



Commonwealth Edison
Byron Nuclear Station
4450 North German Church Road
Byron, Illinois 61010

March 1, 1994

LTR: BYRON 94-0070
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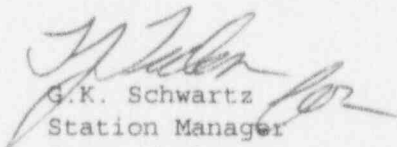
U.S. Nuclear Regulatory Commission
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Washington, D.C. 20555

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)(v).

This report is number 94-001; Docket No. 50-454.

Sincerely,


G.K. Schwartz
Station Manager
Byron Nuclear Power Station

GKS/DSK/ng

Enclosure: Licensee Event Report No. 94-001

cc: J. Martin, NRC Region III Administrator
NRC Senior Resident Inspector
INPO Record Center
CECo Distribution List

070115

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(9968R/WPF/021694-7)

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SIGNATURE PAGE FOR LER (SE) EVENT REPORT

LER Number
454: 94-001

Title of Event: Several Valves may not Stroke Under High Differential Pressure Conditions due to Inadequate Torque Switch Setting

Occurred: 02-01-94 / -----
Date Time

OSR DISCIPLINES REQUIRED: ABG

gsk / 12-24-94
SES DATE

Acceptance by Station Review:

Winkler / 12/23/94
OE Date

Pratt / 12/28/94
SES Date

P. Brink / 1/31/94
RAS Date

Shelton / 12-28-94
OTHER Date

Approved by: [Signature] / 3-1-94
Station Manager Date

LICENSEE EVENT REPORT (LER)

FACILITY NAME BYRON NUCLEAR POWER STATION	DOCKET NUMBER 0 5 0 0 0 4 5 4	PAGE 1 OF 0 5
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TITLE
Several Valves may not Stroke Under High Differential Pressure Conditions due to Inadequate Torque Switch Setting

EVENT DATE			LER NUMBER			REPORT DATE			OTHER FACILITIES INVOLVED		
MONTH	DAY	YEAR	YEAR	SEQ. NUMBER	REVISION	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)
0 2	0 1	9 4	9 4	0 0 1	0 0	0 3	0 1	9 4	Byron Unit 2		0 5 0 0 0 4 5 5
									Braidwood		0 5 0 0 0 4 5 6

OPERATING MODE 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (CHECK ONE OR MORE OF THE FOLLOWING)					
POWER LEVEL 1 0 0	20.402(b)		20.405(e)		50.73(a)(2)(iv)	73.71(b)
	20.405(a)(1)(i)		50.36(c)(1)		X 50.73(a)(2)(vi)	73.71(c)
	20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)		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)(ix)		

LICENSEE CONTACT FOR THIS LER	
NAME M. Ryterski, Site Engineering and Construction, Ext. 2388	TELEPHONE NUMBER 8 1 5 2 3 4 - 5 4 4 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		

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

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines).

ABSTRACT

On February 2, 1994, with Unit 1 and Unit 2 in Mode 1 at 99% power, it was discovered the minimum required torque to open and/or close Essential Service Water System valves 0SX147, 2SX005, 1/2SX033 and 1/2SX034 under high differential pressure conditions may not be available with the presently installed torque switch settings. Additionally, valve actuator, motor gearing, and gearbox torque limits for valves 1/2SX033 and 1/2SX034 could be exceeded if these valves were operated manually against high differential pressures. The questionable ability of valves 1/2SX033 and 1/2SX034 to close during an internal flooding event with a high differential pressure is reportable under 10CFR50.72(b)(2)(iii)(D). No systems or components were declared inoperable as all applicable Technical Specification requirements were met with all six valves in these conditions. The cause of this event was determined to be due to inappropriate actuator sizing and torque switch setting specifications by the manufacturer and/or the utilization of a different methodology for determining minimum required torque capability for these valves. Compensatory actions were put in place to ensure correct operation of these valves in their present condition.

This event is reportable for valves 1/2SX033 and 1/2SX034 pursuant to 10CFR 50.73(a)(2)(v), any event or condition alone that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT Energy Industry Identification System (EIS) codes are identified in the text as [XX]

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 2/2/94 / 1625

Unit 1 Mode 1 - Power Operation Rx Power 99% RCS Temp/Press NOT/NOP

Unit 2 Mode 1 - Power Operation Rx Power 99% RCS Temp/Press NOT/NOP

B. DESCRIPTION OF EVENT:

On February 2, 1994, during a review of butterfly valves in response to Generic Letter 89-10, it was discovered the minimum required torque to open and/or close the following valves under high differential pressure conditions may not be available with the presently installed torque switch settings (TSS):

- 0SX147 Unit 0 Component Cooling Water (CC)[CC] Heat Exchanger Essential Service Water (SX)[BI] outlet isolation valve
- 2SX005 Unit 0 Component Cooling Water Heat Exchanger Essential Service Water inlet isolation valve (and unit crosstie when 1SX005 is also open)
- 1SX033 & 1SX034 Unit 1 SX train to train crosstie valves
- 2SX033 & 2SX034 Unit 2 SX train to train crosstie valves

Additionally, it was determined valve actuator, motor gearing, and gearbox torque limits for valves 1/2SX033 and 1/2SX034 could be exceeded if these valves were operated manually against high differential pressures.

Valve 0SX147 required a seating/unseating torque of 3700 ft-lbs and valve 2SX005 required a seating/unseating torque of 3976 ft-lbs while their present TSS develop a torque of 3570 ft-lbs (see table below). These valves are limit open and closed so the torque switch is initially bypassed in the open direction allowing adequate torque to unseat the valves. These valves would continue to fully open since the fluid dynamic torque at this point is less than the TSS. However, the available torque would close these valves approximately 90-95% after which the torque switch would actuate and stop valve travel.

	Seating/Unseating Torque (ft-lbs)	TSS Open Torque (ft-lbs)	TSS Closing Torque (ft-lbs)
0SX147	3700	3570	3570
2SX005	3976	3570	3570

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TEXT Energy Industry Identification System (EIS) codes are identified in the text as (XX)

B. DESCRIPTION OF EVENT: (continued)

Valves 1/2SX033 and 1/2SX034 required a seating/unseating torque of 7956 ft-lbs. The present TSS develop a torque of 5040 ft-lbs for these valves except for valves 2SX033/034, which develop a torque of 5355 ft-lbs in the closed direction (see table below).

	Seating/Unseating Torque (ft-lbs)	TSS Open Torque (ft-lbs)	TSS Closing Torque (ft-lbs)
1SX033	7956	5040	5040
1SX034	7956	5040	5040
2SX033	7956	5040	5355
2SX034	7956	5040	5355

Valves 1/2SX033 and 1/2SX034 are normally open during plant operation and receive no automatic actuation signals. A review of possible closing requirements determined these valves may be required to close to provide flood mitigation in the event of internal flooding. The available torque would close these valves approximately 90-95% after which the torque switch would actuate and stop valve travel. The present TSS as compared with the limiting valve component would protect these valves during electrical operation. A reduced differential pressure was required to ensure valve actuator, motor gearing, and gearbox torque limits would not be exceeded during manual operation of these valves. It was determined the questionable ability of these valves to close during an internal flooding event was reportable under 10CFR50.72(b)(2)(iii)(D) and an ENS notification was made at 1625 on February 2, 1994. No systems or components were declared inoperable as all applicable Technical Specification requirements were met with the valves in this condition. There were no systems or components inoperable at the beginning of this event which contributed to this event. An Engineering Operability Determination was completed on February 2, 1994 and compensatory actions were put in place under Byron Station On-Site Review (OSR) 94-007.

This event is reportable for valves 1/2SX033 and 1/2SX034 pursuant to 10CFR 50.73(a)(2)(v), any event or condition alone that could have prevented the fulfillment of the safety function of structures on systems that are needed to mitigate the consequences of an accident.

C. CAUSE OF EVENT

The cause of this event was determined to be due to inappropriate actuator sizing and TSS specification by the manufacturer and/or the utilization of a different methodology for determining minimum required torque capability for these valves. Present analysis determined the original TSS may be inadequate to fully open and/or close valves OSX147, 2SX005, 1/2SX033, and 1/2SX034. Present analysis (weak link) also determined the actuator, gear box, and motor gearing capacity limits would be exceeded at high differential pressures for valves 1/2SX033 and 1/2SX034. One of the purposes of NRC Generic Letter 89-10 is to determine if current valve applications (actuator, gear box, structural limits, etc.) and settings are correct for various plant conditions (differential pressure, flow, degraded voltage, etc.). This problem was discovered during this review for these valves.

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TEXT Energy Industry Identification System (EIS) codes are identified in the text as (XX)

D. SAFETY ANALYSIS:

Valves 0SX147 and 2SX005 are normally closed during plant operation and receive no automatic actuation signals. Emergency Operating Procedures (EOPs) require verifying/opening valve 2SX005 to crosstie unit to unit SX systems and require verifying/closing valve 2SX005 to restore SX isolation between units. There are no EOP actions required for valve 0SX147. Valves 1/2SX033 and 1/2SX034 are normally open during plant operation and also receive no automatic actuation signals. EOPs require verifying/opening valves 1SX033/34 or 2SX033/34 to verify correct train to train SX system lineup/operation or to provide unit to unit SX crosstie capability. There is no accident analysis that requires closing these valves. A Nuclear Station Operator (NSO) would normally request manual operation of a valve in an emergency situation if the valve failed to completely close electrically. Structural limits for valves 0SX147 and 2SX005 would not be exceeded during manual operation. Valve actuator, motor gearing, and gearbox torque limits could possibly be exceeded during manual operation of valves 1/2SX033 and 1/2SX034. These valves could have been manipulated as required given the proper set of operator actions, but these actions had not been proceduralized in the past and it is not certain that operators would have been able to perform the actions correctly to close these valves. Specific valve structural limits can be exceeded for one-time events so it is possible these valves could have been manually operated at higher differential pressures. Although these margin calculations indicate possible operability concerns with these valves, plant operating history has indicated no operational problems with the opening or closing of these valves.

E. CORRECTIVE ACTIONS:

The following compensatory actions were put in place for valves 0SX147, 2SX005, 1/2SX033, and 1/2SX034 under Byron Station On-Site Review 94-007:

- 1) Caution cards were placed on valves 0SX147 and 2SX005 informing NSOs the valves may not fully close under high differential pressure conditions and that the valves should be manually assisted if required.
- 2) Caution cards were placed on valves 1/2SX033 and 1/2SX034 informing NSOs to maintain valves 1/2SX033 and 1/2SX034 in the open position.
- 3) An Operating Daily Order and Special Operating Order was written to provide direction to NSOs to minimize differential pressure across valves 1/2SX033 and 1/2SX034 by, (in order of preference):
 - a) closing valves _SX033 and _SX034 ELECTRICALLY, allowing one valve to reduce the differential pressure for the other valve, and closing each valve approximately 90-95%,
 - b) equalizing differential pressure by starting the opposite train pump long enough to close _SX033 and _SX034 MANUALLY, then securing the pump on the leaking train,
 - c) if the opposite train pump cannot be started, securing the operating pump long enough to close _SX033 and _SX034 MANUALLY and then restarting one of the pumps. The time period the operating SX pump is stopped should be minimized.

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E. CORRECTIVE ACTIONS: (continued)

The following corrective actions were initiated by Byron Station On-Site Review 94-007:

- 1) Provide new torque switch settings for Byron valves 0SX147 and 2SX005 (NTS Item 454-240-94-00700-01).
- 2) Install new torque switch settings for Byron valves 0SX147 an 2SX005 (NTS Item 454-240-94-00700-02).
- 3) Determine long term corrective actions for valves 1/2SX033 and 1/2SX034 (NTS Item 454-240-94-00700-03).

F. RECURRING EVENTS SEARCH AND ANALYSIS:

Previous similar occurrences include:

DVR 6-1-90-114 Auxiliary Feedwater Discharge Isolation Valve Design Inadequacy

DVR 6-1-91-073 Failure of Valves (1SI8802A and 1CC9412A) to Stroke during Full Flow Differential Pressure Tests due to Equipment Failures.