Commonwealth Edison Company
Byron Generating Station
4450 North German Church Road
Byron, IL 61010-9794
Tel 815-234-5441

ComEd

June 30, 1997

LTR: BYRON 97-0158
FILE: 3.03.0800 (1.10.0101)

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

Dear Sir:

The Enclosed Licensee Event Report from Byron Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(i).

This report is number 97-012; Docket No. 50-454.

Sincerely,

K. L. Kofron
Station Manager
Byron Nuclear Power Station

KLK/MS/js

Enclosure: Licensee Event Report No. 97-012

cc: A. B. Beach, NRC Region III Administrator
NRC Senior Resident Inspector
INPO Record Center
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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
BYRON NUCLEAR POWER STATION, UNIT 1	05000454	1 OF 5

TITLE (4)

Plant Shutdown Required Within 48 Hours Per Technical Specification

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	29	97	97	-- 012 --	00	06	30	97	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	097

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)
	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)		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)
Terrence Milligan, System Engineer	815-234-5441 X2149

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	SB	ISV	A391	Yes						

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	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 05/29/97, Unit 1 was at 97 percent reactor power. System Engineering was performing 1BVS 7.1.5-2, Unit 1 Main Steam Isolation Valves Partial Stroke test, on the 1A Main Steam [SB] Isolation Valve (MSIV). The surveillance failed when the active train of the 1A MSIV failed to recharge properly at 1114. Operations entered action requirement for Technical Specification 3.3.2.c, Table 3.3-3, Action 22. The stand-by train of the 1A MSIV remained operable. The air/oil pump was replaced. Electrical Maintenance personnel were sent to replace the "C" and "D" solenoids. After initial replacement of the solenoids, it was identified the "D" solenoid as not being the proper solenoid and a new "D" solenoid was installed. The active train accumulator still did not pressurize.

The MSIV was not repaired within a forty-eight hour time limit and Unit 1 was required to shutdown according to Technical Specification 3.3.2.c., which requires restoration of the inoperable channel to OPERABLE status within 48 hours.

On 05/31/97, the turbine was tripped and Unit 1 entered Mode 2 at 1453, and Mode 4 at 2229. The four-way valve was replaced. The removed four-way valve was disassembled and the removed solenoids were benched tested. No apparent problem was found with either the four-way valve or the solenoids.

There were no adverse consequences to the health and safety of the general public or plant personnel as a result of this event. This event is reportable per 10CRF 50.73 (a)(2)(i) (Completion of any nuclear plant shutdown required by the plant's Technical Specification).

Corrective action: The Unit was shutdown as required by Technical Specifications. The four-way valve was replaced and stroke tested successfully. No previous occurrences were found.

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 05-29-97 / 1114

Unit 1 Mode 1 - PWR OP Rx Power 97% RCS [AB] Temperature/Pressure NOT/NOP

Unit 2 Mode 1 - PWR OP Rx Power 100% RCS [AB] Temperature/Pressure NOT/NOP

B. DESCRIPTION OF EVENT:

On 05/29/97, Unit 1 was in Mode 1 at 97 percent reactor power. System Engineering was performing surveillance, 1BVS 7.1.5-2, Unit 1 Main Steam Isolation Valves Partial Stroke test on the active train of the 1A Main Steam [SB] Isolation Valve (MSIV) at 1100. The surveillance failed at 1114 when the active train of the 1A MSIV hydraulic/pneumatic actuator failed to re-charge the accumulator to the proper pressure. Operations Department entered the action requirement for Technical Specification 3.3.2.c., Table 3.3-3, Action 22. The stand-by train of the 1A MSIV actuator remained operable.

The MSIV hydraulic/pneumatic actuator has two separate (active and stand-by) hydraulic controlling trains with one air/oil pump. Each train consists of four air solenoid valves, two four-way hydraulic/pneumatic valves and one hydraulic accumulator. The "C" solenoid operates the "N" four-way valve to recharge the accumulator and the "D" solenoid operates the "N" four-way valve to remove (blowdown) the hydraulic pressure to the pump reservoir.

A Work Request (970060320) was written to replace the air/oil pump on the 1A MSIV. The Maintenance Department has had experience with the air/oil pump on this actuator not pumping to the pressure required at the accumulator. At approximately 1500, the Fix-It-Now Team (FIN) personnel had replaced the air/oil pump. Testing determined that the 1A MSIV active train was still not operating properly. The valve would partially stroke, but would not repressurize the accumulator.

At approximately 1600, a meeting was held between Electrical Maintenance personnel, Mechanical Maintenance personnel, System Engineering personnel, FIN Team members and the Work Week Manager. A decision was made, based on past experience, to replace the "C" and "D" solenoids (1FSV-MS001A-C and 1FSV-MS001A-D) on the active side of the 1A MSIV actuator. The System Engineer and Mechanical Maintenance personnel tested the "N" four-way hydraulic/pneumatic valve in place on the 1A MSIV and determined that the "N" four-way hydraulic/pneumatic valve was stroking, but with this type of valve it cannot be determined if the valve was stroking fully.

Work Requests (970060346 and 970060347) were written to replace the "C and "D" solenoids. An Out-Of-Service (OOS) was requested for the two solenoids at approximately 1700. The OOS was in place and released to work for the Electrical Maintenance Department at approximately 1930.

B. DESCRIPTION OF EVENT (cont.)

At approximately 0230 on 05/30/97, the "C" and "D" solenoids were replaced by Electrical Maintenance personnel with final wiring termination completed at approximately 0630. The wires have to be spliced together individually and require heat shrink tubing to be installed instead of using a terminal block for connection. When the day shift Electrical Maintenance personnel arrived, they identified the "D" solenoid was not the proper solenoid by comparing the model number of the solenoid with the solenoid removed. The two solenoids ("C" and "D") appear identical externally, but operate differently internally. The Electrical Maintenance Procedure BHP EQ-24, Anchor Darling MSIV Operator Skinner Solenoid Valve Replacement states to "Verify like-for-like replacement". The electricians verified "like-for-like" by physical shape, not "like-for-like" by model number. A new "D" solenoid was installed by approximately 1230.

Subsequent testing of the 1A MSIV identified an air leak on the "C" solenoid valve. The "C" solenoid was removed and a new O-ring was installed. No obvious leak path was identified on the O-ring that was removed.

At approximately 1900, testing of the MSIV started. At approximately 2100, the accumulator was successfully charged. The quarterly surveillance (1BVS 7.1.5-2) was performed with the partial strokes and the blowdown of the accumulator performed satisfactorily. However, the accumulator did not charge as required. At approximately 2200, Maintenance personnel, Operations personnel, Byron System Engineering and Braidwood System Engineering held a conference call to discuss the problem. A decision was made to re-test the 1A MSIV and to replace the "N" four-way hydraulic/pneumatic valve, if testing resulted in a non-acceptable surveillance test (1BVS 7.1.5-2). During the conference call, it was identified that the four-way hydraulic/pneumatic valve in stores had a deficiency tag attached due to expired shelf-life on the elastomers inside the four-way hydraulic/pneumatic valve and, therefore, the four-way hydraulic/pneumatic valve needed to be rebuilt prior to being installed.

The "C" solenoid was removed to allow air to be ported to the "N" four-way hydraulic/pneumatic valve, simulating the proper signal. Movement of the "N" four-way hydraulic/pneumatic valve could not be directly observed, however, a flow of air was felt at the proper port indicating movement of the "N" four-way hydraulic/pneumatic valve. The amount of movement could not be determined which rendered the trouble shooting inconclusive.

On 05-31-97, at 0303, Operations began to ramp down Unit 1 in power level in accordance with Nuclear Operations Directive, NOD OP.19, Operations Control of Plant Activities, which requires a Unit shutdown to begin eight hours before the end of the allowed outage time. At approximately 0500, the "C" solenoid was replaced again and the surveillance (1BVS 7.1.5-2) was re-performed with unsatisfactory results. The four-way hydraulic/pneumatic valve from the storeroom was being rebuilt at this time.

At approximately 0700, it was decided to repeat partial strokes on the 1A MSIV and observe recharging. At 0852, operators stopped ramping down Unit 1 in power level. At approximately 1000, it was obvious the accumulator would not pump up satisfactorily. At approximately 1100, Mechanical Maintenance personnel were directed to replace the "N" four-way hydraulic/pneumatic valve when the one from the storeroom was rebuilt. At this time a concern arose about personnel safety when replacing a four-way valve with Unit 1 on line. The manufacturer recommends depressurization of the hydraulics prior to replacing the four-way valve for personnel safety concerns. At that time, the decision was made to complete the shutdown, cool down the plant to Mode 4, close the MSIV and depressurize the hydraulics on the MSIV prior to replacing the four-way hydraulic/pneumatic valve because of the limited time remaining on the time clock.

B. DESCRIPTION OF EVENT (cont.)

At 1452, the turbine was tripped and Unit 1 entered Mode 2 at 1453. Unit 1 entered Mode 4 at 2229.

On 06/01/97, at approximately 0400, with the system cooled down sufficiently, Operations personnel released the 1A MSIV for replacement of the "N" four-way hydraulic/pneumatic valve. At approximately 0400, testing was started on the remaining seven trains (the three remaining active trains and the four stand-by trains on Unit 1 MSIVs). This was completed without any problems.

At approximately 0530, the "N" four-way hydraulic/pneumatic valve replacement was completed, with a successful stroke test at approximately 1000. The active train of the 1A MSIV was stroked four times to ensure the replacement "N" four-way valve had adequately resolved the problem.

On 06/02/97, the removed four-way hydraulic/pneumatic valve was disassembled with emphasis on looking for the cause of the suspected failure which caused the problem with stroking of the 1A MSIV active train. The experienced Mechanical Maintenance Supervisor (and Subject Matter Expert) and System Engineer participated in the disassembly. No apparent root cause was found in the "N" four-way hydraulic/pneumatic valve components, tolerances or elastometer.

The replaced solenoids were benched tested by Electrical Maintenance personnel and found to be operating satisfactorily.

On 06/03/97, a Maintenance Critique was performed on the 1A MSIV repairs, identifying numerous concerns with trouble shooting delays on repairing the 1A MSIV active train problems.

This event is reportable per 10CRF 50.73 (a)(2)(i) (Completion of any nuclear plant shutdown required by the plant's Technical Specifications).

C. CAUSE OF EVENT:

1. MSIV active train was not repaired within 48 hours:

The 1A MSIV active train was not operating properly according to the surveillance, 1BVS 7.1.5-2 (Unit 1 Main Steam Isolation Valves Partial Stroke test) which placed the plant on a 48 hour time clock according to Byron Station's Technical Specifications, 3.3.2.c., which requires restoration of the inoperable channel to OPERABLE status within 48 hours. NOD OP.19, Operation Control of Plant Operations requires a Unit shut down to begin eight hours before the end of the allowed outage time. The MSIV was not repaired within this time limit and Unit 1 was required to shutdown. A contributing factor of not completing repairs within the time limit was the delay encountered due to the incorrect installation of the "D" solenoid and trouble shooting concerns identified in a Post Maintenance Critique.

2. Installation of Incorrect Solenoid:

The Electrical Maintenance workers did not adequately verify like-for-like when replacing the "D" solenoid valve.

3. Post Maintenance critique:

Numerous concerns were identified in the Maintenance Critique regarding trouble shooting delays.

D. SAFETY ANALYSIS:

While the 1A MSIV active train was inoperable, there were no adverse consequences to the health and safety of the general public or plant personnel as a result of this event. During the entire event, the standby train of the 1A MSIV was available to shut the valve if given the close signal; or if pneumatic and electrical power were lost, the hydraulic pressure would have closed the MSIV. Prior to the 48 hour action requirement expiration, the plant was put into the required mode where the MSIV was no longer required to operate and the 1A MSIV was shut.

E. CORRECTIVE ACTIONS:

1. MSIV active train was not repaired within 48 hours:

Shutdown was required by Technical Specification and was performed properly.

2. Installation of Incorrect Solenoid:

Immediate Corrective Action: Electrical Maintenance personnel replaced the "D" solenoid valve with the correct solenoid.

Corrective Action to Prevent Recurrence: All Maintenance Department personnel are being trained to the requirements of like-for-like parts replacement as part of the annual training in 1997.
(NTS Number 454-180-97-SCAQ00012-01)

3. Maintenance critique:

Corrective actions identified, as part of the investigation in the post maintenance critique, will be performed.
(NTS Number 454-180-97-SCAQ00012-02)

F. RECURRING EVENTS SEARCH AND ANALYSIS:

A search of Byron Regulatory Assurance Database (RABY) and Nuclear Station Regulatory Assurance Database (ALRA) was made using the key words MSIV and Tech and Spec. This search covered both Byron and Braidwood Units 1 and 2. There have been previous failures of the four-way hydraulic/pneumatic valves on the MSIC, but none have resulted in a plant shut down.

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number	Mfg. Part Number
Anchor Darling (A391)	four-way hydraulic-pneumatic valve	23304-7001-2853	W19595