U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1	I L Q A D 1 (2)	0 0 0 - 0 0 0 - 0 0 0 (3)	4 1 1 1 1 (4)	(5)					
	LICENSEE CODE	LICENSE NUMBER	LICENSE TYPE	CAT					
CON'T 0 1	REPORT SOURCE L (6)	0 5 0 0 0 2 5 4 (7)	0 6 2 2 8 2 (8)	0 7 0 1 8 2 (9)					
		DOCKET NUMBER	EVENT DATE	REPORT DATE					

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

Following a scram on Unit Two, from loss of off-site power, both the Unit Two and 1/2 Diesel Generators loaded to their respective emergency buses. The 1/2 Diesel Generator subsequently tripped when the "A" RHRSW pump was started. The Unit One Diesel Generator was out of service at this time. Therefore, contrary to Technical Specification 3.9.E.1, Unit One was operating without its Unit or Shared Diesel Generator. Safety implications were minimal since provisions were being initiated to shutdown the Reactor. Also, both on-site and off-site AC power were available to supply the Unit One loads. Plus, the Unit battery systems and the High Pressure Core Injection System were available.

SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
E E (11)	B (12)	A (13)	G E N E R A (14)	A (15)	(16)

(17) LER/RO REPORT NUMBER

EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
8 2	—	0 1 2	/	0 1	T	—	0

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
F (18)	F (19)	Z (20)	Z (21)	0 0 0 0	Y (23)	N (24)	A (25)	G 0 8 0 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

Investigation of the 1/2 Diesel Generator trip revealed it had tripped on under-excitation. This trip should have been locked-out after the Diesel had auto-started on bus undervoltage. A design deficiency was discovered, in that, the Auto-Start Relay should have sealed-in which would have blocked the underexcitation trip. To prevent re-occurrence, the underexcitation relays on all three Diesel Generators were temporarily removed until a permanent design change could be completed. Action Item Record 4-82-18 was written to the Station Nuclear Engineering Department to support this work.

FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
E (28)	0 5 3 (29)	NA	A (31)	Operational Event

ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
Z (33)	Z (34)	NA	NA

PERSONNEL EXPOSURES

NUMBER	TYPE	DESCRIPTION (39)
0 0 0 (37)	Z (38)	NA

PERSONNEL INJURIES

NUMBER	DESCRIPTION (41)
0 0 0 (40)	NA

LOSS OF OR DAMAGE TO FACILITY (43)

TYPE	DESCRIPTION
Z (42)	NA

8207130455 820701
PDR ADOCK 05000254
S PDR

PUBLICITY

ISSUED	DESCRIPTION (45)	NRC USE ONLY
N (44)	NA	

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I. LER NUMBER: LER/RO 82-12/01T-0

II. LICENSEE NAME: Commonwealth Edison Company
Quad-Cities Nuclear Power Station

III. FACILITY NAME: Unit One

IV. DOCKET NUMBER: 050-254

V. EVENT DESCRIPTION:

At 0526 hours on June 22, 1982, the Unit Two Reactor tripped from a Reactor Feedwater pump trip and subsequent low water level. The pump trip resulted from the loss of Bus 22 while the reserve auxiliary transformer 22 was being removed from service for maintenance. The Unit Two and Unit 1/2 Diesel Generators automatically started on a bus undervoltage signal and loaded to their respective buses. At approximately 0547 hours, Bus 23 was energized from Bus 23-1 in order to initiate the Containment Cooling mode of the Residual Heat Removal System (RHR). When the Operator attempted to start the 2A RHR Service Water pump, the Unit 1/2 Diesel Generator tripped. Several attempts were made to restart the Diesel Generator, but without success. Off-site power to Unit Two was restored at 0555 hours and Bus 23-1 was energized by normal means at 0604 hours. At 0805 hours, when the Unit Two scram recovery had returned to normal, the Unit 1/2 Diesel Generator was declared inoperable. During the time of this event, the Unit One Diesel Generator had been inoperable while the Diesel Cooling Water pump was being overhauled. Due to the degraded mode of the Unit One emergency AC power system, a Generating Station Emergency Plan Unusual Event was declared and the Nuclear Regulatory Commission personnel, both on-site and in Bethesda, Maryland, were notified. Technical Specification 3.9.E.1 states that when both the unit and shared Diesel Generator are inoperable, the Reactor must be in the Cold Shutdown condition within 24 hours. The Diesel Generator trip was being investigated and provisions were being initiated to shutdown the Unit One Reactor. Immediately following the unusual event notification, the Generator lock-out relay for the Unit 1/2 Diesel Generator was found to be tripped. At 0820 hours, the lock-out relay was reset; and the Diesel Generator was started and loaded to Bus 23-1 for a two hour operability surveillance.

The operability surveillance was successfully completed, and the unusual event and provisions for Unit One shutdown were cancelled.

VI. PROBABLE CONSEQUENCES OF THE OCCURRENCE:

Between the time that the Unit 1/2 Diesel Generator tripped and off-site power was restored to Unit Two, the Unit Two Diesel Generator performed as designed to supply power to its designated equipment in order to safely shutdown the Reactor. This fact is emphasized in the Final Safety Analysis Report 8.2.3.1, stating that one Diesel Generator is capable of sustaining the necessary power for a safe shutdown of one unit in case of a loss of off-site power. Power to Division I equipment, which is fed from Bus 23-1,

VI. PROBABLE CONSEQUENCES OF THE OCCURRENCE: (Continued)

was de-energized for only 17 minutes, after which time off-site power was restored. All of the Unit Two battery systems were also available and supplied power to their associated equipment over the duration of the event.

Both on-site and off-site power were available to supply the Unit One loads while the Unit 1/2 Diesel Generator was inoperable. Incoming power was available from four outside lines; and the reserve auxiliary transformer was available at all times. The Unit One battery systems were available to operate the High Pressure Coolant Injection System, Reactor Core Isolation Cooling System, and the Automatic Blowdown System. Station procedures exist to place the Reactor in a Hot Shutdown condition without any AC power available. Following the restoration of power to the Unit Two reserve auxiliary transformer, it would have been possible to feed Unit One Division II AC power with the Unit Two Diesel Generator through the Bus 14-1/Bus 24-1 cross-tie. Therefore, had Unit One lost off-site power at this point, a Diesel Generator would have been available to safely shutdown the unit.

The Unit 1/2 Diesel Generator was proven operable four and one-half hours following the trip; thus, the 24 hour Cold Shutdown requirement in Technical Specification 3.9.E.1 was not required to be implemented. Due to the large amount of redundancy in the electrical distribution system, the battery powered high pressure ECCS systems and the short duration of the Diesel Generator outage, safe shutdown of the Unit One Reactor could have been achieved.

VII. CAUSE:

The cause of this occurrence was a design error in the Diesel Generator control logic system. The Diesel Generator trip occurred from an actuation of the underexcitation relay in the Diesel exciter cabinet. The underexcitation relay monitors the phase angle of the Generator output leads. A large phase angle, or low power factor in an AC Generator is a good indication of abnormally low field excitation. When the Operator attempted to start the RHR Service Water pump, a high starting current and extremely low power factor was experienced. This phenomenon is typical when starting a large AC induction motor. The low power factor, approximately 0.40 instead of the normal 0.80, caused the underexcitation relay to actuate and trip the Generator lock-out relay.

An automatic start signal to the Diesel Generator will block all the protective trips except for the phase differential current trip. The Diesel Generator automatically started when the undervoltage relays on Bus 23 & Bus 23-1 energized. After the Generator was loaded to the Bus 23, normal voltage was restored and the undervoltage relays de-energized. This caused the automatic start relay to reset, thus engaging all of the Diesel Generator protective trip functions. The underexcitation relay is

VII. CAUSE: (Continued)

designed to protect the Generator during testing when the Diesel Generator is loaded to an energized bus. When the bus is not energized, the power factor will drop and can cause the underexcitation relay to actuate when a large motor is started.

When the Diesel Generator tripped, several attempts to restart the Diesel were made by the Control Room Operator. The Diesel would not start because the Generator lock-out relay had not been manually reset. The Equipment Operator had been dispatched to the switchyard to expedite the restoration of off-site power to Unit Two. For this reason, the Generator lock-out relay was not immediately reset.

VIII. CORRECTIVE ACTION:

The immediate corrective action was to restore normal off-site power to Unit Two. Power was restored 17 minutes after the Diesel Generator tripped. The Generator lock-out relay was reset and the two hour operability surveillance was successfully completed four and one-half hours following the trip. These actions satisfied the Limiting Conditions for Operation in Technical Specification 3.9.E.1, and Unit One continued normal operation.

To correct the design error in the Diesel Generator automatic start control logic, Action Item Record 4-82-18 has been initiated to provide a seal-in circuit to the automatic start relay. The seal-in circuit will allow all the protective trips to be blocked until normal power is restored. Until this change is completed, the underexcitation relays on all three Diesel Generators have been removed. The removal of these relays will have no affect on the emergency capability of the Diesel Generators. This temporary change will adequately correct the design error and prevent any chance of recurrence.