NRC FORM 366 (7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: I A D A C 1 (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

Line	Field	Value
01	Licensee Code (2)	IADAC1
01	License Number (3)	00-00000-00
01	License Type (4)	41111
01	CAT (5)	
01 CON'T	Report Source (6)	L
01	Docket Number (7)	05000331
01	Event Date (8)	090683
01	Report Date (9)	091683

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

During normal operation, while running APRM scram instrument functional tests, it was found that relay C71A-K12E would not drop out when de-energized by tripping APRM-E. The APRM-E was conservatively declared inoperable and IAW T.S. 3.1.A RPS-A was manually tripped (half scram). This failure would not prevent reactor trip since redundant logic for each RPS is available. Previous similar occurrence RO 83-26.

System Code (11)	Cause Code (12)	Cause Subcode (13)	Component Code (14)	Comp. Subcode (15)	Valve Subcode (16)
IA	E	X	RELAYX	A	Z

LER/RO REPORT NUMBER (17)

Event Year		Sequential Report No.		Occurrence Code	Report Type		Revision No.
83	—	034	/	03	L	—	0

Action Taken (18)	Future Action (19)	Effect on Plant (20)	Shutdown Method (21)	Hours (22)	Attachment Submitted (23)	NPRD-4 Form Sub. (24)	Prime Comp. Supplier (25)	Component Manufacturer (26)
C	X	Z	Z	0000	Y	N	N	G080

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

Failed relay was replaced and channel tested satisfactory on 9/7. RPS-A half scram reset within 24 hours. The GE type HFA relay had failed from coil discharging material that stuck the armature closed. Daily visual checks by operators for deterioration initiated. All HFA's to be replaced. See attachment for additional corrective action.

Facility Status (28)	% Power (29)	Other Status (30)	Method of Discovery (31)	Discovery Description (32)
E	094	NA	B	Instrument Surveillance Test

Activity Released (33)	Content of Release (34)	Amount of Activity (35)	Location of Release (36)
Z	Z	N/A	N/A

PERSONNEL EXPOSURES

Number (37)	Type (38)	Description (39)
000	Z	N/A

PERSONNEL INJURIES

Number (40)	Description (41)
000	N/A

LOSS OF OR DAMAGE TO FACILITY (43)

Type (42)	Description
Z	N/A

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PUBLICITY

Issued (44)	Description (45)
N	N/A

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NRC USE ONLY

NAME OF PREPARER W. J. Miller

PHONE: (319) 851-7238

DUANE ARNOLD ENERGY CENTER

September 16, 1983
DAEC-83-731

Iowa Electric Light and Power Company

Licensee Event Report - Supplemental Data

Docket No. 050-0331

Licensee Event Report Date: 9-16-83

Reportable Occurrence No: 83-034

Description to Event

On September 6, 1983, while conducting routine weekly functional surveillance on the reactor protection system, it was observed that the A_1 logic of the RPS "A" channel did not trip when inserting a high flux trip signal in the APRM E logic. Investigation revealed that an HFA relay had failed to change state when de-energized. As discussed below, APRM E logic also provides a signal to the A_2 logic of RPS channel "A", hence an actual high flux in APRM E would have initiated RPS channel "A" half scram. In addition, APRM A and C would also have performed their function of providing the RPS "A" half scram by tripping the A_1, and A_2 logic respectively.

Cause of Event

The cause of the relay failure is slow deterioration and overheating of the relay coil which results in the coil seeping varnish. The varnish flows and then solidifies between the coil core pole and the relay armature. When solidified, this varnish adheres to the armature and prevents moving from the energized position to the deenergized position when power is removed from the coil.

Corrective Action

The following corrective and preventative actions have been initiated or taken to ensure that there continues to be no significant adverse safety inpact on plant.

1) Upon detection of the failure, the RPS "A" channel was tripped and the HFA relay was promptly replaced.

   APRM E supplies a high flux trip signal to both the A_1 and A_2 logic in the RPS "A" channel. As designed, either A_1 or A_2 will initiate the channel "A" half scram. This relay failure disabled the APRM E, A_1 logic. An actual APRM E high flux signal would still trigger the A_2 logic and give the RPS channel "A" half scram as would APRM A which would provide an A_1 trip and APRM C which would initiate an A_2 trip. However, for conservatism the RPS channel "A" half scram was tripped during the replacement of the failed relay.

Licensee Event Report Date: 9-16-83

Reportable Occurrence No: 83-034 (Cont.)

2) The failure mechanism is understood and detectable by visual and sensory (odor) means. The relay face plate is warm to touch, varnish seeps from coils and the clean copper color of the coil begins to be obscured. Removing the relay face on deteriorating relays also allows the distinct odor to be detected.

3) Our programs initiated in 1981 to replace all HFA's in response to GE recommendations is scheduled to be completed during the Fall, 1984 refueling outage. This program is being expedited as discussed further below.

4) In light of two recent failures (RO 83-026, 83-034) visual inspection has been performed on all normally energized HFA relays in the RPS and PCIS systems (other safety related HFA relays at DAEC are normally deenergized and/or DC powered which are not subject to this failure mechanism.) This resulted in two relays being identified for further testing on 9/9/83. One showed delayed opening characteristics (approximately 5 seconds) and the second normal response. Both were replaced on 9/9/83. Completed visual inspection on 9/12/83 identified 2 more (one in RPS and one in PCIS) with preliminary indication of possible degradation starting. Special testing has demonstrated these to be fully operable. However, these relays are scheduled for replacement by September 20. Sensory (odor) checks are being performed on all relays initially, and on suspect relays identified pursuant to future visual inspections.

5) We are continuing to scope additional technical means to identify onset of degradation in advance of visual degradation. Discussions are continuing with GE on the matter.

6) Visual inspections are being conducted daily by operations personnel on all normally AC energized HFA relays in the RPS and PCIS. Degradation detected in relays will be evaluated on a case by case basis.

7) Expediting of the engineering package, procurement, receipt inspection and post installation testing procedures for normally energized HFA relays in the RPS and PCIS systems is in progress. We estimate that full replacement of energized HFA relays in the RPS and PCIS systems will require approximately 2 weeks plant outage time. We anticipate a scheduled outage commencing within the next 6 weeks. This outage will begin when the MSIV repair and HFA replacment can commence.

8) Weekly, monthly and other scheduled functional testing is being performed on safety related systems which contain HFA relays.

DMB

Iowa Electric Light and Power Company
September 16, 1983
DAEC-83-731

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

Subject: Duane Arnold Energy Center
Docket No. 50-331
Op. License DPR-49
Licensee Event Report No. 83-34
(30-day)

Dear Mr. Keppler:

The purpose of this letter is to inform you of our recent operating failures of the GE HFA relays and the preventative and corrective actions we have implemented to resolve our problems. Although these failures did not compromise plant safety by virtue of the multiple levels of redundancy in the design of protective systems, we have initiated these measures to ensure that the design and licensing basis of DAEC remains uncompromised.

As detailed in the attached LER and LER supplemental data, our corrective and preventative actions initiated include the following.

1) Replacement of all normally energized HFA relays in the RPS and PCIS systems is being accelerated. We anticipate a scheduled outage commencing within the next six weeks to accomplish this HFA replacement and repair to a MSIV. However, in the event an unscheduled outage of sufficient duration prior to MSIV repair occurs, these HFAs will be replaced at that time.

2) All other HFA relays will be replaced during the next refueling outage currently scheduled for the fall, 1984. These remaining, normally de-energized relays have not experienced the failure mechanism we are experiencing with normally energized relays. However, a visual inspection of normally de-energized safety related relays has also been initiated and will be completed by September 20. If relay failures of the type experienced with the energized relays are detected, the NRC will be notified and additional surveillance will be instituted.

3) Daily visual inspection has been initiated for normally energized AC HFA RPS and PCIS relays. This inspection is governed by procedure which specifies acceptance criteria and documents inspection results.

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4) Discussions are continuing with GE to identify other means of predicting relay failure. Although no mechanism has yet been identified for in place testing, these technical discussions are continuing.

5) We will continue to keep the NRC promptly informed (within 24 hours) of all HFA relay failures.

6) We will continue to evaluate, investigate and document the failure mode for the HFA relays. Failure analysis reports will be prepared and made available for NRC review.

We believe that these positive actions we have initiated to detect and prevent relay failures prior to their failure fully protects the health and safety of the public. The failures being experienced are random failures limited to HFA relays that are normally energized with AC power. As discussed further in the LER attachment, none of the failures experienced have had a detrimental effect on safety due to the multiple levels of redundancy in the Reactor Protection System and Primary Containment Isolation System. Further, in all instances of failures, protective actions would have been initiated and completed when challenged from the primary sensed parameter. Hence, the additional protection and redundancy reflected in accident analysis from assuming the second parameter initiates protective functions is also intact.

We conclude, therefore, on the basis of the redundancy in protective systems, the random nature and frequency of failures, the routine and augmented surveillance we have instituted to detect degradation prior to failure and the near term replacement plans that continued operation is justified and is not inimical to the health and safety of the public.

In accordance with Appendix A to Operating License DPR-49, Technical Specifications, Section 6.11.2.b(1), and Bases for Duane Arnold Energy Center and Regulatory Guide 10.1, please find attached a copy of the subject Licensee Event Report.

Very truly yours,

Daniel L. Mineck
Plant Superintendent - Nuclear
Duane Arnold Energy Center

DLM/WJM/pc

Attachments: LER 83-034
LER 83-034 Supplemental Data

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

NRC Resident Inspector - DAEC

File A-118a