NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(6-1998)

LICENSEE EVENT REPORT (LER)

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

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the 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. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Clinton Power Station	05000461	1 OF 4

TITLE (4)
Failure of the Motor Driven Reactor Feedwater Pump Regulating Valve Results in a Level Transient and the Insertion of a Manual Scram

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
									None	05000
05	14	1999	1999	- 008 -	00	06	12	1999	FACILITY NAME: None	DOCKET NUMBER: 05000

OPERATING MODE (9)	2	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	004		20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			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)	X	50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
P. J. Telthorst, Operations Support Manager	(217) 935-8881, Extension 3782

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	IB	ANN	D149	N	X	IG	DET	G080	Y
D	SJ	V	C600	Y					

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

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

On May 14, 1999, the reactor was in Mode 2 operation with feedwater being supplied to the reactor vessel by the Motor Driven Reactor Feed Pump (MDRFP). At approximately 0723 hours the MDRFP flow control valve, 1FW004, failed causing a reactor vessel level transient. Control room operators took manual control of feedwater flow but were unable to maintain reactor vessel level. Reactor vessel level increased to the level 8 trip setpoint and the MDRFP tripped on high vessel water level. A manual scram was initiated and all control rods fully inserted. The cause for this event was failure of the 1FW004 valve's hydraulic control system. This failure was due to inadequate written guidance used when performing maintenance on the valve earlier in the year. The corrective actions include: fixing the discrepancies that caused the 1FW004 valve to fail; replacing the hydraulic system fluid with new, filtered fluid; and developing a maintenance procedure for performing maintenance on the valve which will include the lessons learned from this investigation.

9906180039 990612
PDR ADOCK 05000461
S PDR

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4
Clinton Power Station	05000461	1999	- 008	- 00	

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

DESCRIPTION OF EVENT

On May 14, 1999, at 0720 hours, the plant was in Mode 2 (STARTUP), 4 percent reactor [RCT] power. Reactor vessel water level was approximately 34 inches as indicated on the narrow range reactor water level indicator [LI]. (Note: The reference point for reactor water level is 162 inches above the top of active fuel. This is zero inches as indicated by instrumentation.) Feedwater was being supplied to the reactor vessel by the motor [MO] driven reactor feedwater [SJ] pump (MDRFP) [P]. High pressure testing of the Reactor Core Isolation Cooling [BN] (RCIC) pump [P] in accordance with station procedures was in progress.

At approximately 0723 hours, a level transient occurred, resulting in indicated water level rising to approximately 42 inches. Control room operators, suspecting a malfunction of the MDRFP feed regulating valve, 1FW004, throttled shut feedwater shutoff valve 1B21-F065B in accordance with station procedures to control vessel water level. Reactor vessel water level returned to approximately 30 inches and 1B21-F065B was throttled open to re-establish feedwater flow to the vessel. Upon opening 1B21-F065B, reactor vessel level began to rise rapidly and 1B21-F065B was fully shut. Vessel level continued to rise with 1B21-F065B fully shut due to swell, and at approximately 0751 hours a level 8 isolation signal (52 inches) activated causing the MDRFP to trip on high vessel water level (Note: The level 8 automatic scram signal is bypassed in mode 2.). At approximately 0752 hours, the Control Room Supervisor (CRS) directed the reactor mode switch to be placed in the shutdown position which inserted a manual reactor scram signal. All control rods fully inserted into the reactor.

Operators entered the scram off-normal procedure and took actions to control reactor cooldown rate. The RCIC pump was secured manually at approximately 0754 hours. An automatic trip of the RCIC pump on reactor water level did not occur as the trip setpoint for this pump was not reached. The "B" mechanical vacuum pump was started, and the "B" Steam Jet Air Ejector (SJAE) was secured from service. The outboard main steam isolation valves (MSIVs) were shut, and reactor vessel cooldown rate was established at 70 degrees Fahrenheit an hour. At approximately 0942 hours, the scram off-normal procedure was exited.

During this transient all systems and components operated as expected with the exception of the following:

- The 1FW004 valve failed to automatically control reactor vessel water level. Action Request (AR) number F00419 was written to investigate this condition.

- Source Range Monitor (SRM) "D" read significantly higher than SRMs "A", "B", and "C" after the reactor was shutdown. This condition was investigated under AR F09874.

- Annunciator 5002-4P, feedwater valve control signal failure (1FW004), did not illuminate on failure of the 1FW004 valve. AR F00422 was written to investigate this condition.

Troubleshooting was performed to correct the deficiencies noted. Discrepancies with SRM "D" and annunciator 5002-4P were corrected. During troubleshooting of the 1FW004 valve, Maintenance personnel discovered a damaged position transducer caused by the transducer guide being misaligned. A washer on the transducer guide was rubbing against the position transducer when valve position changed causing damage to braided-steel shielding covering the position transducer. Necessary repairs were performed to correct the problems with the position transducer. Subsequent troubleshooting and testing of the valve was performed. The 1FW004 valve performed satisfactory. Because the failure mechanism of the valve had not been positively determined, additional instrumentation was installed to monitor the valve's performance and the reactor startup was recommenced on May 17, 1999.

On May 19, 1999, while the reactor was in Mode 2, 1FW004 failed to automatically control reactor vessel level. Operators took action to manually control reactor vessel level and the reactor was shutdown. Intensive troubleshooting of 1FW004 was initiated to determine the cause of this subsequent failure.

CAUSE OF EVENT

The level transient and subsequent manual reactor scram on May 14, 1999, and the plant shutdown on May 19, 1999, were caused by a failure of a servo valve in the hydraulic control system of the 1FW004 valve. In February 1999, preventive maintenance (PM), PMMFWR002, was performed on valve 1FW004 to disassemble, clean, inspect, and overhaul the valve's hydraulic operator. During performance of this PM, the servo valve was disassembled, rebuilt, and reassembled. Due to inadequate written guidance for performance of this task in February 1999, the servo valve failed resulting in improper operation of the 1FW004 valve.

An additional deficiency found during the investigation into the 1FW004 valve failure was high particulates in the valve's hydraulic system. This may have caused accelerated seat degradation of the servo valve.

CORRECTIVE ACTIONS

Maintenance was performed with the assistance of a qualified vendor to fix the discrepancies that caused the 1FW004 valve hydraulic control system to fail.

The hydraulic system fluid was drained and replaced with new, filtered fluid.

A station procedure will be developed for performing maintenance on the 1FW004 hydraulic control system. Lessons learned from this investigation are being incorporated.

ANALYSIS OF EVENT

This event is reportable under the provision of 10 CFR 50.73(a)(2)(iv) due to activation of an Engineered Safety System.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 4
Clinton Power Station	05000461	1999	- 008 -	00	

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

Analysis of the nuclear safety significance and consequences of this event has determined that this event had minimal safety significance. Safety systems operated as required and operators took action to place the plant in a safe and stable condition.

ADDITIONAL INFORMATION

Illinois Power (IP) has reported similar events where the 1FW004 valve failed to operate properly resulting in a reactor scram. LER 87-029-00 discusses an automatic reactor protection system (RPS) actuation caused by failure of valve 1FW004 due to a faulty solenoid valve and control circuit board. LER 87-025-00 discusses a manual RPS actuation caused by failure of valve 1FW004 due to the rupture of a pressure switch diaphragm. LER 89-022-00 discussed a manual RPS actuation caused by failure of valve 1FW004 due to discrepancies in the electric/electronic components of the valve.

The following components failed to operate properly during this event:

- 1FW004 hydraulic operator, model number A51212, manufactured by Control Components.
- Incandescent lamp for Annunciator 5002-4P, part number 507-3918-1573-600, manufactured by Dialight.
- SRM "D", model number 304A3710G005, manufactured by General Electric.

For further information regarding this event contact P. J. Telthorst, Operations Support Manager at (217) 935-8881, extension 3782.