PRECURSOR DESCRIPTION SHEET

LER No.: 331/87-009
Event Description: Emergency power system unavailability due to incorrectly set overcurrent relays
Date of Event: 5/27/87
Plant: Duane Arnold

EVENT DESCRIPTION

Sequence

During the performance of a simulated actuation test for a loss-of-coolant accident coincident with a loss of offsite power, the B emergency diesel generator tripped upon loading the core spray pump. The generator tripped because of an incorrect set point on a newly installed phase differential overcurrent relay. The relay was left at its most sensitive set point following construction acceptance testing. The root cause of the generator trip was an inadequate construction acceptance procedure for the generator modification. An inspection of the A diesel generator noted that its equivalent relay was also incorrectly set. The A diesel generator had not yet been tested in the simulated actuation.

Corrective Action

The construction acceptance procedure was modified such that the set points on both A and B EDG phase differential overcurrent relays were adjusted to design specifications. Further, electrical surge suppression circuitry was installed on the over current relays.

Plant/Event Data

Systems Involved:

Emergency power

Components and Failure Modes Involved:

Emergency diesel generator A – incorrectly set phase differential overcurrent relay
Emergency diesel generator B – tripped on loading

Component Unavailability Duration: 360 h (assumed)
Plant Operating Mode: 5(0% power, refueling)
Discovery Method: Testing
Reactor Age: 14.2 y
Plant Type: BWR

Comments

For analysis purposes, it has been assumed that this event could have occurred at power.

MODELING CONSIDERATIONS AND DECISIONS

Initiators Modeled and Initiator Nonrecovery Estimate

Postulated LOOP	Base case nonrecovery

Branches Impacted and Branch Nonrecovery Estimate

Emergency power	1.0	Assumed not recoverable in the short term

Plant Models Utilized

BWR plant Class C

CONDITIONAL CORE DAMAGE PROBABILITY CALCULATIONS

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UNAVAILABILITY, DURATION= 360

NON-RECOVERABLE INITIATING EVENT PROBABILITIES

LOOP	2.0E-03

SEQUENCE CONDITIONAL PROBABILITY SUMS

End State/Initiator	Probability
CD	
LOOP	3.3E-04
Total	3.3E-04
CV	
LOOP	(1.1E-08)
Total	(1.1E-08)
ATWS	
LOOP	6.7E-07
Total	6.7E-07

SEQUENCE CONDITIONAL PROBABILITIES (PROBABILITY ORDER)

	Sequence	End State	Prob	N Rec**
274	loop EMERG.POWER -scram ep.rec	CD	3.3E-04	5.4E-02
841	loop EMERG.POWER scram	ATWS	6.8E-07	3.2E-01

** non-recovery credit for edited case

SEQUENCE CONDITIONAL PROBABILITIES (SEQUENCE ORDER)

	Sequence	End State	Prob	N Rec**
274	loop EMERG.POWER -scram ep.rec	CD	3.3E-04	5.4E-02
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** non-recovery credit for edited case

Note: For unavailabilities, conditional probability values are differential values which reflect the added risk due to failures associated with an event. Parenthetical values indicate a reduction in risk compared to a similar period without the existing failures.

SEQUENCE MODEL: c:\asp\newmodel\bwr_cnew.cmp
BRANCH MODEL: c:\asp\newmodel\duarnold.new
PROBABILITY FILE: c:\asp\newmodel\bwr_cnew.pro

No Recovery Limit

BRANCH FREQUENCIES/PROBABILITIES

Branch	System	Non-Recov	Opr Fail
trans	*8.6E-04*	*1.0E+00*	
loop	1.7E-05	3.2E-01	

Event Identifier: 331/87-009

loca	3.3E-06	5.0E-01	
scram	3.5E-04	1.0E+00	
slc.or.rods	1.0E-02	1.0E+00	1.0E-02
pcs/trans	1.7E-01	1.0E+00	
srv.chall/trans.-scram	1.0E+00	1.0E+00	
srv.chall/loop.-scram	1.0E+00	1.0E+00	
srv.close	2.6E-02	1.0E+00	
EMERG.POWER	2.9E-03 > 1.0E+00	8.0E-01 > 1.0E+00	
Branch Model: 1.OF.2			
Train 1 Cond Prob:	5.0E-02 > Failed		
Train 2 Cond Prob:	5.7E-02 > Failed		
ep.rec	1.0E+00	1.7E-01	
fw/pcs.trans	2.9E-01	3.4E-01	
fw/pcs.loca	4.0E-02	3.4E-01	
hpci	2.9E-02	7.0E-01	
rcic	6.0E-02	7.0E-01	
crd	1.0E-02	1.0E+00	1.0E-02
srv.ads	3.7E-03	7.1E-01	1.0E-02
cond/fw.pcs	1.0E+00	3.4E-01	1.0E-03
lpcs	3.0E-03	3.4E-01	
lpci(rhr)/lpcs	1.0E-03	7.1E-01	
rhr(sdc)	2.1E-02	3.4E-01	1.0E-03
rhr(sdc)/-lpci	2.0E-02	3.4E-01	1.0E-03
rhr(sdc)/lpci	1.0E+00	1.0E+00	1.0E-03
rhr(spcool)/-lpci.rhr(sdc)	2.0E-03	1.0E+00	
rhr(spcool)/lpci.rhr(sdc)	5.2E-01	1.0E+00	
c.i.and.v	1.0E-03	1.0E+00	1.0E-02
rhrsw	2.0E-02	3.4E-01	2.0E-03
rhrsw(c.i.and.v)	5.0E-01	3.4E-01	

* branch model file
** forced

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