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John G. Cook
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JGC-322-94

October 28, 1994

10CFR50.73

Docket No. 50-461

Document Control Desk
Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Clinton Power Station - Unit 1
Licensee Event Report No. 94-008-00

Dear Sir:

Enclosed is Licensee Event Report No. 94-008-00: Reactor Recirculation (RR)
Pump Discharge Valves Outside Seismic Design Basis Due to Loose Yoke Connections,
Cause Unknown. This report is being submitted in accordance with the requirements of
10CFR50.73.

Sincerely yours,

J. G. Cook
Vice President

RSF/csm

Enclosure

cc: NRC Clinton Licensing Project Manager
NRC Resident Office, V-690
Regional Administrator, Region III, USNRC
Illinois Department of Nuclear Safety
INPO Records Center

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LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS
INFORMATION COLLECTION REQUEST: 50.0 HRS.
FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE
INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB
7714), 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.

FACILITY NAME (1)

Clinton Power Station

DOCKET NUMBER (2)

05000461

PAGE (3)

1 OF 5

TITLE (4) Reactor Recirculation (RR) Pump Discharge Valves Outside Seismic Design Bases Due to Loose Yoke Connections, Cause Unknown

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
04	17	94	94	008	00	10	28	94	None	05000
									FACILITY NAME	DOCKET NUMBER
									None	
OPERATING MODE (9)		4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.402(b)			20.405(c)			50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		000	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
			20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text.
			20.405(a)(1)(iv)			X 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)	NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME

J. A. Neuschwanger, Assistant Director-Plant Operations

TELEPHONE NUMBER (Include Area Code)

(217) 935-8881, Extension 3326

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
X	AD	ISV	A391	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES

(If yes, complete EXPECTED SUBMISSION DATE).

X

NO

EXPECTED
SUBMISSION
DATE (15)

MONTH

DAY

YEAR

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

On September 29, 1994, engineers identified that the yoke connections of the discharge isolation valve (ISV) on both reactor recirculation (RR) loops did not meet seismic qualification requirements in the condition they were found on April 17, 1994. This condition was outside the plant's design basis. The plant was in COLD SHUTDOWN for a planned outage on April 17, 1994, when main control room operators attempted to electrically close the "A" RR pump discharge ISV to isolate the loop for replacement of the pump seal. The valve would not fully close. Loose and missing studs/nuts found at the valve's yoke connection caused the valve and actuator to bind, preventing full closure. The "B" RR discharge ISV also had loose studs/nuts in its yoke connection. An engineering evaluation concluded that the structural integrity of the yoke connections could not be assured during an operating basis earthquake event in the condition they were found. The cause of the loose bolts is unknown. Possible causes include piping vibration, thermal cycling, and improper installation during manufacturing/construction. Corrective actions for this event include applying Loctite to the threads of the studs/nuts and properly tensioning the yoke connections, and reinspecting the connections during the next refueling outage.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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

DESCRIPTION OF EVENT

On September 29, 1994, Nuclear Station Engineering Department (NSED) engineers identified that reactor recirculation (RR) system [AD] pump [P] discharge isolation valves [ISV] 1B33-F067A and 1B33-F067B did not meet seismic qualification requirements in the conditions they were found on April 17, 1994, during planned outage (PO)-6.

On April 17, 1994, the plant was in Mode 4 (COLD SHUTDOWN) for PO-6, reactor coolant temperature was about 190 degrees Fahrenheit and pressure was zero pounds per square inch.

At about 1114 hours, the RR system was shut down in preparation for replacing the "A" RR pump seal [SEAL]. In accordance with system operating procedure CPS 3302.01, "Reactor Recirculation (RR)," and in preparation for isolating the "A" RR loop, main control room (MCR) operators attempted to electrically close the "A" RR pump discharge isolation valve 1B33-F067A. MCR instrumentation indicated the valve did not fully close.

At about 1300 hours, operators entered the drywell to investigate the valve position indication discrepancy and discovered the valve was in an intermediate position. Operators made additional attempts to electrically close the valve but were unsuccessful, the valve would not close beyond the intermediate position.

An operator stationed in the drywell observed that one of the four bolts used to connect the valve's yoke to the yoke extension was on the drywell floor. Maintenance Work Request (MWR) D50114 was initiated to investigate the problem. Condition report 1-94-04-026 was initiated to track a root cause and corrective action determination for this issue. The Operations shift supervisor (SS) was notified of the condition of the valve and he determined that the condition was not reportable under the provisions of 10CFR50.73.

The Maintenance investigation of the condition found that the valve and actuator were binding due to loose and missing yoke bolting materials thus preventing the valve from full closure. The valve and actuator assembly contains a yoke extension bolted to the valve bonnet (lower yoke connection) and a yoke bolted to the yoke extension (upper yoke connection). One of the four upper yoke connection studs/nuts was found on the floor and the other three were found installed at less than the required tension. In the lower yoke connection, three of the four studs/nuts were installed at the proper tension and one was installed at a greater than allowed tension. Maintenance also discovered blown control fuses [FU] on the valve's breaker [BKR] which were most likely caused by troubleshooting in the valve actuator limit switch compartment while attempting to determine the cause of the valve positioning problem. The fuses were replaced in accordance with the fuse control program.

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In accordance with the disposition of condition report 1-94-04-026, MWR D50280 was initiated to check the yoke bolting materials on the "B" RR pump discharge isolation valve 1B33-F067B for proper tension. Maintenance personnel found all studs/nuts in place, however, two of four studs/nuts on the upper yoke connection were tensioned less than required and all four studs/nuts were tensioned less than required on the lower yoke connection.

A root cause and corrective actions were assigned for condition report 1-94-04-026 and the condition report was reviewed and closed. The root cause and corrective actions are included in the CAUSE OF EVENT and CORRECTIVE ACTION sections of this LER.

On June 30, 1994, a routine Nuclear Assessment Department (NAD) review of the seismic qualification program implementation identified that an engineering evaluation should have been required per administrative procedure CPS 1016.01, "CPS Condition Reports," to address operability and determine the impact of condition report 1-94-04-026 on the valves' equipment qualifications prior to closing the condition report. The NAD reviewer initiated condition report 1-94-06-021 to track a root cause and corrective action determination for this discrepancy.

In response to condition report 1-94-06-021, on September 29, 1994, NSED completed an evaluation of the conditions of valves 1B33-F067A and 1B33-F067B found on April 17, 1994, and concluded that the structural integrity of the valve yokes and yoke connections could not be assured in the event of an operating basis earthquake (OBE). The valves have a passive safety function and are not required to operate during a safe shutdown earthquake event. Although the capability to position the valve is not a safety function, failure of the valve yokes during an seismic event could allow the valve actuators to fall on and potentially damage nearby control rod drive (CRD) system [AA] insert and withdraw lines.

With respect to the potential impact on the integrity/leak-tightness of the 1B33-F067A and 1B33-F067B valves, an engineering evaluation concluded that the postulated failure of the yoke connection described above would not result in a new leakage path for the valves.

On the basis of the engineering evaluation, the condition of the valves found on April 17, 1994, is considered to have been outside the design basis of the plant.

No automatic or manually initiated safety system responses were necessary to place the plant in a safe and stable condition. No other equipment or components were inoperable at the start of this event to the extent that their inoperable condition contributed to this event.

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CAUSE OF EVENT

The cause of the loose and missing valve yoke bolting material is unknown. A review of maintenance history did not identify any activity which would have loosened the yoke connections. Possible causes include vibration of the RR pump discharge lines, thermal cycling, and improper installation during manufacturing/construction.

The cause of not identifying the need for an equipment qualification impact evaluation in a timely fashion is attributed to personnel errors by the SS and the Corrective Action Review Board (CARB). The SS is responsible for reviewing CRs for impact on operations and reportability and should have recognized the missing bolting material identified in condition report 1-94-04-026 as a potential seismic qualification issue and requested engineering assistance in determining the impact on the equipment qualification. The CARB is responsible for reviewing and concurring with condition report root cause analyses and corrective action plans and should also have recognized the potential seismic qualification issue identified by the CR and required an engineering evaluation.

CORRECTIVE ACTION

Loctite was applied to the threads of the studs/nuts of the upper and lower yoke connections in valves 1B33-F067A and 1B33-F067B, and the studs/nuts were tensioned to the proper value. Valve 1B33-F067A was electrically stroked with satisfactory results.

The application of Loctite to the threads of the bolting materials is expected to prevent the studs/nuts from loosening again. However, the bolted connections will be inspected during the fifth refueling outage (RF-5) in accordance with MWR D50008 to verify the studs/nuts have not loosened and have retained the proper tension.

Operations shift and assistant shift supervisors and the permanent CARB members and their alternates will complete required reading of this LER to enhance their understanding of the errors made.

A discussion of this event will be added to the existing periodic seismic qualification refresher training given to Operations, Maintenance, engineering and Nuclear Assessment personnel.

ANALYSIS OF EVENT

This event is reportable under the provisions of 10CFR50.73(a)(2)(ii)(B) because the as-found condition of the valves is considered to be outside the design basis of the plant.

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IP has assessed the safety consequences and implications of this event and has concluded that if an OBE were to occur and the actuators were to fall on and damage CRD system insert and withdraw lines, reactor pressure vessel [RPV] water could leak through the damaged piping and normal CRD system functions could be prevented. However, depending on which lines were damaged (insert or withdrawn lines, or both), if reactor pressure was greater than 600 pounds per square inch gauge (psig) control rods would insert due to reactor pressure or would be capable of being inserted on a reactor scram signal. If reactor pressure was less than 600 psig, control rods with damaged CRD lines may not insert or be capable of being inserted. However, the inability to shut down the reactor is unlikely due to the combination of conditions that must occur: the reactor must be critical; RPV pressure must be less than 600 psig; a seismic event of sufficient magnitude to cause failure of the valve yokes must occur; and the valve actuators must fall on and cause damage to the CRD lines to prevent a sufficient number of control rods from full insertion. Any reactor coolant leakage resulting from damaged CRD lines would be within the bounds of the loss of coolant accident analysis. On these bases, IP has concluded that this event has low safety significance.

The valves were reworked and available for service by April 22, 1994.

ADDITIONAL INFORMATION

Valves 1B33-F067A and 1B33-F067B are 20-inch gate valves, model 3630, manufactured by the Anchor/Darling Valve Company with SMB-1 motor actuators manufactured by the Limitorque Corporation.

LER 89-027 discusses the failure of the SS to recognize that a missing mounting screw for time delay relays [RLY] in the control room heating ventilating and air conditioning (VC) system [VI] affected the VC system operability. Corrective actions included briefing and training Operations and Maintenance personnel and periodic refresher training on how to preliminary assess the effect of discrepant conditions on seismic and environmental qualification.

LER 89-027 was dissimilar from LER 94-008 in that the missing mounting screw for the relay directly affected the VC system, a system required to be operable in accordance with the plant Technical Specifications, whereas, the loose yoke connections on the valves had no impact on the RR system's operability required by the plant Technical Specifications. Instead the loose yoke connections had a potential impact on surrounding equipment.

For further information regarding this event, contact J. A. Neuschwanger, Assistant Director-Plant Operations at (217) 935-8881, extension 3326.