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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TEXAS 76012

April 3, 1980

Docket No. 50-285

Omaha Public Power District
ATTN: W. C. Jones, Division Manager -
Production Operations
1623 Harney Street
Omaha, Nebraska 68102

Gentlemen:

The enclosed IE Circular No. 80-07 is forwarded to you for information. No written response is required. Should you have any questions related to your understanding of the recommendations on this matter, please contact this office.

Sincerely,

Karl V. Seyfrit

Karl V. Seyfrit
Director

Enclosures:
1. IE Circular No. 80-07
2. List of IE Circulars
Recently Issued

cc: S. C. Stevens, Manager
Fort Calhoun Station
Post Office Box 98
Fort Calhoun, Nebraska 68102

8004180158

SSINS: 6830
Accession No.:
8002280657

UNITED TATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

PROBLEMS WITH HPCI TURBINE OIL SYSTEM

Description of Circumstances:

During 1979, a number of events were experienced at BWRs in which the High Pressure Coolant Injection (HPCI) system failed to perform its function due to HPCI turbine problems. Most of the failures were found during normally required surveillance testing, although others occurred during demand conditions. Events which are examples of these occurrences are described below. The turbines in these events were Terry Steam Turbines.

Failure Due to Water in the HPCI Turbine Oil System:

Georgia Power Company reported on June 4, 1979, that the Hatch Unit 2 HPCI system failed to function upon receiving an initiation signal. The turbine-driven HPCI pump failed to start because the turbine steam stop valve failed to open. Investigation revealed water in the turbine oil system, which is a combined lubrication and hydraulic control system. Hydraulic oil pressure is supplied to the turbine control and the stop valves and also to system bearings by an auxiliary DC powered oil pump during startup and then by the shaft-driven hydraulic oil pump when the turbine reaches operating speed.

The water contamination changed the oil characteristics; as a result, sufficient hydraulic oil pressure was not developed to open the turbine stop valve.

Two sources of water inleakage into the turbine oil system were identified. One source of leakage was determined to be from a defective mechanical seal on the HPCI pump seal injection line. A second source of inleakage was determined to be the oil cooler. Repairs to the cooler tube sheet and mechanical seal were made. Additional corrective action included locking open the bracket cavity drain valve which had not been included on system drawings or procedures, and the initiation of routine sampling of the turbine oil system.

Failure of Hydraulic Cylinder Seal in HPCI Turbine Stop Valve:

Nebraska Public Power District reported at the Cooper Station that on August 9, 1979, upon receipt of an auto start signal, the HPCI system did not properly start. However, a short time (14 minutes) after the initiation signal, the HPCI did start and maintained reactor vessel water level. Investigation showed that the initial failure of the HPCI system to start was due to the

failure of the HPCI turbine stop valve to open. Further investigation revealed a failure of the seal rings in the hydraulic cylinder actuator of the turbine stop valve. The seal rings were allowing oil leakage to bypass the piston of the operator and insufficient force was available to open the stop valve at full system steam pressure.

The HPCI turbine stop valve is a vertically mounted, hydraulically operated, piston type globe valve with the actuating cylinder on the bottom and an internal balance chamber on top of the globe valve piston. The balance chamber functions to provide smooth operation of the valve during its actuation. This function is provided by an internal orificed steam passage which permits a portion of the incident steam pressure to accumulate in the balance chamber. During this event the valve actuation did not have sufficient force, due to the leaking seal rings, to overcome the initial steam pressure in the balance chamber. As the main steam pressure decreased to about 600 psig after the reactor scram, the force on the valve actuator piston became sufficient to open the stop valve thereby permitting the HPCI turbine to start and aid in restoring the water level in the reactor.

The failed piston ring seals were fabricated from resin impregnated leather. The design and failure causes were reviewed by General Electric together with Terry turbine and component suppliers and the review resulted in recommending that the hydraulic cylinder be examined for bypass leakage and replacement of the seals upon determination of excess leakage. It was also recommended that subsequent seal replacement be placed on a five year schedule.

Recommended action for BWR licensee's and permit holder's considerations:

All holders of operating licenses for BWR power reactor facilities having Terry turbines should be aware of the potential problems described above (it is noted that the seal problem is related to the HPCI turbine and not to the RCIC turbine which does not use a hydraulic actuated stop valve). It is recommended that the matters identified above be reviewed at your facility in the following respects:

1. Each BWR licensee should assure that the as-built system is consistent with operating procedures and drawings, and that their preventive maintenance program includes the means of routinely detecting water or other deterioration of the turbine oil systems. Periodically, the turbine oil should be sampled for moisture immediately following turbine operation. Procedures specifying appropriate corrective actions should be provided as necessary.

2. Each BWR licensee should initiate an examination of the stop valve hydraulic cylinder seals for excess bypass leakage and proceed with seal replacement on determination of excess leakage followed by the recommended 5 year schedule. Thereafter, periodic re-examinations of the seals are to be made to provide assurance that seal replacements are functioning as required.

All holders of construction permits for BWR power reactor facilities should be aware of the potential problems identified above and initiate appropriate procedures prior to initial fuel loading.

This Circular is being forwarded for information to all other power reactor facilities with an operating license or construction permit. No written response to this Circular is required. If you need additional information regarding these matters, contact the Director of the appropriate NRC Regional Office.

IE Circular No. 80-07
April 3, 1980

RECENTLY ISSUED
IE CIRCULARS

Circular No.	Subject	Date Issued	Issued To
80-01	Service Advice for GE Induction Disc Relays	1/17/80	All licensees of nuclear power reactor operating facilities and holders of nuclear power reactor Construction Permits (CPs)
80-02	Nuclear Power Plant Staff Work Hours	2/1/80	All holders of Reactor Operating Licenses (OLs), including research and test reactors, and Construction Permits (CPs)
80-03	Protection from Toxic Gas Hazards	3/6/80	All holders of a power reactor Operating License (OL)
80-04	Securing of Threaded Locking Devices on Safety-Related Equipment	3/14/80	All holders of a power reactor Operating License (OL) or Construction Permit (CP)
80-05	Emergency Diesel-Generator Lubricating Oil Addition and Onsite Supply	4/1/80	All holders of a power reactor Operating License (OL) or Construction Permit (CP)
80-06	Control and Accountability Systems for Implant Therapy Sources	4/14/80	Medical licensees in Categories G and G1

Enclosure