

Clinton Power Station  
8401 Power Road  
Clinton, IL 61727

U-603959  
May 17, 2010

SRRS 5A.108

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555-0001

Clinton Power Station, Unit 1  
Facility Operating License No. NPF-62  
NRC Docket No. 50-461

Subject: Licensee Event Report 2008-003-00

Enclosed is Licensee Event Report (LER) No. 2008-003-00: Excessive Leakage through Feedwater Isolation Valve 1B21-F032A. This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(ii), a degraded or unanalyzed condition, and 10 CFR 50.73 (b)(2)(v), a condition that could have prevented the fulfillment of a safety function.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this report, please contact Mr. T. W. Parrent at (217) 937-3382.

Respectfully,



F. A. Kearney  
Site Vice President  
Clinton Power Station

RSF/blf

Enclosures: Licensee Event Report 2008-003-00

cc: Regional Administrator – NRC Region III  
NRC Senior Resident Inspector – Clinton Power Station  
Office of Nuclear Facility Safety – IEMA Division of Nuclear Safety

IE22  
NCR

**LICENSEE EVENT REPORT (LER)**

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

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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.

<b>1. FACILITY NAME</b> Clinton Power Station, Unit 1	<b>2. DOCKET NUMBER</b> 05000461	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
Excessive Leakage through Feedwater Isolation Valve 1B21F032A

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	21	2008	2008	003	00	05	17	2010		05000
									FACILITY NAME	DOCKET NUMBER
										05000

<b>9. OPERATING MODE</b> 5	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)									
<b>10. POWER LEVEL</b> 0	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)						
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER							
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A							

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME T. W. Parrent, Programs Engineer	TELEPHONE NUMBER (Include Area Code) (217) 937-3382
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	SJ	ISV	A391	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>
	MONTH DAY YEAR

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

On 1/28/08, primary containment local leak rate test (LLRT) performed on feedwater check valve, 1B21-F032A, exceeded acceptance criteria. Technical Specification (TS) Surveillance Requirement (SR) 3.6.1.3.11 requires that the combined leakage rate for both primary containment feedwater penetrations to be less than or equal to 2 gallons per minute (gpm) for the worst of the isolation valves. The measured leakage rate for 1B21-F032A was reported to be 3.75 gpm. Following the identification of the excessive leakage, an internal inspection of the valve was performed and the disc and seat conditions were found satisfactory. The air actuator was stroked with the top of the valve removed and was found not stroking consistently and evenly. The air actuator linkages were cleaned and lubricated resulting in the disc seating properly. The LLRT was performed with satisfactory results on 1/26/08, prior to plant startup. The cause of check valve 1B21-F032A failing leak rate testing is considered to be age-related degradation of lubrication causing increased friction in the actuator. Corrective action includes establishing preventive maintenance activities to lubricate and overhaul the actuators. Reportability of this event was not discovered until 3/24/10 during review of the cause evaluation for another LLRT failure.

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**NARRATIVE**

**EVENT DESCRIPTION**

On March 24, 2010, while reviewing the root cause report for failure of the local leak rate test (LLRT) for outboard feedwater [SJ] containment isolation valve [ISV] 1B21-F032B in refueling outage C1R12 (reported in LER 2010-002), a regulatory engineer identified that a similar test failure occurred during refueling outage C1R11 in 2008 for feedwater containment isolation valve 1B21-F032A. Evaluation of the 2008 test failure concluded that the failure should have been identified as a reportable condition under 10 CFR 50.72 and 10 CFR 50.73.

On January 21, 2008, with unit in Mode 5 (refueling) for refueling outage C1R11, results of a primary containment local LLRT performed on feedwater check valve, 1B21-F032A, exceeded acceptance criteria. Technical Specification (TS) Surveillance Requirement (SR) 3.6.1.3.11 requires the combined leakage rate for the primary containment feedwater penetrations to be less than or equal to 2 gallons per minute (gpm) through the worst of the isolation valves. The measured leakage rate for 1B21-F032A was reported to be 3.75 gpm and the measured leakage rate for 1B21-F032B was reported to be 0.08 gpm. The sum of the leakage rates was 3.83 gpm. This leakage rate is greater than assumed in the plant safety analysis.

Feedwater check valve 1B21F032A is a 20", Anchor Darling air-assisted testable check valve. This valve is one of the outboard containment isolation valves for Containment Penetration [PEN] 1MC-009. The air actuator consists of four, 4-inch double acting cylinders arranged in a scotch yoke design to assist in closing the valve disc for outboard containment isolation purposes. The actuator is not designed to close the valve against normal flow. The air to the cylinders is controlled by four solenoid [SOL] operated valves (SOVs), two in series to the open side of the cylinders and two in series to the closed side of the cylinders. During normal operations, the open side of the cylinders is pressurized which allows the disc to free swing, acting as a tilting disc check valve. In the closed mode, the close side of the cylinders is pressurized to force the disc in the close direction. A Loss of Coolant Accident (LOCA) signal de-energizes the SOVs and air from an accumulator [ACC] tank [TK] pressurizes the close side of the cylinders. Loss of Instrument Air [LD] or loss of power to the SOVs puts the actuator in the "close" mode (provides "closing assist force"). The reverse flow from Residual Heat Removal system [BO] will create a water seal on the outboard side of the feedwater system thus maintaining containment isolation.

Following the identification of the excessive leakage, an internal inspection of the valve was performed under Work Order 2647 that identified the disc and seat conditions were satisfactory. The air actuator was stroked with the top of the valve removed and was found not stroking consistently and evenly. The air actuator linkages were cleaned and lubricated resulting in the disc seating properly. The LLRT was performed to confirm the valve could meet its safety function for the Feedwater Leakage Control System (FWLCS) with satisfactory results on January 26, 2008 prior to plant startup. The retest leakage rate was 0.65 gpm.

This issue was entered into the corrective action program as issue report (IR) number 1047133.

**CAUSE OF EVENT**

The cause of the 1B21-F032A check valve to fail its leak rate test is considered to be age-related degradation of lubrication causing increased friction in the actuator, the same cause for the similar failure of the 1B21F032B failure when tested in 2010 during refueling outage C1R12. The actuator had not been re-lubricated since initial installation during a refueling outage that ended in May 1999. No preventive maintenance activities existed to lubricate or overhaul the actuator.

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**NARRATIVE**

**SAFETY ANALYSIS**

This event is reportable under the provisions of 10 CFR 50.73(a)(2)(ii) due to a degraded or unanalyzed condition and 10 CFR 50.73(a)(2)(v) due to a condition that could have prevented fulfillment of the safety function of the feedwater containment isolation valves to ensure offsite doses are not exceeded following a design basis loss of coolant accident (DBA LOCA).

The feedwater isolation valves and the FWLCS provide a sealing system to ensure that offsite doses are not exceeded following a DBA LOCA. The 2 gpm leakage limit in TS SR 3.6.1.3.11 has been shown by testing and analysis to bound the condition following a DBA LOCA where, for a limited time, both air and water are postulated to leak through this pathway. No release of radioactive material occurred as a result of this event.

Feedwater check valve 1B21-F032A must close to isolate containment from the feedwater system during emergency and post accident periods by providing a barrier necessary for the Feedwater Leakage Control System (FWLCS) to create a water-seal on the containment penetration. This check valve must also close to prevent a significant loss of reactor coolant inventory and provide immediate isolation should a break occur in the feedwater line.

This issue would not impact Core Damage Frequency or Large Early Release Frequency. The Feedwater System function of supplying the reactor vessel with water is not impacted and thus there is no impact on core damage frequency. Failure of the valve disc to properly seat will not affect the 1B21F032A function to pass flow into the reactor vessel, but impacts leak tightness of the check valve in the closing direction. However, when Feedwater shutdown occurs, hydraulic conditions are generally such that sufficient backpressure will exist to firmly seat the check valve even without the assistance of the air actuator. The air assist function has been provided to give tight shutoff even when the backpressure across the valve is very low, but low backpressure would rarely exist at the time feedwater shuts down. Radionuclide release paths through the Feedwater System lines are not regarded as credible Large Early Release Frequency (LERF) release pathways because there are multiple barriers against a large release through this pathway.

**CORRECTIVE ACTIONS**

The valve was repaired by cleaning and lubricating the valve's air actuator linkages. Following completion of repairs, the valve was stroked and, prior to performing post-maintenance LLRT, the valve was closed by normal means. An LLRT was completed on January 26, 2008 with satisfactory results of 0.65 gpm. During refueling outage C1R12 (2010), the LLRT of check valve 1B21-F032A was completed with satisfactory results of 0.28 gpm.

Preventive maintenance activities will be established to lubricate and overhaul the 1B21-F032 actuators; a six-year frequency has been recommended for lubrication of the actuators.

**PREVIOUS OCCURRENCES**

This is the first failure of the 1B21-F032A since the installation and implementation of a Feedwater Leakage Control system in 2000.

The following LERs occurred prior to the installation of a Feedwater Leakage Control system:

U.S. NUCLEAR REGULATORY COMMISSION

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**NARRATIVE**

LER 92-003 dated March 31, 1992 – Local Leak Rate Test Failure of Feedwater Containment Isolation Valves Results in Total Leakage Rates in Excess of Technical Specification and 10CFR50 Appendix J Limits.

LER 95-002-01 dated June 6, 1995 – Local Leak Rate Test Failures of Feedwater Containment Isolation Valves Results in Total Leakage Rates Greater than Technical Specification and 10CFR50, Appendix J Limits.

LER 96-013-01 dated July 24, 1997 – Inadequate Actuator Design and Failure to Recognize Limitations of Resilient Seat Design Result in Local Leak Rate Test Failures of Feedwater Containment Isolation Valves and Total Leakage Rates Greater than Technical Specification and 10CFR50, Appendix J Limits.

**COMPONENT FAILURE DATA**

Feedwater valve 1B21-F032A is a 20-inch, air-assisted, non-slam tilting disc check valve, manufactured by Anchor Darling Valve Company.

The air actuator on check valve 1B21-F032A is a station specific design and was built in accordance with Engineering Change Notice 30103.