the dirty condition of the stator. The report also indicated that the motor winding air vents were approximately 80% blocked by oil soaked dirt.

On October 7, 1992, dust covers were installed by contractors working for Engineering and Construction (ENC) on the inlet vents of all the Unit 3 C/CBP motors to prevent dust and paint contamination of the motor internals while spray painting in the area. On October 9, 1992, an ENC field supervisor contacted the Technical Staff to determine if dust cover installation on the motors was acceptable. The ENC field supervisor did not communicate to the Technical Staff that the dust covers were already installed.

The ENC field supervisor was informed on October 13, 1992 that the dust covers were a temporary system alteration and an engineering evaluation had to be performed. At this time, he informed the Tech Staff that the dust covers were already installed, and he was instructed to have the dust covers removed from the motors and to stop all spray painting. The ENC field supervisor did not receive DAP 7-4 training following the development of the ENC administrative procedure matrix.

The dust cover installation could have been a contributing factor to the 3B C/CB Pp motor failure by reducing the air cooling flow to the motor windings. This caused an increase in temperature and possible thermal breakdown of the motor's stator insulation.

Preventative maintenance activities for the C/CBP motors began on a regular basis in 1987 which included normal motor inspection and in some cases motor cleaning. The 3B C/CBP motor was last cleaned by Electrical Maintenance Personnel on June 21, 1988 per work request D72412. A polarization index on the 3B C/CBP motor was performed in 1991 and the result was in the good range.

Following the failure of the 2A C/CBP motor on May 22, 1992, the station committed to ensuring that all 8 C/CBP motors would be overhauled by December 31, 1992. The Electrical Maintenance Department had scheduled to send the 3B C/CBP motor to Westinghouse for overhaul during the month of October following the replacement of the 3A C/CBP motor. At the time of this event, the 3A C/CBP motor was in the process of being replaced. Based upon the history review, it appears that the 2B and 2C C/CBP motors are the only two motors remaining to be overhauled.

2. The First-Out Alarm on Channel "A".

It was determined that the windows on Panel 903-5 responded in the correct manner. Only one window (the "first-hit" window) on the 903-5 should backlight red. This was the Channel "B" Reactor Scram window, D-15. This concurs with the Sequencial Event Recorder printout. Thus, the Channel "A" Reactor Scram window, D-10, should not have backlit red.

3. The performance of the Feedwater flow control system, and the 3B Feedwater Regulating Valve sluggish response and lockout alarm.

After additional testing and review of data, it was determined that the control network reacted correctly based upon the inputs it received during the event. However, three problems were identified. While in the flow control logic mode, the system reacted to reduce pump flow, however, did not succeed in reducing flow to 5.6 Mlb/hr to ensure pump cavitation would not occur. It was determined that the network response to small error signals (while in the flow control logic mode) was too slow. However, any adjustments to the response time would be difficult to make since it would also affect the response time to large error signals (which was working properly). Furthermore, testing of a new response time would be difficult since it requires flow changes while in a pump flow control condition, with the Unit in operation.

The second problem identified was the failure of the computer network to transfer from the 1 pump flow control setpoint to the 2 pump setpoint after a second pump was started. The apparent cause of this problem was determined to be a dirty contact on relay 3-601-111, located on panel 903-18. The dry contact from the relay is used to determine which setpoint the network uses for pump flow control (ie. contact open for 1 pump operation, contact closed for two pump operation). Although the relay properly energized when the second pump was started, oxidation of the contact surfaces prevented continuity, and therefore the network did not transfer to the 2 pump flow control setpoint.

The third problem identified was the existence of an erroneous voltage signal which was observed as a large RFP flow "spike" as a RFP receives a 'start' signal, and was observed to last for only 2 to 3 seconds. This flow spike occurs before the discharge valve opens so the flow could not be real. Testing on the FW flow transmitters found that as the Honeywell Smart transmitters powered up, a corresponding spike in output occurred. These transmitters were replaced with Rosemount 1152's. The Rosemounts do not show this spike when powering up.

The apparent cause of the sluggish response for the 3B regulating valve was determined to be a faulty Linear Variable Difference Transducer (LVDT), located on the valve actuator. The root cause was a loose plunger assembly which allowed for an amount of 'play' in the actuator response, creating the sluggish operation observed.

4. The IRM 15 and 17 problems.

Investigation by the Instrument Maintenance Department (IMD) into spurious spiking of IRM 15 (WR 13213) showed that there were some bad soldered wires on a circuit board located in the Amp and Attenuator Module. There was a long lead on a wire which penetrated through a circuit board in the Amp and Attenuator Module which may have been in contact with the Mylar Insulation Board located behind the amp/attenuator board. Evidence of rubbing on the insulation board substantiated contact between the wire and the board. It is believed that this contact was the primary cause of the failure of the solder joint.

Investigation into the drive motor failure of IRM 17 was performed by the Electrical Maintenance Department (EMD) under WR 13241. Initially, a blown fuse was found. This fuse was replaced and the drive was tested, resulting in another blown fuse. Further investigation found a wire had loosened from an Amphenol connector located in the drive module. The loose wire acted as a ground when water leaking from the Isolation Condenser manual globe drain valve 3-1304-500 valve located above the IRM motor module came in contact with it, resulting in the motor failure.

5. The Failure of HCU Scram Valves to close on Scram Reset.

When resetting a Unit 3 Reactor scram with Channel B Reactor Protection System (RPS) 1/2 scram still tripped, approximately 1/3 of the Hydraulic Control Unit (HCU) Scram Valves (126 and 127) failed to reclose. The General Electric (GE) representative was contacted for guidance. Per GE instructions, the Nuclear Station Operator reset the scram per Dresden General Procedure (DGP) 2-3. All scram valves then closed as expected. Resetting RPS can result in the leakage of instrument air through the Scram Pilot Solenoid Valves (SPSV) 117 and 118. This condition occurs only under a given set of conditions:

a. Full scram has occurred and the CRD air system is depressurized.

b. Reactor RPS Channel "B" 118 SPSV remains de-energized at the time of resetting, but Channel "A" resets and energizes.

Following the reset with the above conditions, the CRD instrument air header pressure rises to approximately 42 psig and then apparently reaches equilibrium with the scram pilot leakage and therefore the scram valves do not close.

The pilot valves require a minimum differenial pressure across the valve to operate. With the 117 SPSV energized and a pressure buildup from zero, there is a back pressure set up in the 118 SPSV which restricts the differential pressure across the 117 valve to less than required. The air supply system does not have the capacity to feed all the valves and overcome this minimum differential pressure situation.

6. Contamination Event.

The root cause of the contamination event following the reactor scram was due to a Reactor Water Cleanup (RWCU) pressure relief valve momentarily lifting. This was confirmed by an increase in Reactor Building Equipment Drain Tank (RBEDT) level and temperature. There is also a sight glass on the relief line to visually confirm flow; however, it is inside the RWCU Heat Exchanger room and was not used. The RWCU relief valves are hard-piped to the RBEDT via the Reactor Building Equipment Drain System. The pressure spike blew contamination out of the pump baseplate drains on the RWCU Aux Pump and the RWCU Filter Sludge Pump onto the surrounding areas. The ventilation system then spread the contamination to the RWCU room and change area. A contributing factor may have been the length of time from the scram initiation until the SDV vents were closed.

D. SAFETY ANALYSIS OF EVENT:

A safety analysis for each identified concern is provided below.

1. The 3B Condensate/Condensate Booster Pump Motor Failure.

The safety significance of the failure of the 3B C/CB Pp motor is considered to be minimal since the automatic low reactor water level scram, and Primary Containment Group II and Group III isolations occurred as designed, ensuring that sufficient inventory was maintained in the reactor vessel. Multiple Emergency Core Cooling Systems (ECCS) were also available to provide reactor vessel make-up if necessary. No safety system actuations were required.

2. The First-Out Alarm on Channel "A".

As described previously, the Channel "A" Reactor Scram window, D-10, should not have backlit red. Thus, this system operated as designed, and there is no safety significance due to this observation.

3. The performance of the Feedwater flow control system, and the 3B Feedwater Regulating Valve sluggish response and lockout alarm.

The performance of the Feedwater system did not interfere with the initiation and operation of any Primary Containment Isolation capabilities, Emergency Core Cooling Systems (ECCS), or reactor overpressurization systems. The response of the Feedwater system during the event had no impact on the safe shutdown and cooldown of the reactor; therefore, the safety significance was considered minimal.

4. The IRM 15 and 17 problems.

Technical Specifications require that three of the four IRM Instrument Channels per RPS Trip System be available in the Refuel and Startup modes. Loss of operability of more than one IRM in either RPS Trip System requires that RPS channel to be placed in a tripped condition (i.e. half scram). Due to the simultaneous loss of operability of IRM 15 and IRM 17, both of which provide input to RPS, Channel "B" was placed in a tripped condition. This trip was conservative but not required, because all control rods had been fully inserted into the reactor and the reactor mode switch was in Shutdown. For these reasons, the safety significance was minimal.

5. The Failure of HCU Scram Valves to close on Scram Reset.

   Since previously established administrative controls are successful in maintaining primary coolant boundary in a post-scram condition, the safety significance is considered minimal.

6. Contamination Event.

   The purpose of the RWCU relief valves on the RWCU heat exchangers is to vent pressure to the RBEDT. The relief valve performed as designed. Primary containment was never challenged. Therefore this event had minimal safety significance.

E. CORRECTIVE ACTIONS:

A summary of the corrective actions for each identified concern is provided below.

1. The 3B Condensate/Condensate Booster Pump Motor Failure.

   a. The Electrical Maintenance Department (EMD) on October 28, 1992, replaced the 3B C/CB Pp motor with a refurbished motor in accordance with CECo System Standard EM-20030. The failed 3B C/CB Pp motor was sent to Westinghouse where it was disassembled and inspected further in an attempt to determine the root cause of the failure.

   b. In order to determine if other motors may have been damaged by the installation of the dust covers, a sample of polarization indexes (PIs) were taken on selected motors. PIs were taken for the 3A and 3B Control Rod Drive (CRD) pumps, the 3A and 3D Containment Cooling Service Water (CCSW) pumps and the 3C C/CB Pp motors per work requests (WR) D13345, D13332, D13330, D13331, and D13333, respectively. The results were as follows:

3A CRD: 3.79	3A CCSW: 3.48	3C C/CB: 3.67
3B CRD: 4.73	3D CCSW: 3.89	

   All results were found in the good and excellent ranges per Dresden Electrical Procedure (DEP) 040-27, Megger and Bridge Testing and Acceptance Criteria. The PI ranges are:

PI	Insulation Condition
Less than 1.0	Dangerous
1.0 to 2.0	Questionable
2.0 to 4.0	Good
Above than 4.0	Excellent

   c. Since dust covers were also installed on the Unit 2 CRD, CCSW, and C/CBP motors, the Electrical Maintenance Department will take PI measurements on the Unit 2 motors (249-180-92-13201S1) during D2R13 refuel outage, by April 30, 1993. These readings will be taken on the 2B and 2C C/CBP motors first, since they have not been recently cleaned or overhauled.

d. The rollamatic drives for the Unit 2 and Unit 3 north Turbine Building ventilation system were evaluated (249-180-92-013202AS1 and 249-180-92-013202BS1) and were found to be working properly. No repairs were necessary, and these action items were closed.

The filters on the Unit 2 north Turbine Building ventilation system were replaced on November 11, 1992 per WR# D14039, and this action item (249-180-92-13203S1) was also closed.

e. Temperature monitors will be installed on the C/CBP motors for routine local monitoring of winding temperatures. The RTD temperature monitors will be installed on Unit 2 during D2R13 refuel outage (249-180-92-13204AS1) and by June 28, 1993 on Unit 3 (249-180-92-13204BS1). The C/CBP motor winding temperatures will be monitored weekly under the General Surveillance (GSRV) program (249-180-13204CS1).

f. ENC revised their administrative procedure matrix to include DAP 7-4. This ensures that all necessary ENC personnel receive required training on temporary alterations. This was completed on December 5, 1992 (249-180-92-13205S1).

g. The Maintenance Staff has reviewed the recommendations of the Condensate/Condensate Booster Pump Motor Committee. During D2R13, a new bearing/seal configuration will be installed on all four C/CB motors (249-180-92-13206S1). Motor temperatures will be monitored as identified above (249-180-92-13204AS1, 249-180-92-13204BS1, and 249-180-92-13204CS1). No other changes to current preventative maintenance procedures were recommended.

2. The First-Out Alarm on Channel "A".

The Channel "A" Reactor Scram window was tested using all four inputs to window D-10. The window was found to operate properly for all four inputs.

3. The performance of the Feedwater flow control system, and the 3B Feedwater Regulating Valve sluggish response and lockout alarm.

a. To improve the response time of the network to small error signals, the 5.6 Mlb/hr flow setpoint for pump runout will be lowered to 4.9 Mlb/hr. The current 5.6 Mlb/hr setpoint corresponds to approximately 115% of rated pump flow. By lowering the setpoint to 4.9 Mlb/hr (approximately 100% rated flow), the network would transfer to pump flow control logic at 5.6 Mlb/hr then limit flow to 4.9 Mlb/hr, thus reacting to a larger initial error signal therefore improving system response time.

This will be completed during D2R14 for Unit 2 (249-180-92-13207AS1), and during D3R13 for Unit 3 (249-180-92-13207BS1).

b. As immediate corrective action for relay 3-601-111, the affected contact surfaces were cleaned and the circuit tested to insure that the network would transfer to the two pump runout setpoint. As long term corrective action, the Feedwater system engineer will determine which relays (including relay 3-601-111) provide a dry contact path for milli-amp signals from the control network, and submit a modification request to the Technical Review Board (TRB) to have these relays replaced with solid state relays, or enclosed relays with wetted contacts. The modification request will be submitted by April 30, 1993 (249-180-92-13208S1).

As corrective action for the 3B regulating valve actuator LVDT, the loose plunger assembly was tightened using Loc-Tite and the LVDT was tested to verify proper operation. Corrective actions for the spurious lockout alarms consisted of replacement of the annunciator card and monitoring for future occurrences.

4. The IRM 15 and 17 problems.

The wires located on the Amp attenuator module of IRM 15 were resoldered and IRM 15 was removed from the Degraded Equipment Log (DEL) at 2350 on October 15, 1992. Normal operation of IRM 15 was observed following its return to service.

The loose wire in the drive module of IRM 17 was repaired and the drive motor was replaced. Subsequent testing of the IRM 17 drive verified that it cycled properly, and IRM 17 was removed from the DEL at 1730 on October 16, 1992. In addition, leaking valve 3-1304-500 was repaired under WR 13271. No further corrective actions are necessary.

5. The Failure of HCU Scram Valves to close on Scram Reset.

Initial corrective actions were to reset both Channel "A" and "B" RPS and then reset the scram signal. In order to prevent the potential release of reactor steam to the reactor building through the Scram Discharge Volume (SDV) Vent and Drain Valves when resetting a scram, the current revision of DGP 2-3 ensures that the vents and drains remain closed until all scram valves are verified closed.

6. Contamination Event.

An investigation was conducted to determine the source of the contamination. Previous RWCU area surveys were compared to area surveys after the event. These surveys confirmed that the auxiliary pump baseplate drains were the source of the contamination. The auxiliary pump baseplate drain area was then decontaminated by Station personnel.

F. PREVIOUS OCCURRENCES:

A Summary of recent events related to condensate/condensate booster pump motor issues is provided below.

LER/Docket Numbers	Title
90-002-1/050237	Reactor Scram following Condensate/Condensate Booster Pump Failure and Subsequent loss of Offsite Power. The 2D C/CB Pp failed and the 2B C/CB Pp auto started but was not able to restore RFP Suction pressure fast enough to prevent a trip of the RFPs. This led to a loss of offsite power incident following other equipment failures. All other C/CB Pps were cleaned although winding cleanliness was not determined to be a primary contributing factor. The root cause was determined to be a poor winding configuration utilized by a vendor performing a previous motor rewind. Reactor Scram Due to Loss of Normal Feedwater as Result of 3C C/CB Pp Motor Failure.
87-011-0/050249	The 3C C/CB Pp tripped on instantaneous overcurrent and the 3D C/CB Pp auto started but was not able to restore RFP suction header pressure fast enough to prevent a trip of the RFPs.

F. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number	Mfg. Part Number
General Electric	Motor	5K8311	V-4000-RPM-1785-A-227

An industry-wide NPRDS data base search revealed 9 failures with this type of motor. Four failures were due to an internal short due to degraded insulation, and one was attributed to dirt/ moisture accumulation. Four failures were caused by oil leaks. One failure was due to an overheated bearing.

ATTACHMENT 1
SEQUENCE OF EVENTS

On October 13, 1992, Unit 3 was at 97% rated core thermal power. The 3A and 3C RFPs were operting with the 3B RFP selected as standby. The 3B, 3C, and 3D Condensate/Condensate Booster (C/B) pumps were operating, and the 3A C/B pump was out-of-service for maintenance.

Time	Description
22:48:51	Condensate Demin. Trouble Alarm
22:48:53	3A and 3C RFPs trip, apparently on low suction pressure, and 3B RFP auto starts
22:49:02	Automatic reactor scram on low reactor water level
22:49:03	Group II and III containment isolation on low reactor water level
22:49:04	Manual reactor scram
22:49:38	3A RFP restarted by operator
22:49:42	3A and 3B RFPs trip on low suction pressure
22:49:43	3B RFP auto starts on clearing of low suction pressure trip Water level increasing
22:50:06	345 kV switchyard Output Circuit Breakers (OCBs) 9-10 and 10-11 trip
22:50:07	Generator and turbine trip. 4kV buses 31 and 33 auto transfer from Unit Aux Transformer 31 to Reserve Aux Transformer 32
22:50:18	High reactor water level alarm
22:50:29	3B RFP trips on high reactor water level
22:51 (approx)	IRM 17 drive motor fails to insert IRM 17 into core. Other IRM's inserted by operator.
22:56	IRM 15 taken out of bypass by operator. IRM 15 High trips begin, apparently due to spiking.
23:00:56 (approx)	3B Feedwater Reg. Valve (FWRV) Trouble alarm

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Time	Description
23:01 (approx)	Operator verifies Scram Discharge Volume vents and drains are closed
23:02:44	3B RFP On
23:05:59	Reactor scram reset by operator
23:06:07	Channel B manual scram tripped by operator due to concerns with IRM 15 and IRM 17
23:07 (approx)	Operator notices indication (red indicator lights on full-core display) that some of the 126 & 127 scram valves remain open for both the east and west Hydraulic Control Unit (HCU) banks.
23:08:38	B Channel reactor manual scram reset by operator to allow scram valves to close
23:09 (approx)	Operator verifies that all scram valves indicate closed.
23:10 (approx)	B Channel reactor manual scram tripped by operator. XL-3 smoke detector alarm for RWCU Heat exchanger area. Alarm acknowledged and operator sent to investigate. Operator finds no indication of fire in area (2nd floor of Reactor Building). Contamination is found on 2nd floor of Reactor Building during a subsequent survey.
23:12 (approx)	Operator opens vents and drains for Scram Discharge Volume
23:21	East and West Scram Discharge Volume High Level Scram Reset.

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ATTACHMENT 2

During the transient, the following feedwater events occurred:

1. 3A and 3C reactor feed pumps trip on low suction header pressure
2. 3B reactor feed pump (in standby) auto starts with low suction header pressure
3. Header pressure recovers and 3B reactor feed pump reaches flow > 6 M lbs/hr
4. Bailey network transfers to pump runout logic and closes reg valves to limit flow to 5.6 M lbs/hr, however response is slow and 3B flow is still above 6M lbs/hr 30 seconds later.
5. 3A reactor feed pump is manually started, at which time a large close demand signal is sent to both reg. valves from the Bailey network.
6. Both reg. valves respond properly to the demand signal and begin closing.
7. Suction header pressure is too low for 2 pump operation subsequently 3A and 3B reactor feed pumps trip at which time, a large open demand signal is sent to reg valves from Bailey network.
8. One second after trip, the 3B reactor feed pump auto-starts with sufficient header pressure for 1 pump operation.
9. 3B reactor feed pump reaches flow > 6M lbs/hr.
10. Reg. valves again respond too slow to limit flow to 5.6 M lb/hr. for another 30 seconds during which time reactor vessel level increases past + 20 inches.
11. Bailey network transfers from pump runout logic to level control logic.
12. 3B reactor feed pump is manually shut off (both reg. valves closed prior to shut off).