PSE&G

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

Hope Creek Generating Station

August 5, 1991

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 91-007-01

This revised Licensee Event Report is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(i).

Sincerely,

J.J. Hagan
General Manager -
Hope Creek Operations

DAS/rbc

Attachment
SORC Mtg. 91-079

C Distribution

IE22

The Energy People

9108070113 910805
PDR ADOCK 05000354
S PDR

95-2173 (25M) 12-89

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 10

TITLE (4): FILTRATION, RECIRCULATION, AND VENTILATION SYSTEM (FRVS) UNITS DISCOVERED INOPERABLE DURING SURVEILLANCE TEST DUE TO BLOWN HEATER CONTROL FUSES - ENTRY INTO TECHNICAL SPECIFICATION 3.0.3

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 5	0 5	9 1	9 1	-	0 0 7 - 0 1	0 8	0 5	9 1		

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR: (CHECK ONE OR MORE BELOW) (11)					
POWER LEVEL	1 0 0	20.402(b)		20.405(c)		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)	XX	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
David A. Smith, Station Licensing Engineer	6 0 9 3 3 9 3 2 3 4

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	GJ	FU	A340	N					

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

ABSTRACT (16)

On 5/5/91, and twice on 7/6/91, during the course of performing a monthly Operations Department surveillance procedure on the Filtration, Recirculation, and Ventilation System (FRVS), three of the FRVS recirculation units were found to be inoperable due to blown fuses in the heater control circuits. On 5/5/91, the A, C, and D FRVS recirculation units each had one heater bank phase that was not energized, as such, the heater banks could not meet the kilowatt rating required by Technical Specifications and the subject units were declared inoperable. On 7/6/91, the A, D, and E units were determined to be inoperable for the same reasons. In each case, Technical Specification 3.0.3 was entered due to more than two trains being concurrently inoperable. The fuses were replaced, the heaters verified operational and the affected FRVS units were returned to operability, and Technical Specification 3.0.3 was exited prior to the requirement to initiate plant shutdown. The initiating cause of these events was the blown heater control fuses in the affected FRVS recirculation units. Engineering assesment of both events has determined that the primary cause of the fuses blowing to be excessive heat buildup in the heater control cabinets. The excessive heat in the panels resulted in derating of the subject fuses, and blowing of the fuses at lower than rated current levels. In each case, immediate corrective actions consisted of replacing the blown fuses, verifying the heaters operational, and returning the affected units to an operable status. Followup corrective actions have included test method revisions, design changes and temporary modifications to the heater control panels, and licensing reviews to ensure that the environmental qualification program requirements are being met. Testing and analysis of the FRVS unit heaters circuitry is continuing.

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)
Filtration, Ventilation, and Recirculation System
(EIIS Designation: BH)
Ventilation Unit (EIIS Designation: FCU)

IDENTIFICATION OF OCCURRENCE

Filtration, Recirculation, and Ventilation System (FRVS) Units Discovered Inoperable During Surveillance Test Due to Blown Heater Control Fuses - Entry Into Technical Specification 3.0.3

Event Date: 5/5/91; 7/6/91
Event Time: 0958; 0106; 1348
This LER was initiated by Incident Report Nos. 91-066, 91-100, and 91-101

CONDITIONS PRIOR TO OCCURRENCE

Plant in OPERATIONAL CONDITION 1 (Power Operation), Reactor Power 100%, Unit Load 1110 MWe.

DESCRIPTION OF OCCURRENCE

On May 5, 1991 while performing surveillance procedure HC.OP-ST.GU-0001(Q) revision 6 and on July 5, 1991 and July 6,1991, during performance of Technical Specification surveillance procedure HC.OP-ST.GU-0001(Q) revision 7, a fuse blew in the power supplies to the heaters of three units of the Recirculation subsystem of the Filtration, Recirculation, and Ventilation System (FRVS). The May 5, 1991 event was reported in LER 91-07-00 on June 4, 1991.

These fuses are located in the local heater control panels for the Recirculation subsystem filter trains. Upon discovery of the open circuits to the heaters, the entire FRVS Recirculation subsystem was declared inoperable in accordance with Technical Specification (TS) 3/4.6.5.3.2 which subsequently required entry into Technical Specification 3.0.3. In each instance the fuses were replaced the heaters verified operational and the affected Recirculation units declared operable. No power reductions were initiated as a result of entry into specification 3.0.3 because the units were declared operable within one hour.

ANALYSIS OF OCCURRENCE

The FRVS is a redundant safety related system consisting of two subsystems (Recirculation and the Vent). FRVS functions to maintain secondary containment negative pressure and filter airborn effluents during specific design basis events (DBE). It is similar in function to the Standby Gas Treatment System installed at most BWR's, but has many unique design features.

Discovery of the open circuits during performance of the required 31 day surveillance test resulted in the Shift Supervisor declaring the system Inoperable and entering the Action statements.

As committed to in the previous revision of this LER, PSE&G enhanced the surveillance procedure associated with this test. The enhancements included taking current readings for each of the three phases supplying the four banks of heaters. It was also theorized that the interlock on the door of the panel which deenergizes the heaters upon opening it, caused surges within the heater circuitry and blew the fuses. To enable taking the current readings without having to de-energize and re-energize the heaters, a method of taking the current readings at the MCC was also incorporated into revision 7 of the procedure. The July surveillance was the first time revision 7 of the procedure was utilized.

To restore operability of the system, the blown fuses were replaced, the heaters were verified operational, and Technical Specification 3.0.3 was exited. This situation occurred twice on 7/6/91. The second surveillance included obtaining temperature measurements of the fuses inside the panel by the system engineer who suspected that high temperatures inside the panel effected the fuses' current carrying capacity.

Upon discovery of the fuses blowing utilizing the revised procedure, various personnel representing Station Operations, Maintenance, Technical Department, Licensing, and Engineering met at the plant to provide expertise and management review to determine appropriate actions based on the difficulties encountered in during performance of revision 7 of the procedure. This included verification of operability IAW system design and surveillance requirements.

0 Specifically HCGS' 31 day Surveillance Requirement is "... the subsystem operates for at least 10 hours with the heaters on in order to reduce the buildup of moisture on the carbon adsorbers and HEPA filters". Other NPS TS require "... with the heaters OPERABLE" or "... with the heaters in automatic".

ANALYSIS OF OCCURRENCE, CONT'D

- It was reasoned that this wording difference resulted in an interpretation for the Surveillance test that required the heaters be on full demand continuously for the duration of the test. This was suspected to be much more rigorous than accident conditions would require.

- This conclusion was supported by the following: 1) While HCGS TS state the purpose of the heaters as "reduce the buildup of moisture on the carbon adsorbers" in the Surveillance Requirements, other TS state the same reason for their heaters in their Bases: 2) The high temperatures measured in the panel during HCGS surveillance testing are higher than the temperatures calculated by the vendor during environmental qualification (EQ) under assumed postulated accident conditions, also the vendor cycled the components during the test: 3) Operability of the Carbon, HEPA, and Heaters are all determined specifically through 18 month surveillance tests in all Technical Specifications examined.

- It was determined that the demand for the heaters imposed by the HCGS test was not necessary or within the design requirements of the system. This determination was enforced by the methodology of the vendor's EQ test which utilized cycling heater components.

- Based on this determination, the surveillance test was subsequently revised to reflect actual system standby conditions and the test was reperformed successfully. The heaters were set at the demand necessary to "reduce the buildup of moisture" i.e. 55% set point, and fulfill the Surveillance Requirement.

- Two open items were identified at this time to follow-up and ascertain full and continued Operability including; 1) Determine the impact of past testing on EQ documentation end of life and update as necessary and 2) Determine the actual duty cycle of the heaters for the most severe design basis event and incorporate it into the 18 month surveillance

- A multi-discipline team was identified to resolve these items and mobilized that night. Over the course of the investigation by the team lead by the Nuclear Electrical Engineering Manager, it became evident that specific calculations to support the sizing of the FRVS recirculation system heaters were not available, therefore a design basis reconstitution effort was begun.

ANALYSIS OF OCCURRENCE, CONT'D

0 It was soon determined that the carbon adsorbers would remain dry through a combination of fan heat and less than 100kw of heaters to assure adequate iodine removal and fulfill the system's safety related function.

0 The fans in the system upstream of the carbon beds reduce the in-coming air stream's relative humidity from assumed saturated (100% relative humidity) conditions to 78% relative humidity (RH). The demand on the heaters to assure the TS RH of 70% was established later as 41kw in combination with the fan heat. This is significantly below the available 100kw installed and less than half of the four heater banks installed in the units. Only a single bank had ever been partially effected in past testing and was not expected to exceed two if extrapolated to accident conditions.

Based on this, only the EQ issue appeared outstanding until testing could be performed. It was determined that insitu testing representative of the past surveillance tests would need to be conducted to provide new EQ baseline data and to verify availability of the minimum number of heaters. The testing was performed on a single Recirculation panel and a single Vent panel.

Prior to conducting the testing, thermographies of the panels were performed, as was an evaluation of potential heat sensitive components. Conservative actions to provide increased margin were taken after a re-review of the panel design and configuration. The panel enhancements assured integrity of the panel while the investigation continued and the test procedures developed. Components were replaced or jumpered out of the panel circuitry and were covered by temporary modifications or design changes. Other panel enhancements included replacement of the existing fuses with fuses that provide better protection and coordination from instantaneous overcurrent. The panel doors were also removed to promote heat dissipation.

The first test was designed to establish new EQ parameters and end of life of components in the modified configuration. The test was also designed to verify 41kw of heaters would remain energized.

ANALYSIS OF OCCURRENCE, CONT'D

The second test included testing of representative Vent and Recirculation panels in the pre-modified/prior surveillance procedure revision configuration. The objective was to establish the temperature parameters and resultant end of life. The test was to also verify enough heater capacity (41kw for Recirculation) would have remained available to support carbon Operability had a DBE LOCA occurred prior to the discovery of the system problems.

Test results of the modified Recirculation panels test were released on July 22, 1991. The data and calculations verify that the panels are fully qualified and capable of performing their safety related function for the full 110 days assumed in the EQ data packages. Sufficient heaters remain available to provide the 70% RH designated in the TS. However, new end of life replacement dates based on measured parameters and past usage need to be incorporated into the EQ component replacement program.

Test results on the modified Vent panels yielded data and calculations that indicate present EQ documentation cannot support 110 day EQ requirement now described in the EQ data packages. The data is suspected to be the result of proximity of heat producing components to heat sensitive components in the panel.

The 110 day function is an established value for the HCGS EQ program for post accident operability time based on temperature. PSE&G is presently establishing post accident operability requirements for each component in the FRVS vent heater panel. Additional testing by the vendor is ongoing. In parallel, additional modifications to remove heat sensitive and heat generating components are being investigated, as is installation of "muffin fans" to circulate cool air. Results of these efforts are expected to be in place soon. Two options exist to resolve this item completely including:

1) Qualify the panels and components completely for 110 days by test and/or modification and amend the documentation or

2) Assess dose mitigation provided by existing or modified configuration (if qualifiable to less than 110 days) and compare to existing License dose assumptions through a 10CFR50.59 review.

ANALYSIS OF OCCURRENCE CONT'D

A Justification for Continued Operation (JCO) has been prepared in accordance with Generic Letter 86-15 to allow power operation of the Station until the outstanding EQ issues are resolved.

APPARENT CAUSE OF OCCURRENCE

The original assessment of the cause of the fuses blowing was apparently not correct. The implementation of the corrective actions imposed by revision 7 of the surveillance procedure did not preclude the blowing of fuses. Since then it has been determined through extensive analyses, tests, and consultation with the vendor that the buildup of heat within the panels is not what was assumed in the design of the circuits or provided for in the EQ testing parameters. Excessive heat down-rated the fuses current carrying capacity. The modified configuration of the panels have been tested and confirms the root cause of the fuses blowing has been identified and corrected.

PREVIOUS OCCURRENCES

This is a revision to a previous LER for a similar event in May 1991. No other reportable occurrences of a similar nature have been experienced at Hope Creek.

SAFETY SIGNIFICANCE

Post accident function of the FRVS is based on the mitigation of thyroid doses to the public below those assumed in the UFSAR and SER. It is known that the FRVS Recirculation units will continue to function fully for the full 110 days and the Vent units will fully function for at least 24 days. Therefore, EQ documentation for the Vent units required by 10CFR50.49 is not currently available for the 110 day function. However the safety significance is considered negligible for the following reasons;

The heaters assist in lowering the relative humidity of the incoming air stream to 70% from saturated conditions by heating it. Efficiency of the carbon adsorbers as iodine scrubbers is directly related to relative humidity and moisture absorption by the carbon filter banks. PSE&G has performed calculations to determine the effect that potential loss of the heaters in the vent system has on the combined efficiency assigned to the FRVS Recirculation and Vent filters.

SAFETY SIGNIFICANCE, CONT'D

While the results of this calculation indicate an efficiency below that calculated from Technical Specification Surveillance Requirements, the effective value is within the band between the Technical Specification calculated value and the value provided in the UFSAR. This is an extremely conservative calculation in that no credit is taken for Vent heaters at all.

This is despite the fact that the Vent heaters would be available for at least 24 days after an accident.Most of the potential iodine activity is expected to be released within 2 days following the accident.

PSE&G has determined that the FRVS is credited for thyroid dose mitigation under two specific limiting accident scenarios, the fuel bundle drop accident and a DBA LOCA within containment. The fuel bundle drop accident is a relatively mild environment accident for temperature considerations. Because of this, the EQ documentation presently on file is valid to assure continuous availability of the system for as long as needed and credited in the UFSAR.

The FRVS is credited for thyroid dose mitigation following a DBA LOCA within containment. It is also committed to being able to process a saturated air stream (100% relative humidity) as needed for 110 days per Regulatory Guide 1.52 and EQ requirements . This is despite Chapter 15 of the UFSAR stating that fuel damage is not expected to occur during a LOCA. The FRVS is expected to accept and process three potential containment leakage paths including MSIV leakage, seepage from containment through penetrations, and expected leakage/drains from equipment in secondary containment. Per calculations performed by Bechtel for HCGS, the 4 million cubic feet of secondary containment volume is not expected to approach near 100% relative humidity given these inputs. Therefore the iodine removal efficiency of the carbon will likely be significantly higher than that discussed above.

As previously discussed, the FRVS is installed to perform thyroid dose mitigation post LOCA and fuel bundle drop accident. The other functions of the system, including its requirement to maintain secondary containment integrity by inducing negative pressure in the building, and providing a monitored effluent release point are unaffected by the lack of EQ documentation. The heaters are installed to enhance the effectiveness of the carbon adsorber. However, the potential loss of the heaters in the Vent subsystem does not render the filter system ineffective.

SAFETY SIGNIFICANCE, CONT'D

The PSE&G Engineering Sciences Group has evaluated HCGS for the potential to experience a design basis LOCA with fuel damage. It has been determined that the FRVS system has the probability of being fully challenged at a frequency of less than 3.2 x e-8 per year.

It can be reasonably expected to be able to further qualify the components within the FRVS panel without additional modifications. However modifications may be implemented in parallel with the supplemental testing to provide additional conservative margin. The lack of documentation is the result of terminating the previous qualification test when it was determined the component could perform its intended function under the conditions and durations specified. The testing was not performed to destruction and the components functioned normally until the test was completed.

CORRECTIVE ACTIONS

1. The blown heater control fuses were replaced.

2. The 31 day Surveillance procedure was modified to reflect the actual intent of the Surveillance Requirement.

3. The 18 month surveillance will be revised to incorporate the results of the analysis of the design basis.

4. EQ documentation to support post accident operation of the FRVS Vent heaters will be revised to reflect test data.

5. New replacement dates for components based on the new EQ data will be incorporated into the end of life replacement program.

6. A Justification for Continued Operation in accordance with Generic Letter 86-15 has been prepared for the vent system heater panels to remain in effect until supplemental testing is complete.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION																		
FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)												PAGE (3)				
		YEAR	\\	NUMBER			\\	REV										
HOPE CREEK GENERATING STATION	05000354	91	-	0	0	7	-	0	0					1	0	OF	1	0

CORRECTIVE ACTIONS, CONT'D

7. Determination of past operability in the pre-modified configuration will be performed. Notification to the NRC will be made if the units are found to have been inoperable.

8. The panel vendor (Nutherm) has been notified and a 10CFR21 evaluation is in progress.

Sincerely,

J.J. Hagan
General Manager -
Hope Creek Operations

DAS/rbc

SORC Mtg. 91-079