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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Dresden Nuclear Power Station, Unit 3
Facility Operating License No. DPR-25
NRC Docket No. 50-249

Subject: Licensee Event Report 2000-006-01, "Unanalyzed Condition Resulting From Inadequate Design Control for Bus 34 Undervoltage Relay"

Reference: Letter from Preston Swafford (Exelon) to U. S. Nuclear Regulatory Commission, "Licensee Event Report 2000-006-00, "Unanalyzed Condition Resulting From Inadequate Design Control for Bus 34 Undervoltage Relay" dated October 27, 2000.

Enclosed is a supplement to Licensee Event Report 2000-006, " Unanalyzed Condition Resulting From Inadequate Design Control for Bus 34 Undervoltage Relay," for the Dresden Nuclear Power Station (DNPS). The purpose for this revision is to clarify the corrective actions that were taken at the time of this event and to clarify the corrective action to revise Corporate Procedure MA-AA-OA-2-00011. This report supersedes the previous report submitted in the above Reference.

The following actions were taken:

A walkdown was performed to verify all safety related 4KV relay tap settings. One additional relay setting was found in Bus 24 as a result of the walkdown.

The previous commitment to revise Corporate Procedure MA-AA-OA-2-00011, "Calibration of Protective Relays," was changed and was replaced by procedures that identify specific relay types (i.e. Power Protective relays, Overcurrent Protective Relays, etc). These procedures provide specific instructions addressing relays found with tap settings other than 2.0 amps, and require formal relay setting order revisions and design engineering review to perform any change to these relay coil tap settings.

IE22

If you have any questions, please contact Dale Ambler, Regulatory Assurance Manager at (815) 416-2800.

Respectfully,

Preston Swafford
Site Vice President
Dresden Nuclear Power Station

Enclosure

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Dresden Nuclear Power Station

NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED BY OMB NO. 3150-0104
EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the information and Records Management Branch (t-6 f33), 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. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Dresden Nuclear Power Station, Unit 3	05000249	1 of 4

TITLE (4)
Unanalyzed Condition Resulting From Inadequate Design Control for Bus 34 Undervoltage Relay

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	DOCKET NUMBER
									N/A	N/A
09	27	2000	2000	006	01	10	22	2001	FACILITY NAME: N/A	DOCKET NUMBER: N/A

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more) (11)							
POWER LEVEL (10)	0		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
			20.2203(a)(1)		20.2203(a)(3)(i)	X	50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i))		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Timothy P. Heisterman, Regulatory Assurance	(815) 416-2815

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	EB	27	G080	No					

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 September 27, 2000, at 1845 hours, with Unit 3 shutdown for Refuel Outage D3R16, during the performance of Division II (Div II) Undervoltage (UV) testing, the Overvoltage (OV) coil in relay 127-2-B34 failed. The failure of this relay caused the test to be suspended until replacement of the failed relay was completed. The new relay was installed and it subsequently failed during testing. The cause of the failure was an improper overvoltage coil tap setting. The root cause of this event was ineffective design configuration control for the relays. Contributing to this was inadequate questioning attitude of the System Engineer and System Protection, Operation Analysis Department, as a result of the historical method of control for relay settings. The corrective action for this event is to include relay configuration in a station approved design control process. Based on a risk assessment, the safety significance of this event is minimal.

PLANT AND SYSTEM IDENTIFICATION:

General Electric – Boiling Water Reactor – 2527 MWt rated core thermal power
Energy Industry Identification System (EIIS) Codes are identified in the text as [XX] and are obtained from IEEE Standard 805-1984, IEEE Recommended Practice for System Identification in Nuclear Power Plants and Related Facilities.

EVENT IDENTIFICATION:

Unanalyzed Condition Resulting From Inadequate Design Control for Bus 34 Undervoltage Relay

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: 3 Event Date: 09-27-2000 Event Time: 1845
Reactor Mode: 5 Mode Name: Refuel Power Level: 0
Reactor Coolant System Pressure: 0 psig

B. DESCRIPTION OF EVENT:

This LER is being submitted pursuant to 10 CFR 50.73 (a)(2)(ii)(B), which requires the reporting of any operation or condition that was outside of the design basis of the plant.

On September 27, 2000, at 1845 hours, with Unit 3 shutdown for Refuel Outage D3R16, during the performance of Division II (Div II) Undervoltage (UV) testing on the 4160 VAC switchgear [EB], the Overvoltage (OV) coil in relay 127-2-B34 failed. This relay allows Bus 34-1 to be re-energized following the removal of an undervoltage condition which caused the bus to shed loads. A timeline leading up to the failure was developed revealing the following information:

On February 10, 1999, during refueling outage 15 (D3R15), arcing was observed on the Overvoltage (OV) contact of relay 127-2-B34 during the performance of Div II UV testing. Upon discovery, a work request was initiated to clean and burnish the relay contacts.

During completion of this work request, both the UV and OV portions were cleaned and calibrated per the vendor instructions. However, one of the problems observed with the arcing was that the target flags would not consistently drop. The maintenance performed demonstrated that the targets would drop if sufficient load existed. Maintenance requested verification that the tap setting of 2.0 amps was correct.

The configuration control method for these relays was a Relay Setting Order (RSO). The RSO contains general design information and setpoints for the relays. This tap setting (e.g., 2.0 amps or 0.2 amps) was not specified on the RSO. Since the RSO did not specify the tap setting, the System Engineer contacted System Protection to discuss the settings of the tap. System Protection agreed that changing the tap setting to 0.2 amps would result in a greater likelihood the target would drop, correcting one of the observed problems. Based on the discussion and the fact that the tap setting was not contained in the RSO, on the schematic, or in the Electronic Work Control System (EWCS), the tap setting was changed to the 0.2 amp setting.

During refueling outage 16 (D3R16), Bus 34 and Bus 34-1 were de-energized for outage bus surveillances. During the surveillance, Bus 34 was re-energized and the load shed logic reset. Bus 34-1 was then re-energized with normal indications. Busses 34 and 34-1 were then de-energized for the load shed portion of the UV logic system functional test (LSFT).

When Bus 34 was re-energized the load shed relay logic did not reset. At the time, the operating staff believed the bus had been re-energized. The Sequence of Events Recorder (SER) printout does not include indication that the

low voltage alarm for Bus 34 was clear. There is indication that several alarms did clear as expected, so the operating staff had indication that power had been restored to the Bus 34.

Subsequently, another attempt to re-energize Bus 34-1 from Bus 34 was made. The control switch was positioned and the Bus 34-1 low voltage alarm was cleared, as well as several other alarms as expected. When the control switch was released, the feed breakers between Bus 34 and Bus 34-1 tripped open immediately. A second attempt to close the breakers was made with the same result. The Div II UV LSFT was stopped and troubleshooting started.

The Electrical Maintenance Department (EMD) Component Specialist reviewed the schematics and determined that the potential problem was confined to either the Bus 34 or Bus 34-1 under voltage relay circuits. Indications of this were that the operator stationed at Bus 34 during the test noted some smoke in the vicinity of the UV relays, a review of the SER printout revealed that the Bus 34 low voltage alarm did not clear until 13 minutes after the attempt to re-energize Bus 34-1, and this alarm should have cleared after the operators cleared the Bus 34-1 low voltage alarm. Troubleshooting identified the 127-2-B34 relay (the over voltage coil) had failed. The relay was replaced and both tap settings were set to match the 'as found' tap settings.

On September 25, an attempt to re-power Bus 34-1 from Bus 34 was made. Once again, when the control switch was released, the feed breakers tripped open immediately. Approximately 6 minutes later, the U2 Battery 125 vdc ground alarm (U3 Div II control power) came in and the operator stationed near the bus reported smoke from the vicinity of the 127-2-B34 relay. Testing was secured. Troubleshooting indicated the same coil had failed. EMD personnel then inspected the undervoltage relays on Busses 33 and 34 to verify the OV coil tap setting for those relays. During this inspection, it was determined that the OV coil taps were on the 2.0 amp setting for these other relays.

Based on this discovery, a second new relay was installed with the OV coil tap on the 2.0 A setting. Testing was resumed and subsequently completed.

The relays in question are type IAV69A. The relay contains an under voltage and an over voltage coil. When the under voltage condition is sensed the UV contacts close, energizing the 127-B34-X1, -X2 and –X3 relays. The 127-B34-X series relays provide the actual load shed functions. In addition, the 127-B34–X1 relay has one set of contacts that seal in the load shed relays. These relays are GE HFA type relays. They have a nominal coil resistance of approximately 2000 ohms and a nominal pick up voltage of 50 percent to 60 percent of rated coil voltage (between 57 vdc and 75 vdc). The drop out voltage is not specified. A test run on three HFA relays by Operation Analysis Department (OAD) indicated that the relay would drop out between 7 and 12 vdc.

When the under voltage condition clears, the 127-2-B34 picks up (through the OV contact). The resistance of the 127-2-B34 OV target/seal-in coil is applied across the coil of the 127-B34-X1 relay. This resistance is 0.13 ohms with the tap setting in the 2.0 A position, which is the correct configuration. This results in approximately a 0.2 vdc drop across the 127-B34–X1 relay coil, causing it to dropout, breaking the seal-in and resetting the load shed relays (i.e., de-energizing the relays).

The resistance of the 127-2-B34 OV coil with the tap setting at 0.2 A (i.e., the as found tap setting) is 7 ohms. This results in approximately a 9.5 vdc drop across the 127-B34–X1 relay coil. This may or may not result in the dropout of the 127-B34–X1 relay.

If the 127-B34-X1 relay does not dropout, the seal-in contact does not open and the load shed relays do not reset (de-energize). This can result in a current flow of approximately 1.5 amps. The majority of this current would flow through the OV coil. The current rating for the OV coil with the tap setting at 0.2 A is 0.3 amps for 30 sec and 0.2 amps continuous. Applying this much over current to the coil would result in severe overheating and ultimately coil failure.

C. CAUSE OF EVENT:

The root cause of this event was determined to be the failure to provide adequate design controls on the relay tap settings for protective relays controlled by RSOs (NRC Cause Code B). As a result, the relay tap setting was improperly changed. A contributing factor in this event was determined to be a lack of a questioning attitude by personnel involved in the relay tap setting change that was made during D3R15 (NRC Cause Code A). Immediate corrective actions were performed which included a walkdown of all the safety related 4kV-relay tap settings. One additional relay was found on Bus 24. This relay, although not the same function as the relay for Bus 34, was found with a more conservative tap setting of 2.0 instead of 0.2. An operability determination was performed and determined that the relay would have performed its intended function with this tap setting.

D. SAFETY ANALYSIS

A risk assessment was performed assuming the UV relay failure had occurred. The change in core damage probability for this event was shown to be 4.2E-7 per reactor year. Since this is less that the 1.0E-6 criteria established in the NEI PSA Applications Guideline, the event would be classified as not risk significant. In addition, sufficient alarms and indications of this condition were available to diagnose the failure. Additionally, the relay logic can be bypassed locally to allow re-energizing Bus 34 from either the Station Blackout Diesel Generators or Bus 34-1.

The improper tap setting only affected Division II. Division I remained unaffected.

Based upon the above, the safety significance of this event is has been determined to be minimal.

E. CORRECTIVE ACTIONS:

The Operation Analysis Department briefed all technicians and engineers on the issues of inadequate RSOs and process, with regards to the coil tap setting of relays. (Complete)

A walkdown was performed to verify all safety related 4KV relay tap settings. One additional relay setting was found in Bus 24 as a result of the walkdown. (Complete)

Corporate Procedure MA-AA-OA-2-00011, "Calibration of Protective Relays," was replaced by procedures that identify specific relay types (i.e. Power Protective relays, Overcurrent Protective Relays, etc). These procedures provide specific instructions addressing relays found with tap settings other than 2.0 amps, and require formal relay setting order revisions and design engineering review to perform any change to these relay coil tap settings. (Complete)

F. PREVIOUS OCCURRENCES:

None

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number	Mfg. Part Number
General Electric Co.	Undervoltage Relay	IAV69A	N/A