NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Turkey Point Unit 4	0 5 0 0 0 2 5 1	1 OF 0 4

TITLE (4)
Engineered Safety Feature Actuation - Reactor Trip

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)
0 6	2 0	8 5	8 5	— 0 1 7	— 0 0	0 7	2 2	8 5	Turkey Point Unit 3	0 5 0 0 0 2 5 0
									N/A	0 5 0 0 0

OPERATING MODE (9): 1

POWER LEVEL (10): 1 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)
	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)
	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)
	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)

	73.71(b)
	73.71(c)
	OTHER (Specify in Abstract below and in Text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)
R. D. Hart, Licensing Engineer	3 0 5 2 4 5 - 2 9 1 0

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
X	E F	F U	S 1 5 6	Y	X	E F	F U	S 1 5 6	Y
X	E F	F U	S 1 5 6	Y					

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)

Event: On June 20, 1985, Unit 4 experienced a reactor trip from 100% full power. The 4C inverter that was in service supplying power to the 120 volt vital instrument panel 4P06, tripped. Loss of 4P06 de-energized level controller LC-460C and the pressurizer spray valve controllers (causing the spray valves to remain at their last demand position). De-energizing of LC-460C generated a false indication of low pressurizer level (less than 14%) which de-energized the pressurizer heaters (control and backup) and initiated letdown isolation. Loss of 4P06 also resulted in the loss of automatic operation of power operated relief valve (PORV), PCV-4-455C. PORV PCV-4-456 was available with its associated block valve, MOV-4-535 closed due to slight leakage through PCV-4-456. These conditions, along with a turbine runback due to loss of power to nuclear instrumentation system channel N-41, resulted in the reactor coolant system pressure increasing until it reached the pressurizer high pressure reactor trip setpoint of 2370 psig resulting in a reactor trip.

Cause of Event: The loss of the 4C inverter occurred while attempting to energize the 3C inverter onto the 3B 120 volt DC bus. The procedural requirements for this evolution require charging the 3C inverter's charging capacitors prior to energizing the inverter onto the bus. This step was not executed causing the loss of the 3C inverter which resulted in a DC bus transient which in turn caused a loss of the 4C inverter.

Corrective Actions: The following corrective actions were taken following the event:

1) Power to the vital instrument bus for panel 4P06 was re-established and the affected equipment was returned to normal lineup.
2) The 3C and 4C inverters were inspected and checked as per maintenance instructions and no significant problems were found.
3) A post-trip review was completed and no abnormal operating conditions were identified. Following completion of necessary repairs, inspections, and testing, the unit was returned to full power at 9:00 p.m., on June 23, 1985.
4) The long term corrective action will be to replace the inverters with a model of a different manufacturer. Replacement of the inverters is currently scheduled to begin in July 1985.

The health and safety of the public were not affected.

L-85-283

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Event:

On June 20, 1985, at 3:18 p.m., Unit 4 experienced a reactor trip from 100% full power. At 3:17 p.m., the 4C inverter that was in service supplying power to 120 volt vital instrument panel (4P06), tripped. Loss of power to panel 4P06 resulted in a loss of power to the nuclear instrumentation system (NIS) power range channel N-41. This channel generated a "NIS Rod Drop" signal which generated a turbine runback to 70% power.

Loss of 4P06 de-energized level controller LC-460C and the pressurizer spray valve controllers (causing the spray valves to remain at their last demand position, approximately 10% open). The de-energizing of LC-460C generated a false indication of low pressurizer level (less than 14%) which de-energized the pressurizer heaters (control and back-up) and initiated letdown isolation. Loss of 4P06 also resulted in the loss of automatic operation of power operated relief valve (PORV) PCV-4-455C. PORV PCV-4-456 was available with its associated block valve, MOV-4-535, closed due to slight leakage through PCV-4-456. These conditions resulted in the reactor coolant system (RCS) pressure increasing until it reached the pressurizer high pressure reactor trip setpoint of 2370 psig resulting in a reactor trip. Pressurizer pressure decreased after the trip and continued to decrease because of the de-energized pressurizer spray valve controllers. At this time, a RCS cooldown was in progress due to the feedwater transient experienced as a result of the loss of the 4C inverter. The main steam isolation valves (MSIVs) were closed at 3:20 p.m., to help reduce the cooldown. The "B" and "C" reactor coolant pumps (RCPs) were stopped at 3:20 p.m., to stop the pressurizer sprays effect on RCS depressurization. The "B" and "C" RCS loops supply flow for the pressurizer spray valves. Pressurizer pressure recovery was initiated, pressurizer heaters were energized by holding in relay LC-460CX and the "B" and "C" RCPs were subsequently started.

Loss of 4P06 also caused the "A" steam generator (SG) feedwater level control to transfer from automatic to manual remaining at a demand setting of 100% feedwater flow. Loss of automatic level control along with continuous feedwater flow resulted in the "A" SG level increasing until it reached the Hi-Hi level setpoint (80%) which tripped both SG feedwater pumps at 3:19 p.m. This resulted in a feedwater isolation signal and an automatic start of the auxiliary feedwater (AFW) pumps which supplied feedwater to the SGs until the "B" SG feedwater pump was started at 3:32 p.m., establishing a normal feedwater train to the SGs.

At 3:35 p.m., power to 4P06 was restored via the 4C inverter using Off-Normal Operating Procedure 4-ONOP-003.6, "Loss of 120 V Vital Instrument Panel 4P06", and the lost instrumentation on Unit 4 was regained.

At the time of this event, the "A" emergency diesel generator (EDG) was out of service (OOS) for preventive maintenance. Technical Specification (TS) 3.7.2 allows one EDG to be OOS only during power operation. Therefore, a cooldown was commenced for Unit 4 at 5:55 p.m., and stopped at 7:50 p.m., when the "A" EDG was placed back in service. The unit was then returned to hot standby.

After the trip, the containment airborne activity levels recorded on the process radiation monitoring instrument R-11 (particulate) reached the high activity alarm setpoint. This caused containment ventilation to isolate and control room ventilation to switch over to the recirculation mode as designed.

At 6:08 p.m., while cooling down Unit 4, the 4C inverter that was in service supplying power to 120 volt vital instrument panel (4P06), tripped. The loss of power to 4P06 resulted in a loss of power to the nuclear instrumentation system (NIS) power range channel N-41, intermediate range channel N-35, and source range channel N-31. Loss of power to NIS channels N-31 and N-35 generated a source range high flux (N-31) and an intermediate range high flux (N-35) reactor trip signal. The reactor trip breakers were closed prior to the event, due to the performance of Operating Procedure 1004.2, "Reactor Protection System - Periodic Test", after the reactor trip, and opened as a result of the reactor trip signal, thus completing the reactor protection system logic. ONOP-4-003.6 was used to restore power to panel 4P06 with the 4C inverter at 6:35 p.m., and the lost instrumentation on Unit 4 was regained.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Cause of Event:

The loss of the 4C inverter occurred while attempting to energize the 3C inverter onto the 3B 120 volt DC bus for post maintenance no load check out. The 3C inverter had been out of service as part of a preventative maintenance task action plan to enhance the overall reliability of the inverters. The procedural requirements for this evolution require charging the 3C inverter's charging capacitors prior to energizing the inverter onto the bus. This step was not executed, thus when the 3C inverter DC input breaker was closed onto the bus, an overcurrent condition occurred which tripped off the 3C and 4C inverters.

A Chemistry Department evaluation for a similar event revealed that the two most probable reasons for the high R-11 readings are:

1) Particulate matter inside containment was shaken loose due to the reactor trip,

2) A possible system gas leak in containment is leaking gas into the containment which is decaying to a particulate.

The cause of the second loss of the 4C inverter was due to a loss of the 3C inverter. The cause of loss of discovered the 3C inverter could not be positively identified. The most probable cause is attributed to a ground discovered on the 3C normal containment cooler.

Analysis of Event:

A post-trip review was performed to assess the proper operation of safety-related equipment. After the inverters were inspected and checked, they were placed back in service and run for a period of 24 hours without any mode change on either unit to ensure reliability. During this period, Unit 3 was in cold shutdown and Unit 4 was in hot standby. No problems were encountered during this period. Other safety related equipment were verified to have functioned as designed upon actuation of reactor protection system features. Similarly, the post-trip review established that the transient behavior of pertinent plant parameters for the reactor coolant system and SGs responded as expected of a reactor trip of this kind. Specifically, the RCS pressures and temperatures were determined to be following an expected pattern based on the conditions leading up to this transient. Based on the above, the health and safety of the public were not affected.

Corrective Actions:

The following corrective actions were taken:

1) Power to the vital instrument bus for panel 4P06 was re-established at 3:35 p.m., from the 4C inverter and affected equipment returned to normal lineup.

2) The ground on the 3C normal containment cooler was cleared. The 3C and 4C inverters were inspected and checked as per maintenance instructions. For the 4C inverter, the DC input breaker trip settings were changed and fuse F6 was replaced. For the 3C inverter, fuses FL and F6 were replaced and the DC input breaker trip settings were checked. Upon completion of the inspection, the original sequence of events related in the "Cause of Event" above were repeated. The 4C inverter did not trip, thus verifying that the changed DC input breaker trip settings eliminated the interaction between the 3C and 4C inverters.

3) After sufficient time had elapsed to allow the activity to decay off, containment and control room ventilation were returned to its normal configuration at 7:50 p.m., on June 20, 1985.

4) A post-trip review was completed and no abnormal operating conditions were identified. Because of the second loss of the 3C and 4C inverters, Plant Management decided to inspect the twelve inverters and check the DC input breaker trip setpoints and then run the twelve inverters for 24 hours with no change in operating mode for either unit. No problems were encountered during the 24 hour period.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Corrective Actions: (continued)

5) Plant Change/Modification (PC/M) 85-103 was completed for Unit 4 to modify the logic for initiating a turbine runback caused by a negative flux rate input (NIS signal) from 1 out of 4 channels to 2 out of 4 channels. This logic will prevent challenges to the reactor protection system by not initiating a turbine runback due to a single NIS channel "Rod Drop" signal.

6) Upon sucessful completion of the 24 hour run on the inverters, and implementation of PC/M 85-103, the unit was returned to full power operation at 9:00 p.m., on June 23, 1985.

7) Off-Normal Operating Procedures (ONOP) 003.6 - 003.9 were reviewed and revised to clarify immediate and subsequent operator actions to be taken upon loss of a 120 volt vital instrument panel. As part of this revision, a method of closing the pressurizer spray valves was included. These procedures also include a list of control room indications lost on failure of a vital instrument panel.

8) Training was given to the operating shifts on the revisions to ONOP 003.6 - 003.9 by having the Plant Supervisor - Nuclear review the revised procedures with his operating crew.

9) PC/M 84-210 was previously implemented on Unit 3 to provide redundant rod position indication (RPI) signals into the turbine runback initiating logic. This allows disabling of the NIS signal to the turbine runback logic.

10) An evaluation will be performed on the existing breaker coordination of the 120 volt instrument AC system.

11) The individual involved in the event was counseled to exercise greater care in using plant procedures.

12) The long term corrective action will be to replace the inverters with a model of a different manufacturer. As part of this replacement, a regulated 120 volt AC alternate power supply (constant voltage transformer) for each of the eight(8) normal vital inverters will be installed. Each replacement inverter has a static transfer switch that will automatically transfer the load to the alternate power supply upon loss of a normal inverter, to allow transition time in manually switching over to the spare inverters without inducing transients in the vital AC power system. Implementation of this replacement enhances plant safety as the availability of vital AC power is improved.
Replacement of the inverters for both Units 3 and 4 is currently scheduled to begin in July 1985.

Similar Previous Occurrences:

LERs 250-84-003, 250-84-014, 250-84-026, 251-84-011, 251-84-021, 251-84-022, 251-85-012, and 251-85-013.