PSE&G

Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038

Hope Creek Generating Station

DATE May 18, 1994

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

Dear Sir:

HOPE CREEK GENERATING STATION
DOCKET NO. 50-354
UNIT NO. 1
LICENSEE EVENT REPORT 94-005-00

This Licensee Event Report is being submitted pursuant to the requirements of 10CFR 50.73(a)(2)(iv).

Sincerely,

R.J. Hovey
General Manager -
Hope Creek Operations

LLA/

Attachment
SORC Mtg. 94-036
C Distribution

250023

IE27
1/1

LICENSEE EVENT REPORT

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
HOPE CREEK GENERATING STATION	0 5 0 0 0 3 5 4	1 OF 4

TITLE (4): Engineered Safety Feature Actuation - Residual Heat Removal System isolation due to design deficiency.

EVENT DATE (5)			LER NUMBER (6)					REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	*	NUMBER	*	REV	MONTH	DAY	YEAR	FACILITY NAME(S)	DOCKET NUMBER(S)
0 4	2 0	9 4	9 4	-	0 0 5	-	0 0	0 5	1 8	9 4		

OPERATING MODE (9)	4
POWER LEVEL %	0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR: (CHECK ONE OR MORE BELOW) (11)

	20.402(b)		20.405(c)	xx	50.73(a)(2)(iv)		73.71(b)
	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)
	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
Louis Aversa, Senior Staff Engineer - Technical	6 0 9 3 3 9 3 3 8 6

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE NOTED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS?	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS?
B	EC	XFMR							

SUPPLEMENTAL REPORT EXPECTED? (14) YES		NO	x	DATE EXPECTED (15)	MONTH	DAY	YEAR

ABSTRACT (16)

On 4/20/94, control room personnel were performing an 18 month reactor pressure vessel hydrostatic surveillance test as the fifth refuel outage was nearing completion. Concurrent activities included scheduled repair, testing and system restorations in preparation for plant startup. One of the activities involved removal of the reactor protection system (RPS) motor-generator (MG) set for bearing replacement which required the "B" RPS bus to be powered via its alternate power supply. At 0005 hours the nuclear control operator (NCO - RO licensed) initiated a start of the "C" station service water pump. When the pump started the alternate RPS power supply electric protection assembly (EPA) breaker tripped resulting in a loss of RPS power, actuation of the Nuclear Steam Supply Shutoff System (NS4) logic and closure of the outboard main steam line drain valves. The NCO verified all appropriate automatic actions were complete and verified reactor pressure was within the allowable limits of the vessel pressure/temperature curves. The RPS EPA was reset, the NS4 logic was reset and the steam line drains were reopened. Initial investigation determined the breaker had tripped on undervoltage when the service water pump was started. Operation continued on the alternate power supply, until the M-G set was returned to service, with no further incidents. The root cause of this event is design deficiency. Less than timely implementation of corrective actions was a contributing factor for this event.

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)
Reactor Protection System Alternate power supply

IDENTIFICATION OF OCCURRENCE

TITLE: Engineered Safety Feature Actuation - Main Steam Drain Line isolation due to Reactor Protection System power supply trip

Event Date: April 20, 1994
Event Time: 0005
This LER was initiated by Incident Report No. 94-088

CONDITIONS PRIOR TO OCCURRENCE

Plant in OPERATIONAL CONDITION 4 (Cold Shutdown)
Reactor Power 0% of rated, 0 MWe
All Control Rods fully Inserted
Reactor vessel hydrostatic test in progress

DESCRIPTION OF OCCURRENCE

On 4/20/94, control room personnel were performing an 18 month reactor pressure vessel hydrostatic surveillance test as the fifth refuel outage was nearing completion. Concurrent activities included scheduled repair, testing and system restorations in preparation for plant startup. One of the activities involved removal of the reactor protection system (RPS) motor-generator (MG) set for bearing replacement which required the "B" RPS bus to be powered via its alternate power supply. At 0005 hours the nuclear control operator (NCO - RO licensed) initiated a start of the "C" station service water pump. When the pump started the alternate RPS power supply electric protection assembly (EPA) breaker tripped resulting in a loss of RPS power, actuation of the Nuclear Steam Supply Shutoff System (NS4) logic and closure of the outboard main steam line drain valves. The NCO verified all appropriate automatic actions were complete and verified reactor pressure was within the allowable limits of the vessel pressure/temperature curves. The RPS EPA was reset, the NS4 logic was reset and the steam line drains were reopened. Initial investigation determined the breaker had tripped on undervoltage when the service water pump was started. Operation continued on the alternate power supply, until the M-G set was returned to service, with no further incidents.

ANALYSIS OF OCCURRENCE

The normal power for the Nuclear Steam Supply Shutoff System logic is supplied via the Reactor Protection System (RPS) motor - generator (MG) set. An alternate power supply is also available via a 480/120VAC power supply transformer. Both the normal and alternate power is routed through an Electrical Protection Assembly (EPA) breaker which monitors the frequency and voltage level of the power being supplied to the NS4 and RPS logic. When the frequency or voltage exceeds predetermined limits the EPA will isolate the power source to ensure the logic devices are not subject to conditions outside their design ratings. The RPS MG set is designed with a flywheel to provide stable generator output during interruptions and/or minor fluctuations in the MG set motor power supply. The alternate power supply transformers incorporated in the original system design do not have the capability of maintaining a fixed output voltage during transient conditions, that is, as the input voltage varies so will the output voltage.

The alternate power supplies have been known to be susceptible to voltage swings when large motors are started. When the service water pump was started the voltage drop on the AC distribution system was of sufficient magnitude and duration to cause a drop in the output of the alternate power supply transformer of sufficient magnitude to trip the EPA breaker.

This problem has been previously identified and a corrective action to replace the alternate power supply transformer with a regulating power transformer was implemented. Regulated output transformers were installed during the third refuel outage to replace the in use 480 to 120 VAC transformers; however, the output waveform of the new transformers was tripping the EPA in the unloaded condition and was subsequently disconnected. Engineering continued to evaluate changes that would eliminate the problem when a similar event occurred during the fourth refuel outage. Following this event, engineering proposed three options to rectify the problem. The selected option was a DCP which was targeted for installation during the fifth refuel outage. A review of the DCP installation instructions prior to the outage indicated the DCP could be installed at power and was not included in the outage. The DCP was scheduled to be performed during power operation following the outage.

Operations department procedures, used for the operation of the reactor protection system, had been revised previous to this event to caution operators that a loss of the alternate RPS power supply was possible when swapping infeed breakers to the electrical substations which supply the alternate power. Operator simulator training also included a scenario where the alternate power supply trips when a large motor is started and follow-up discussion of the alternate power supplies sensitivity to voltage swings induced during motor starts. Due to previous events, RPS MG-Set outages were minimized to avoid operation on the alternate power supply.

APPARENT CAUSE OF OCCURRENCE

The root cause of this event is design deficiency. The installed RPS/NS4 alternate power supply transformers are susceptible to voltage transients which are expected to occur during normal plant operation. Contributing factors for this event are, less than timely implementation of corrective actions for the installation and testing of the new power supply transformers. Additionally, Control room operators did not anticipate the consequences of starting a large electrical load while operating on the RPS alternate power supply.

PREVIOUS OCCURRENCES

There have been three previous events where the alternate power supply EPA breaker tripped resulting in an ESF actuation as reported in LER's 92-014-00, 91-015-00 and 90-033-00.

SAFETY SIGNIFICANCE

The Reactor Protection System and Nuclear Steam Supply Shutoff System are designed to perform their safety function in the event of a loss of logic power. All systems functioned as required therefore the health and safety of the general public was not compromised during this event.

CORRECTIVE ACTIONS

The station has committed to install and test the new alternate power supply transformers by year end.

Operations department will review this event with Supervisors and Control Operators emphasizing the sensitivity of the alternate RPS power supply until the DCP is completed.

Sincerely,

LPO Maag for RJ Hovey

R.J. Hovey
General Manager -
Hope Creek Operations

LLA/
SORC Mtg. 92-036
Recommended approval - Yes