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 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-027-00: on 920613, lack of breaker coordination due to instantaneous trip circuitry. Disabled Amptector's "Discriminator" circuit for each of six feeder breakers. W/920710 ltr.

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EXTERNAL:	EG&G BRYCE, J.H		3	3		L ST LOBBY WARD		1	1
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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

P.O. Box 968 • 3000 George Washington Way • Richland, Washington 99352

July 10, 1992  
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Docket No. 50-397

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Washington, D.C. 20555

**SUBJECT: NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21  
LICENSEE EVENT REPORT NO. 92-027**

Transmitted herewith is Licensee Event Report No. 92-027 for the WNP-2 Plant. This report is submitted in response to the report requirements of 10CFR50.73 and discusses the items of reportability, corrective action taken, and action taken to preclude recurrence.

Sincerely,

*J. W. Baker*

J. W. Baker  
WNP-2 Plant Manager (Mail Drop 927M)

JWB/CLF/jd  
Enclosure

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LICENSEE EVENT REPORT (LER)																															
FACILITY NAME (1) Washington Nuclear Plant - Unit 2															DOCKET NUMBER (2) 0 5 0 0 0 3 9 7										PAGE (3) 1 OF 5						
TITLE (4) Lack of Breaker Coordination Caused by Instantaneous Trip Circuitry																															
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 NUMBERS(S)												
0	6	1	3	9	9	9	2	0	2	7	0	7	1	0	9	2											0	5	0	0	0
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																													
5																															
POWER LEVEL (10)		20.402(b)					20.405(c)					50.73(a)(2)(iv)					77.71(b)														
0 0 0		20.405(a)(1)(i)					50.36(c)(1)					X 50.73(a)(2)(v)					73.73(c)														
		20.405(a)(1)(ii)					50.36(c)(2)					50.73(a)(2)(vii)					OTHER (Specify in Abstract below and in Text, NRC Form 366A)														
		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 C. L. Fies, Compliance Engineer															TELEPHONE NUMBER AREA CODE 5 0 9 3 7 7 - 4 1 4 7																
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	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	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 (16) At 1130 hours on June 13, 1992 an analysis was completed that concluded that various safety related 480 volt electrical loads did not have adequate coordination between the feeder breakers and the load breakers. This condition was present on two redundant safety related divisions that provide power to Class 1E equipment. This situation was discovered as a result of a review performed in response to NRC Information Notice 92-29 which provided information on a "Discriminator" circuit in certain Westinghouse circuit breakers.  The root causes of this event were determined to be an analysis deficiency and insufficient vendor information.  Immediate corrective action was taken to disable the Amptector's "Discriminator" circuit for each of the six feeder breakers. Further corrective action is being taken to review other breaker vendor manuals to assure no additional problems exist.  There is safety significance associated with this event because of the potential for common mode failure.  The event posed no threat to the health and safety of either the public or plant personnel.																															

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION							
FACILITY NAME (1)  Washington Nuclear Plant - Unit 2	DOCKET NUMBER (2)  0   5   0   0   0   3   9   7	LER NUMBER (8)			PAGE (3)		
		Year	Number	Rev. No.			
		92	027	00	2	OF	5
TITLE (4) Lack of Breaker Coordination Caused by Instantaneous Trip Circuitry							

### Plant Conditions

Power Level - 0%

Plant Mode - 5

### Event Description

At 1130 hours on June 13, 1992 an evaluation was completed that concluded that various safety related 480 volt electrical loads did not have adequate coordination between the Unit Substation Motor Control Center (MCC) feeder breakers and the MCC load breakers. This condition was discovered as a result of a review performed in response to NRC Information Notice 92-29 entitled Potential Breaker Miscoordination Caused By Instantaneous Trip Circuitry.

At WNP-2 six feeder breakers for redundant Divisions I and II were found to have this condition. Division I feeder breakers impacted were E-CB-71/7B, E-CB-73/7A and E-CB-73/7F. Division II feeder breakers impacted were E-CB-81/8B, E-CB-83/8A and E-CB-83/8F. The purpose of these feeder breakers is to supply 480 volt AC power to loads connected to their respective Class 1E Motor Control Centers. Most of these loads are safety related but a small fraction of the loads are non-safety related. These non-safety related loads are allowed since adequate isolation is provided between the two types of loads.

The evaluation determined that these feeder breakers manufactured by Westinghouse were DS Breakers with model LS, LSG or SE Amptectors that contained an instantaneous making current release feature know as a "Discriminator" circuit as described in NRC Information Notice 92-29. The "Discriminator" circuit in the trip unit determines at the time of a fault whether or not there has been current flow in the primary circuit previous to the fault. The circuit is provided for personnel safety protection against possible injury should the breaker be closed on a faulted bus. If there has been no measurable current flow previous to the fault indicating that the circuit breaker is just being closed and if the primary current flow exceeds approximately 12 times the sensor rating, the amptector unit will function instantaneously to trip the breaker instead of allowing a normal short time delay before trip.

A problem could occur in nuclear applications where a motor control center serves both safety-related and non safety-related loads and a loss off-site power is postulated. Under these conditions, current flow in the feeder breaker portion of the circuit would be zero meeting the less than three percent required by the "Discriminator". If this is followed by a fault in a non safety-related load portion of the circuit it could cause both the load and feeder breakers to open simultaneously and result in the loss of the safety-related loads.

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More specifically, at WNP-2, a loss of offsite power will cause a complete loss of voltage to the 4160 volt safety buses. Under these conditions there can be up to a 10 second time interval where the 4160 volt safety buses (as well as the 480 volt unit substations fed from these 4160 volt safety buses) are without power. This condition would exist until the associated emergency diesel generator is at rated speed and voltage, closes its output breaker, and re-energizes the safety bus. When sequencing to the backup transformer, TR-B, the 4160 volt safety buses may be without power for up to 4 seconds. In either case, during this time when the safety buses are without power and then re-energized, the "Discriminator" circuit in the Amptector is active and in control of the 480 volt feeder breaker's trip function. The Amptector is active since DC control power is available during loss of offsite power conditions.

If faults (in excess of 12 times the sensor rating) are present on the non-Class 1E MCC loads when the diesel generator (or TR-B) re-energizes the safety bus, the feeder breaker(s) would trip instantaneously due to the Amptector's "Discriminator". If the feeder breakers trip before the fault(s) were cleared by load circuit overcurrent protection, then the Class 1E MCCs would have been rendered inoperative. Since non-Class 1E equipment is not qualified for an SSE or high energy line break accident scenarios it is considered to have failed under these accident conditions. Since this is a common mode condition, loss of the Class 1E MCCs would prevent Class 1E equipment in two safety divisions from performing their safety functions.

#### Immediate Corrective Action

At 1150 hours on June 13 Technical Specification Action Statement 3.8.3.2.a.1, A-C Power Shutdown, was entered when the six feeder breakers named above were declared inoperable. This action required cessation of any core alterations, handling of irradiated fuel in secondary containment or operations with a potential for draining the reactor vessel.

For each of the six unit feeder breakers, the Amptector's "Discriminator" circuit was disabled by installing a jumper between the terminals marked "DN" and "DS" as recommended by the vendor. Testing was performed to verify the normal trip functions were operational and the "Discriminator" was bypassed correctly. These actions were completed at 0629 hours on June 15, 1992.

#### Further Evaluation and Corrective Action

##### A. Further Evaluation

1. This event is being reported per the requirements of 10CFR50.73(a)(2)(v) as, "....Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to: (A) Shut down the reactor and maintain it in a safe shutdown condition; (B) Remove residual heat; (C) Control the release of radioactive material; or (D) Mitigate the consequences of an accident." This event was also called in to the NRC Operations Center as a non-emergency event under 50.72(b)(2)(iii) at 1220 hours on June 13, 1992.

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TITLE (4) Lack of Breaker Coordination Caused by Instantaneous Trip Circuitry							

2. A review of the vendor manual history showed that information on the "Discriminator" circuit was not provided in the manual's original issue. When the manual was updated in 1976 a paragraph was added that describes the circuit in general terms but the time-current characteristic curves did not illustrate the impact of the "Discriminator".
3. Information Notice 92-29 indicated the "Discriminator" would consider "no measurable current" as the current flow that was less than approximately 10 percent of the sensor's rating. Discussion with Westinghouse and direct measurements showed the threshold to be in the range of 2 to 3 percent....
4. The root causes of this event were determined to be an analysis deficiency and insufficient vendor information. The safety analysis performed on the AC distribution system should have discovered this condition. However, the vendor information provided did not clearly communicate the impact of the "Discriminator" circuit.
5. There were no structures, components or systems that were inoperable prior to the start of this event which contributed to the event.

**B. Further Corrective Action**

Technical manuals of other safety-related breakers will be reviewed to provide assurance that other similar design features do not exist. This review will be completed by September 1, 1992.

**Safety Significance**

There is safety significance associated with this event because of the potential for common mode failure. An earthquake could cause a loss of offsite power and create conditions where non-1E equipment could fail causing a faulted condition. This condition is assumed to occur during accident scenarios (LOCA and HELB). As explained above, under these conditions there can be up to a 10 second time interval where the 4160 volt safety buses (as well as the 480 volt unit substations fed from these 4160 volt safety buses) are without power. During this time when the safety buses are without power and then re-energized, the "Discriminator" circuit in the Amptector is active and in control of the 480 volt unit substation MCC feeder breaker's trip function.

The non-1E loads downstream of the feeder breakers are not qualified for an earthquake or conditions resulting from a HELB. Therefore, they are assumed to have failed resulting in a faulted condition.

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						9   2		0   2   7		0   0	
TITLE (4)		Lack of Breaker Coordination Caused by Instantaneous Trip Circuitry									

Theoretically six Class 1E MCCs could have been inoperable for a period of time beyond the design basis. In reality, the probability of non-1E equipment failing from these conditions is low. Further, manual action could be taken to restore power to the effected equipment. However, given the proper conditions, the "Discriminators" could have caused malfunctions that would increase the consequences of accident conditions beyond those analyzed in the FSAR.

The High Pressure Core Spray (HPCS) System was not impacted by this event and would have been available for accident mitigation.

#### Similar Events

LER 89-034 reported the condition where five Class 1E 480 Volt MCCs (MC-7A-A, MC-7B-B, MC-7B-A, MC-8A-A, and MC-8B-A) were found to be inoperable because the design did not include fault tripping coordination all the way down to the individual loads on the subfed Class 1E Motor Control Centers. The corrective actions for LER 89-034 called for additional reviews including a self generated Safety System Functional Inspection (SSFI) of the AC Power Distribution System. However, this effort did not perform a review of the vendors documentation to the level needed to detect the event discovered by this LER.

#### EIIS Information

##### Text Reference

Feeder Breakers (E-CB-71/7B  
E-CB-73/7A, E-CB-73/7F,  
E-CB-81-8B, E-CB-83/8A,  
and E-CB-83/8F

Subfed Class 1E Motor  
Control Centers (MC-71-A,  
MC-7B-B, MC-7B-A,  
MC-8A-A, and MC-8B-A)

##### EIIS Reference

##### System                      Component

ED                      BKR

ED                      PL