



Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038-0236

Nuclear Business Unit

APR 12 1996

LR-N96102

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 NO. 96-008-00

This Licensee Event Report entitled "Plant Operation with Control Rod Withdrawal Speeds Outside of Design Basis Due to Mis-Adjustment of Control Rod Drive System Flow Control Needle Valves" is being submitted pursuant to 10CFR50.73(a)(2)(ii)(B).

Sincerely,

Mark E. Reddemann
General Manager -
Hope Creek Operations

JWK
SORC Mtg. 96-045

C Distribution
 LER File

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S PDR

The power is in your hands.

LICENSEE EVENT REPORT (LER)

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digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TITLE (4)
Plant Operation With Control Rod Withdrawal Speeds Outside of Design Basis Due to Mis-Adjustment of Control Rod Drive System Flow Control Needle Valves

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 NAME	DOCKET NUMBER
05	10	92	96	-- 008	-- 00	04	12	96	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
POWER LEVEL (10)	0	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(viii)					
		20.2203(a)(1)	20.2203(a)(3)(i)	X 50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)					
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71					
		20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER					
		20.2203(a)(2)(iii)	50.36 ⁽¹⁾	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A					
		20.2203(a)(2)(iv)	50.36 ⁽²⁾	50.73(a)(2)(vii)						

LICENSEE CONTACT FOR THIS LER (12)

NAME John Karrick, LER Coordinator	TELEPHONE NUMBER (Include Area Code) (609) 339-5298
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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
X YES (If yes, complete EXPECTED SUBMISSION DATE):	NO				05	30	96

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On March 14, 1996 it was discovered that on various past occasions, the Hope Creek Generating Station had operated outside of the plant's design basis for control rod withdrawal speeds. These occurrences involved operation with control rod withdrawal speeds that were faster than the design basis assumptions used in the analysis for a Rod Withdrawal Event. The cause of the excessive withdrawal speeds was mis-adjustment of the Control Rod Drive system's flow control needle valves and procedure inadequacy. Operation of the plant in the power range with the rod withdrawal speeds outside of their design values did not nor could it have resulted in a violation of the Minimum Critical Power Ratio (MCPR) safety limit. Operator with the faster withdrawal speeds in the startup range is bounded by supplemental analyses for Rod Withdrawal Events which was provided by General Electric. Therefore, these events had minimal safety significance. Corrective actions include revisions to the Updated Final Safety Analysis Report (UFSAR) and the procedure used to adjust the rod speeds, as well as a review of vendor and UFSAR information pertaining to the Control Rod Drive System. A supplement to this report will be issued to provide complete root cause information.

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

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)
Control Rod Drive System (CRD) (EIIS Identifier AA)

IDENTIFICATION OF OCCURRENCE

Event Date(s): May 10, 1992 and August 5, 1994
Discovery Date: March 14, 1996

CONDITIONS PRIOR TO OCCURRENCE

Discovery Date: OPERATIONAL CONDITION 5 (Refueling). There were no structures, systems, or components that were inoperable at the start of this event that contributed to this event.

DESCRIPTION OF OCCURRENCE

On March 14, 1996, a discrepancy was discovered by an NRC inspector between the Hope Creek Generating Station (HCGS) Rod Withdrawal Event analysis in the Updated Final Safety Analysis Report (UFSAR) and the procedure that is used to adjust control rod withdraw speeds (HC.OP-FT.BF-0001Q). The Rod Withdrawal Event analysis assumes a withdraw speed of 3.6 inches per second, which corresponds to a stroke time of 40 seconds for the rod to withdraw its full length. The procedure allows a minimum stroke time of 39 seconds, which is a less conservative value than what the analysis assumes.

A review of as found data for the control rod stroke time tests performed during Refuel Outage (RFO) 6 revealed that (15) control rods had stroke times less than 39 seconds and (5) other rods had times that fell between 39 and 40 seconds. None of the (15) rods that were less than 39 seconds had speeds faster than 28.8 seconds or a rate of greater than or equal to 5.0 inches per second. These control rods were all adjusted to a value greater than 43.2 seconds prior to startup from RFO 6.

A review of Rod Withdrawal Event (RWE) analyses performed by General Electric for other plants, which was determined to be applicable to Hope Creek, indicates that changes to rod withdraw speeds from 3.0 to 5.0 inches per second are bounded within the margins of the RWE analysis and operation with rod speeds slower than 5.0 inches per second does not pose a safety concern.

However, during this investigation, data from previous control rod withdraw speed testing was reviewed. The results of this review indicated that the withdrawal speed for control rod 10-35 during a plant startup conducted on August 4, 1994, was 26.4 seconds which is equivalent to a rate of 5.5 inches per second. Additionally, on May 10, 1992, control rod 22-35 was documented as having a withdrawal speed of 28.8 seconds which is equivalent to a rate of 5.0 inches per second.

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The operation of the plant with control rod withdrawal speeds faster than the value in the UFSAR RWE analysis constituted operation outside of the design basis of the plant and is being reported pursuant to 10CFR50.73(a)(2)(ii)(B).

Control rod 10-35 was adjusted to 46.8 seconds on August 5, 1994, one day after the startup. Control rod 22-35 was adjusted to 51.8 seconds on October 12, 1992, after work was performed during Refuel Outage 4.

Several other control rods were identified as having as left stroke times between 39.0 and 40.0 seconds during past refuel outages. It is recognized that these were also outside of the assumptions in the Hope Creek UFSAR RWE analysis, but as stated above, the GE review of this data indicated that these rod speeds are bounded by the margins in the RWE analysis.

ANALYSIS OF OCCURRENCE

Control rod 10-35 was stroke timed at power as a retest under a work order on August 5, 1994. The rod withdraw time was recorded as 2.2 seconds from position 04 to 08 which indicates a full stroke time of 26.4 seconds or a rate of 5.5 inches per second. The last stroke time test for this rod was on October 20, 1992. At that time, the as found withdraw speed was 43.1 seconds and no adjustments were necessary.

Adjustments to the withdraw speed is normally accomplished by adjusting the flow control needle valve (FCV) that is integral to the design of the CRD system's directional control valves (DCV). Prior to August 1994, these valves were adjusted to free rods that experienced difficulty in moving. This practice was discontinued because it did not address the problems causing the rods to stick and because of the potential to adversely impact rod speeds. It has been concluded that an adjustment was made to the FCV at some time prior to the August 5, 1994 discovery date that caused the increased rod speed. This conclusion is supported by the fact that the rod speed was returned to within specifications by re-adjusting the FCV without any other work on the rod drive mechanism.

Control rod 22-35 was stroke timed at power on May 10, 1992 also as a result of a work order written because of observed double notching. The as found withdraw speed was recorded as 2.6 seconds from position 04 to 08, which corresponds to a stroke time of 31.2 seconds and a rate of 4.6 inches per second. In this case, the rod speed was not able to be adjusted to a lower value because the rod was unable to be stroked if the FCV was throttled any further. After several attempts were made at lowering the speed, the FCV was throttled to an as left value that corresponds to 28.8 seconds and a rate of 5.0 inches per second.

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APPARENT CAUSE OF OCCURRENCE

The apparent cause of the excess withdraw speed for control rod 10-35 is the mis-adjustment of the flow control needle valve. This could have occurred at any time between October 20, 1992 and August 5, 1994, most probably during a startup evolution to free the rod. This apparent cause is supported by the following: (1) The rod was recorded as having double notched three times during the August 4, 1994 startup. (2) Once the FCV was properly set on August 5, 1994, the stroke time remained satisfactory when next tested on March 8, 1996 during RFO 6. (3) The rod has not double notched since its speed was properly set on August 5, 1994.

The apparent cause of the excess withdraw speed for control rod 22-35 is also mis-adjustment of its flow control needle valve. However, it is known that this FCV was throttled open to this position on May 10, 1992 in order to prevent potential rod sticking. The cause of the control rod sticking was later determined to be from leaking directional control valves which were repaired on October 12, 1992, during RFO 4. After these repairs, control rod 22-35 was adjusted to be within acceptable withdraw speeds and no further sticking was observed. Subsequent stroke times measured during RFO 6 were satisfactory.

The apparent cause of the other rods that had as left values between 39.0 and 40.0 seconds in past outages was a discrepancy in the procedure used for testing and adjusting withdrawal speeds (HC.OP-FT.BF-0001Q).

The root cause evaluation into all of these issues was still in progress at the time this report was issued. Further root cause information will be provided in a supplement to this LER.

ASSESSMENT OF SAFETY CONSEQUENCES

Control rod withdrawal speed is an input to the Rod Withdrawal Event (RWE) transient analysis since the rate of reactivity addition effects energy deposition in the fuel bundle. For the analysis of a RWE in the startup range, it must be shown that the peak enthalpy criteria of 170 calories/gram is not exceeded and in the power range, the Minimum Critical Power Ratio (MCPR) safety limit is not violated. Further GE analysis was requested upon discovery of the subject two control rods as well as (8) others that had recorded speeds greater than or equal to 5.0 inches per second.

The other (8) rods with high withdrawal speeds were observed during post maintenance testing and adjusted prior to plant operation at power and as such are not being considered as occurrences of plant operation outside of design basis.

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The additional analysis evaluated the impact of rod speeds up to 8.0 inches per second (18.0 seconds total) which bounds all of the as found withdrawal speed data. Withdrawal speeds up to 8.0 inches per second in the startup range does not affect the conclusions of the Hope Creek UFSAR RWE analysis because the peak enthalpy criteria of 170 calories/gram is not exceeded. In the power range, the faster speed could possibly result in a small overtravel to the next Rod Block Monitor position. However, previous GE evaluations and a review of the RWE analysis show that this effect is less than a 0.01 change in Critical Power Ratio (CPR). The faster withdrawal speeds documented in this event could not have resulted in a violation of the MCPR safety limit in the power range or the RWE analysis for startups.

The scram insertion times of the subject rods were not affected by the mis-adjustment of the FCVs; therefore, the ability of the control rods to scram was not affected by this condition.

PREVIOUS OCCURRENCES

There have been no previous similar events involving the Control Rod Drive system in the last three years at the Hope Creek Generating Station.

CORRECTIVE ACTIONS

1. The additional analyses provided by GE will be incorporated into the Hope Creek UFSAR. This revision will be implemented by September 27, 1996.
2. Hope Creek procedure HP.OP-FT.BF-0001(Q) will be revised to ensure that as found rod speeds are adjusted to within 10% of the allowed value, require that all rods are stroke timed at least once per 18 months, and incorporate the UFSAR values for withdrawal speed. This procedure revision will be implemented by June 14, 1996.
3. A review of GE Technical Information (GEKs) applicable to operation, maintenance, and testing of the CRD system will be performed to ensure plant procedures are consistent with vendor recommendations. This review will be completed by June 13, 1996.
4. The sections of the UFSAR pertaining to the CRD system will be reviewed to ensure consistency with plant implementing procedures. This review will be completed by June 27, 1996.
5. The root cause will be completed and a supplement submitted for this LER. The expected submission date for the supplement is May 30, 1996.