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SUBJECT: LER 89-024-01:on 891212,ESF actuation during reactor coolant pump test.

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R I D S / A D D S

Arizona Public Service Company
PALO VERDE NUCLEAR GENERATING STATION
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

192-00635-JML/TRB/SBJ
February 27, 1990

JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

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

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528 (License No. NPF-41)
Licensee Event Report 1-89-024-01
File: 90-020-404

Attached please find Supplement Number 1 to Licensee Event Report (LER) No. 89-024-00 prepared and submitted pursuant to 10CFR50.73. In accordance with 10CFR50.73(d), we are herewith forwarding a copy of the LER to the Regional Administrator of the Region V office.

If you have any questions, please contact T. R. Bradish, (Acting) Compliance Manager at (602) 393-2521.

Very truly yours,

James M Levine

JML/TRB/SBJ/kj

Attachment

cc: W. F. Conway (all with attachment)
E. E. Van Brunt
J. B. Martin
D. H. Coe
T. L. Chan
A. C. Gehr
INPO Records Center

IE22
1/1

NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WTH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Palo Verde Unit 1	0 5 0 0 0 5 2 8	1 OF 0 7

TITLE (4)

Engineered Safety Feature Actuation During Reactor Coolant Pump Test

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 2	1 2	8 9	8 9	0 2 4	0 1	0 2	2 7	9 0	N/A	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)			
6	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 0 0 0	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, 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	TELEPHONE NUMBER
Thomas R. Bradish, (Acting) Compliance Manager	AREA CODE 6 0 2 3 9 3 - 2 5 2 1

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	

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 fifteen single-space typewritten lines) (16)

On December 12, 1989 Unit 1 was in Mode 6 with the reactor coolant system at atmospheric pressure and approximately 95 degrees Fahrenheit. At approximately 1055 MST, a test was initiated on reactor coolant pump 2A motor prior to coupling the impeller. The motor start caused a voltage perturbation in the electrical system that tripped radiation monitors and initiated a containment purge isolation actuation signal, a fuel building essential ventilation actuation signal, and a control room essential filtration actuation signal. All systems responded as designed.

The RCP motor was immediately stopped. All actuations were reset by approximately 1300 MST.

The investigation of the event determined that the event was caused by an abnormal electrical alignment at the time of the event.

To prevent recurrence, the operating procedures for 13.8 kv pump motors will be revised to include a precaution on the consequences of starting the motors with a 1E battery disconnected.

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

On December 12, 1989 at the time of this event, Palo Verde Unit 1 was in Mode 6 (REFUELING). The reactor coolant system (RCS)(AB) was at atmospheric pressure and approximately 95 degrees Fahrenheit.

B. Reportable Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification: Engineered Safety Feature Actuation

On December 12, 1989 at approximately 1055 MST, reactor coolant pump (RCP)(AB) 2A motor (MO) was started to perform a test with the motor uncoupled from the impeller. The pump start caused a voltage perturbation in the AC electrical distribution system and resulted in an undervoltage condition on the "A" AC vital instrument distribution panel (EF) which tripped radiation monitor actuation relays. This resulted in the initiation of a containment purge isolation actuation signal (CPIAS)(JE), a control room essential filtration actuation signal (CREFAS)(VI), and a fuel building essential ventilation actuation signal (FBEVAS)(VG).

Prior to the event on December 12, 1989 at approximately 0615 MST, the emergency power supply (the "A" class 1E battery (EI)(BTRY)) was disconnected from the 125 volt DC control center (EJ) in order to support outage work. The normal power supply to the 125 volt DC control center (battery charger (BYC)) remained connected. The battery charger was powered via the 480 volt AC Motor Control Center (ED), the 13.8 kv AC bus (BU) NAN-S03 (EA), and ultimately from the startup transformer (NAN-X03)(EA)(XFMR). (See attached sketch.)

The RCP 2A motor was powered from 13.8 kv AC bus NAN-S01 (EA). Since Unit 1 was not in operation, the 13.8 kv AC bus NAN-S01 was powered via the 13.8 kv AC bus NAN-S03 and from the startup transformer (NAN-X03). (See attached sketch.)

Prior to the test, operations personnel (utility, licensed) and the system engineer (utility, non-licensed) discussed the impact of running the battery charger on the 125 volt DC control center with the battery disconnected. Engineering determined that since

the battery stabilizes the DC control center voltage, any voltage fluctuations in the electrical system could cause voltage dips on the DC control center. The voltage dips could cause annunciations in the control room but equipment actuations were not expected.

At approximately 1055 MST, RCP 2A motor was started causing a voltage perturbation in the AC electrical system. This perturbation propagated from the 13.8 kv busses (NAN-S01 & S03), through the ESF transformer (NBN-X03), the load center transformer, the battery charger (PKA-H11), the 125 VDC bus, the 120 VAC invertor (PNA-N11), and finally to the 120 VAC distribution panel. This perturbation caused an undervoltage condition on the 120 volt AC instrument and control distribution panel (EF). The undervoltage condition on the 120 volt AC instrument and control distribution panel deenergized (tripped) the actuation relays for the containment purge effluent radiation monitor (RU-37)(IL), control building effluent radiation monitor (RU-29)(IL) and the fuel building area radiation monitor (RU-31)(IL) and initiated a CREFAS, FBEVAS, and CPIAS. Upon receipt of the CREFAS, the "B" train essential chiller (CHU)(KM), essential cooling water (CC) pump (P), and essential spray pond (BS) pump started. The "A" train essential chiller, essential cooling water, and essential spray pond systems were in service prior to the event.

The RCP 2A motor was immediately stopped. At approximately 1112 MST the control building (NA) normal air handling unit (AHU) and engineered safety features (ESF) equipment room AHUs were stopped per operating procedures. At approximately 1120 MST, all equipment actuations were verified per plant procedures.

The CPIAS, FBEVAS, and CREFAS were reset at approximately 1243 MST. The fuel building (ND) ventilation was returned to normal at approximately 1247 MST. The control room and control building ventilation were returned to normal at approximately 1258 MST. The "B" train essential cooling water, essential chiller, and essential spray pond systems were stopped at approximately 1300 MST.

C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the event:

The ventilation to the DC equipment room and battery rooms was inoperable at the time of the event. In order to support the outage work on the ventilation (See LER 528/89-23-00), the "A"

class 1E battery was disconnected from the distribution bus.

D. Cause of each component or system failure, if known:

Not applicable - No failures were involved.

E. Failure mode, mechanism, and effect of each failed component, if known:

Not applicable - No failures were involved.

F. For failures of components with multiple functions, list of systems or secondary functions that were also affected:

Not applicable - No failures were involved.

G. For failures that rendered a train of a safety system inoperable, estimated time elapsed from the discovery of the failure until the trains were returned to service:

Not applicable - No failures were involved.

H. Method of discovery of each component or system failure or procedural error:

Not applicable - No failures were involved.

I. Cause of Event:

On January 5, 1990, voltage data from the 480 volt AC system to the battery charger and voltage regulator, the battery charger to the 125 volt DC distribution panel, the invertor to the 120 volt AC instrumentation and control distribution, and the voltage regulator to the 120 volt instrumentation and control distribution panel were recorded during the reperformance of the RCP 2A uncoupled impeller motor run. Evaluation of the recorded data indicated that the 480 volt AC system voltage decreased to approximately 424 VAC during the initial current surge when the RCP motor was started. This 424 VAC input to the battery charger was less than the 432 VAC minimum input voltage specification for the battery charger. The lower input voltage (424 VAC) to the battery charger resulted in a decrease in the output of the battery charger from a normal 130 VDC to approximately 96 VDC.

The 96 VDC output of the battery charger was below the minimum 105 VDC input to the invertor, therefore the invertor automatically shutdown. The invertor shutdown deenergized the 120 VAC instrumentation and control distribution panel which supplies power to the radiation monitor actuation relays. When the battery charger voltage recovered, the invertor automatically started.

With the DC distribution system in the normal configuration, and the 1E battery and battery charger in service, it was observed that the battery charger did not supply the bus during the first two to three seconds of the RCP motor start. During this initial two to three seconds, the 1E battery maintained the DC system voltage. Therefore, the invertor continued to receive the required input voltage and maintained the instrumentation and controls distribution panel power.

This event was caused by the abnormal electrical alignments during the RCP motor tests. The plant equipment functioned as designed. There was no previous information available on the electrical system response to a RCP motor start which would have allowed anticipation of the plant response.

J. Safety System Response:

The containment purge (CP)(BK) isolation valves were isolated prior to the event; therefore, the CPIAS did not result in actuation of any CP components per design.

The FBEVAS stopped the normal fuel building AHUs, isolated the normal supply and exhaust dampers (DMP), and started the fuel building essential exhaust air filtration units per design.

The CREFAS closed the control room isolation dampers, stopped the control room normal AHUs, and started the control room essential AHUs per design. The "B" train essential cooling water pump, essential chiller, and essential spray pond pump also started as a result of the CREFAS per design. The "A" train essential chiller, essential cooling water pump, and essential spray pond pump were in service prior to this event.

K. Failed Component Information:

Not applicable - No failures were involved.

II. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:

The undervoltage condition on the "A" AC vital instrument distribution panel, caused by the starting of the RCP 2A motor, only lasted a few seconds as indicated by computer printout following the event. The voltage returned to normal immediately after the RCP motor was stopped. Alarms were only received on the "A" AC vital instrumentation and control distribution bus indicating the undervoltage condition only affected one of the four vital instrumentation and control distribution panels. The availability of redundant instrumentation and control distribution panels and the short duration of the electrical transient did not effect the ability to monitor and operate systems required by technical specifications.

The initiation of emergency ventilation and emergency cooling water systems was the result of an undervoltage condition and not the result of abnormal levels of radiation. The safety systems responded as designed. Therefore, this event did not have an effect on the health and safety of the public.

III. CORRECTIVE ACTIONS:

A. Immediate

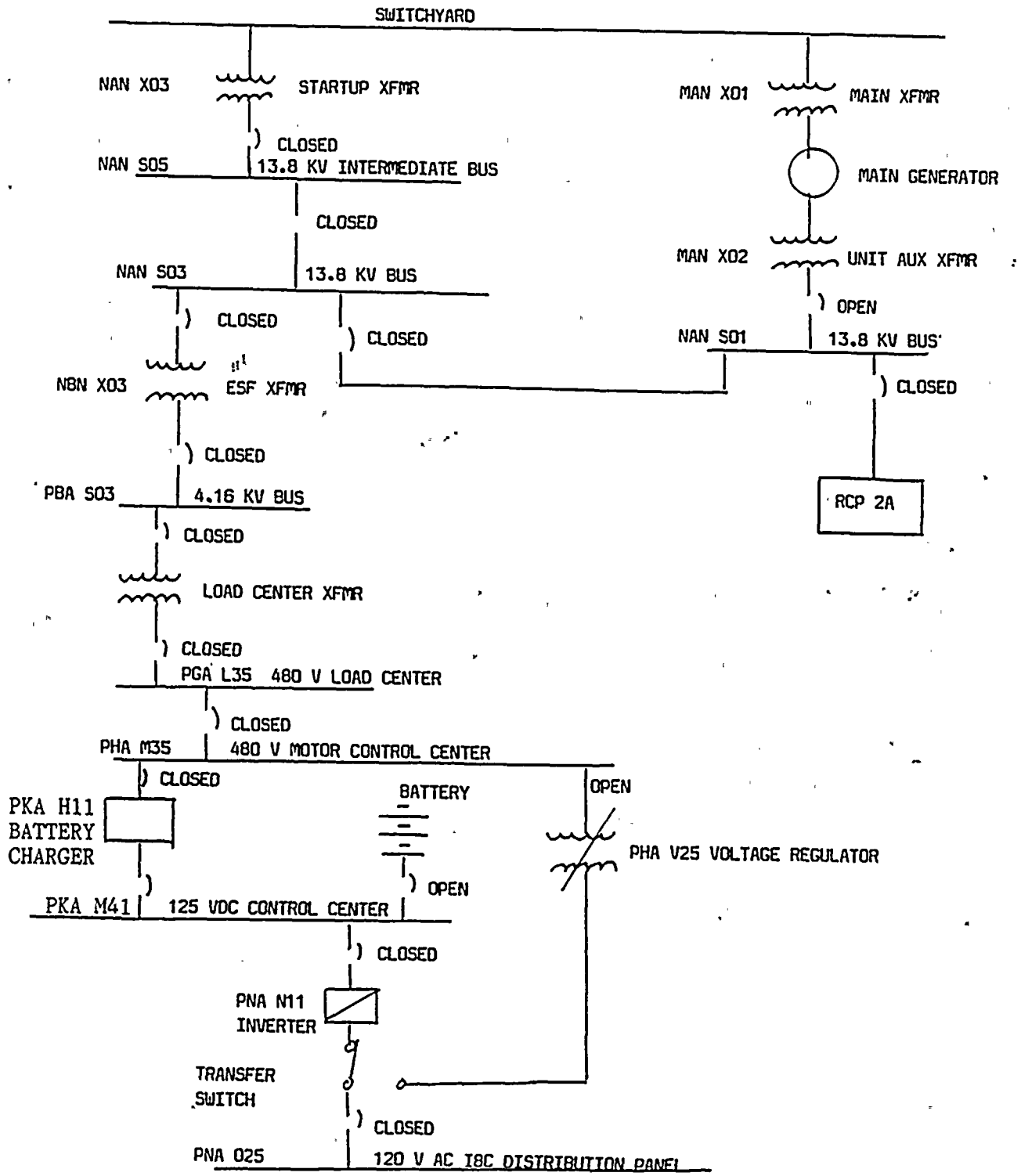
The RCP motor was immediately stopped and equipment actuations were verified.

B. Action to Prevent Recurrence:

The RCP operating procedures have been revised to include precautions on the possible power interruption to the instrument and control distribution panel if any 1E battery is disconnected from the DC distribution panel. Circulating water pump operating procedures will have a precaution added to warn of possible power interruption to the instrument and control distribution panel if any 1E battery is disconnected from the DC distribution panel. This should be completed by March 31, 1990.

IV. PREVIOUS SIMILAR EVENTS:

There have been no previous similar events reported pursuant to 10CFR 50.73. There have been several reported engineered safety feature actuations caused by the deenergization of an instrumentation and control distribution panel. However, none of the previous events were caused by an undervoltage condition associated with the starting of a reactor coolant pump motor.


SWITCHYARD
NAN X03
STARTUP XFMR
CLOSED
NAN S05
13.8 KV INTERMEDIATE BUS
CLOSED
NAN S03
13.8 KV BUS
CLOSED
CLOSED
NBN X03
ESF XFMR
CLOSED
PBA S03
4.16 KV BUS
CLOSED
LOAD CENTER XFMR
CLOSED
PGA L35 480 V LOAD CENTER
CLOSED
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CLOSED
PNA N11
INVERTER
TRANSFER
SWITCH
CLOSED
PNA 025
120 V AC I&C DISTRIBUTION PANEL
MAN X01
MAIN XFMR
MAIN GENERATOR
MAN X02
UNIT AUX XFMR
OPEN
NAN S01
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