

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



DATE September 13, 1995

LTR: BYRON 95-0316  
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)(B).

This report is number 95-002; Docket No. 50-454.

Sincerely,

  
K. L. Kofron  
Station Manager  
Byron Nuclear Power Station

KLK/PW/ba

Enclosure: Licensee Event Report No. 95-002

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

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## SIGNATURE PAGE FOR LICENSEE EVENT REPORT

LER Number

454:95-002

Title of Event: Unit 1 Train B Hydrogen Monitor Found Inoperable due to isolated water trap

Occurred: 08-18-95 / 1100  
Date Time

Licensee Contact: Steven Gould / Bill Pirnat

OSR DISCIPLINES REQUIRED: ABG

SES 9-12-95  
SES DATE

Acceptance by Station Review:

R. W. [Signature] ABG 9/13/95  
OE Disciplines Date

[Signature] ABG 9-13-95  
SES Disciplines Date

D. Brinley ABG 9/13/95  
RAS Disciplines Date

W. D. [Signature] AB 9/13/95  
Other Disciplines Date

[Signature] AG 9/13/95  
Other Disciplines Date

Approved by: K. C. Kofron 9/15/95  
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				
TITLE UNIT 1 TRAIN B HYDRGEN MONITOR FOUND INOPERABLE DUE TO ISOLATED WATER TRAP																			
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	8	1	8	9	5	9	5	-	0	0	2	-	0	0		0 5 0 0 0			
OPERATING MODE			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (CHECK ONE OR MORE OF THE FOLLOWING)																
1			20.402(b)				20.405(e)				50.73(a)(2)(iv)				73.71(b)				
POWER LEVEL			20.405(a)(1)(i)				50.36(c)(1)				50.73(a)(2)(v)				73.71(c)				
0			9			9			20.405(a)(1)(ii)				50.36(c)(2)				50.73(a)(2)(vii)		
			20.405(a)(1)(iii)				X 50.73(a)(2)(i)				50.73(a)(2)(viii)(A)				OTHER (Specify in Abstract below and in Text, NRC Form 366A)				
			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)(x)								
LICENSEE CONTACT FOR THIS LER																			
NAME S. GOULD, SYSTEM ENGINEERING, EXT. 2765 W. PIRNAT, TRAINING DEPT, EXT. 4190										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										
X	P	S	F	S	V	A	6	0	9	N									
SUPPLEMENTAL REPORT EXPECTED																			
<input type="checkbox"/> YES. (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO										EXPECTED SUBMISSION DATE MONTH DAY YEAR									

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

On 08/16/95 while performing the "SHIFTLY AND DAILY OPERATING SURVEILLANCE", the Nuclear Station Operator (NSO) received the "POST LOCA H2 MONITOR TROUBLE" alarm. Instrument Maintenance personnel discovered that a small portion of the 1B Hydrogen Monitoring water trap tubing and related solenoid valves were improperly configured. Limiting Condition for Operations Action Requirement (LCOAR) 1BOS 6.4.1-1a was entered. On 8/21/95 at 1900, work on the 1B Hydrogen Monitor was completed and LCOAR 1BOS 6.4.1-1a was exited on 8/23/95 at 0348. This event is reportable per 10CFR50.73(a)(2)(i)(B)-any operation or condition prohibited by the plant's Technical Specifications.

# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER			PAGE								
BYRON NUCLEAR POWER STATION		YEAR	SEQ. NUMBER	REVISION									
		0	5	-	0	0	2	-	0	0	0	2	OF

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

## A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 08-18-95 / 1100

Unit 1 MODE 1 - Power Operation Rx Power 98.5% RCS (AB) Temperature/Pressure NOT/NOP

Unit 2 MODE 1 - Power Operation Rx Power 100% RCS (AB) Temperature/Pressure NOT/NOP

## B. DESCRIPTION OF EVENT:

On 08/16/95 while performing surveillance 1BOS 0.1-1,2,3, "SHIFTLY AND DAILY OPERATING SURVEILLANCE", the Nuclear Station Operator (NSO) received the "POST LOCA H2 monitor trouble" (annunciator 1-3-E3) alarm. The alarm cleared in a matter of seconds. The NSO questioned the cause of this alarm and on 08/16/95 at 1700, the Byron Unit 1 NSO initiated Problem Identification Form (PIF) 454-201-95-0905 to document the trouble alarm that was received on the Unit 1 Train B Hydrogen Monitor (PS)(KN). Action Request (AR) 950043840 was written to investigate and identify the source of the alarm.

On 8/18/95 at 0500, when troubleshooting under Work Request 950071789 was authorized to begin, the 1B Hydrogen Monitor was declared inoperable and Limiting Condition for Operations Action Requirement (LCOAR) 1BOS 6.4.1-1a was entered.

On 8/18/95 at 1100, Instrument Maintenance personnel discovered that a small portion of the 1B Hydrogen Monitoring water trap tubing and related solenoid valves were improperly configured. This improper configuration isolated the flow path of the sample pump during the monitor's water purge cycle. The water purge cycle occurs approximately once each fifteen minutes of system operation and lasts approximately 15 seconds. Since a trouble alarm (annunciator 1-3-E3) is generated from a low flow condition, the isolated flow path was determined to be the cause of the alarm. A second PIF, PIF 454-180-95-0002, was written to document this finding.

From 8/19/95 through 8/21/95, actions were taken to restore the water trap tubing and related solenoid valves to the correct configuration. A failed solenoid valve (SV3) was also replaced at that time.

On 8/21/95 at 1900, work on the 1B Hydrogen Monitor was completed. During subsequent testing the monitor no longer alarmed during the water purge cycle. However, improper limit switch indication from the containment isolation suction valve (1PS228B) to the 1B Hydrogen Monitor prevented exiting the LCOAR. This valve was repaired and LCOAR 1BOS 6.4.1-1a was exited on 8/23/95 at 0348.

Investigation into the cause of the event and impact on the operability of the 1B Hydrogen Monitor has shown that this monitor would not have been able to fully perform its post-accident sampling function. The water trap portion of the Hydrogen Monitor functions to collect moisture removed from the containment gas sample. Approximately every fifteen minutes of system operation the water purge cycle is initiated to purge the collected water back to the containment building. It is postulated that the loss of the purge function would have, during an accident condition, eventually filled the tubing with moisture and rendered the monitor inoperable. The investigation into this event was not able to uncover the exact circumstances leading to the 1B Hydrogen Monitor being placed in the altered configuration. The improper configuration is believed to have existed since before plant start-up.

# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

## B. DESCRIPTION OF EVENT: (cont.)

This event is reportable per 10CFR50.73(a)(2)(i)(B) - any operation or condition prohibited by the plant's Technical Specifications. Action Requirement 3.6.4.a, which states that "with one hydrogen monitor inoperable, restore the inoperable monitor to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours", was missed. Additionally, after investigation of work history, it was determined that Action Requirement 3.6.4.b was also violated. On three occasions (in 1988 and 1989) the 1A Hydrogen Monitor was inoperable for greater than seventy-two (72) hours. Action Requirement 3.6.4.b states that "with both hydrogen monitors inoperable, restore at least one monitor to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours."

## C. CAUSE OF EVENT:

The investigation into this event was not able to uncover the exact circumstances leading to the 1B Hydrogen Monitor being placed in the altered configuration. It is speculated that the cause of this event is improper reassembly of a component following work by unknown individual(s). A review of Maintenance work history did not reveal any work performed that would have altered the water trap portion of the Hydrogen Monitor.

A review of the pre-operational testing history for the 1B Hydrogen Monitor indicates that it is possible that the altered configuration may have existed prior to plant start-up. Specifically, the Control Board annunciators were not functional at the time of testing. Test deficiencies were written to address the annunciators and the 1B Hydrogen Monitor pre-operational test was completed upon successful sampling and indication of hydrogen concentrations using calibration gases. The test deficiencies associated with the control board annunciators were later closed by performing a functional test of the annunciation capabilities rather than a retest of the Hydrogen Monitor.

Recent interviews conducted with operating personnel indicate that the alarm (annunciator 1-3-E3) has infrequently annunciated and immediately cleared (in 10 to 15 seconds), for a length of time sufficient to conclude also that the problem has existed since initial plant start-up. Discussions with the more experienced NSOs indicate that a misconception existed that the alarm (annunciator 1-3-E3) was associated with the normal operation of the 1B Hydrogen Monitor.

The objective of the Shiftly/Daily surveillance for the Hydrogen Monitor system is a qualitative system check (channel check). Due to an inconsistency between an operating procedure (BOP PS-9) and the Shiftly/Daily BOS, the NSOs were uncertain about the minimum required operating time for the Hydrogen Monitors prior to taking readings. BOP PS-9 indicates time delays of 6 and 17 minutes are to obtain a current containment Hydrogen concentration. These times reflect the sample transit time from containment to each monitor. These transit times are not required to meet the intent of the Shiftly/Daily BOS. The alarm frequency, coupled with the fact that the Hydrogen Monitoring system passed all surveillance tests, convinced the NSOs over time that the 1B train of the Hydrogen Monitoring system was operational and that the low flow alarm (annunciator 1-3-E3) was unique to the 1B train operation. The alarm became "expected". This false perception, based on wrong assumptions made, was passed along to new NSOs.



# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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BYRON NUCLEAR POWER STATION		YEAR	SEQ. NUMBER	REVISION				
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TEXT Energy Industry Identification System (EIS) codes are identified in the text as [XX]

## C. CAUSE OF EVENT: (cont.)

System Engineering Department (SED) personnel were also interviewed. It was determined that there are no Engineering procedures or circumstances that would involve altering the configuration of the water trap portion of the Hydrogen Monitor. It is unlikely that periodic system walkdowns would have caught this altered configuration. The Hydrogen Monitor water trap is within a locked cabinet and the capped/missing tubing was a small portion of the tubing that configured the system. The altered configuration was not obvious.

Instrument surveillances check the accuracy and operation of the Hydrogen Monitors on a periodic basis. Instrument Maintenance personnel were also interviewed and it was determined that there have been no Instrument Department evolutions or calibration procedures that would require any disassembly or alteration associated with the water trap portion of the Hydrogen Monitor.

## D. SAFETY ANALYSIS:

The as-found (8/18/95) configuration of the Hydrogen Monitor allowed for normal suction and return of the containment atmosphere and calibration gases under all conditions except during the water purge cycle. During the water purge cycle, an isolated flow path condition resulted. Upon completion of the water purge cycle (approximately 15 seconds every 15 minutes of system operation) the system realigns and continues to sample. It is postulated that the inability to purge the system of water would render the monitor inoperable. It is noted that there was never a loss of containment integrity during normal sampling or during water purge cycle operation.

The Hydrogen Monitor provides passive detection/indication of hydrogen concentration in the containment building during accident conditions. There were no accident conditions during the time this monitor was inoperable. In addition to the redundant train A Hydrogen Monitor, the Hydrogen Recombiner and the Containment Air Sample Panel (CASP) are two other methods of obtaining containment hydrogen concentration. The loss of the Hydrogen Monitor is addressed in Emergency Operating procedures, which state to consult with the Technical Support Organization to obtain hydrogen concentrations utilizing an alternate method. Therefore, this event is considered to have low safety significance.

A review of LCOARs for the Unit 1 Hydrogen Monitors has shown that in addition to the 1B Hydrogen Monitor being inoperable from start-up through 8/23/95, the 1A Hydrogen Monitor was inoperable for greater than 72 hours on three occasions since start-up. The occurrences were 1/25/88 through 2/10/88, 11/24/88 through 12/19/88, and 6/26/89 through 7/18/89. This indicates that Action Requirement 3.6.4.b for Technical Specification 3.6.4.1 was also not met. Having both trains of Hydrogen Monitoring inoperable simultaneously, although viewed as a serious concern, is still considered a low safety significance due to the redundant sampling capabilities previously stated.

# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

## E. CORRECTIVE ACTIONS:

- a). The Unit 1 train B Hydrogen Monitor line caps were removed and the system was restored to proper configuration.
- b). The Unit 1 train A and the Unit 2 train A and train B Hydrogen Monitoring systems were verified to be properly configured.
- c). The failed open Unit 1 train B water trap drain valve (SV3) was replaced.
- d). The containment isolation suction valve (1PS228B) was repaired.
- e). Testing was performed and the Unit 1 train B Hydrogen Monitoring system was declared operable.
- f). Operating, Instrument, and SED procedures/surveillances relating to this event will be reviewed for clarity and revised accordingly. The appropriate procedure/surveillance will be revised to verify that the purge portion of the Hydrogen Monitoring system is capable of performing its intended function. This action will be tracked by NTS item # 454-180-95-0002-01. This will be completed by December 8, 1995.
- g). A sampling of Operating, Instrument and SED procedures/surveillances that direct action in accordance with another procedure, will be reviewed to ensure consistency of the two (2) documents. This action will be tracked by NTS 454-180-95-0002-04. This will be completed by December 8, 1995.
- h). The Operating Department annunciator response administrative procedure will be reviewed as to the definition and handling of "expected" and "unexpected" alarms. Industry annunciator response practices will be considered when reviewing this procedure. Appropriate revisions will be tracked by NTS item # 454 180-95-0002-02. This will be completed by December 8, 1995.
- i). This event and the lessons learned will be presented, during continuing training, to Operations, Maintenance and SED personnel. This action will be tracked by NTS item # 454-180-95-0002-03.

## F. RECURRING EVENTS SEARCH AND ANALYSIS:

DVR 6-1-92-014: Train A Hydrogen Monitor failure due to pipe cap on discharge line. This DVR is related in terms of the type of failure. Both the current event and DVR 6-1-92-014 were the result of an altered system configuration, resulting in an isolated flow path condition and a low flow alarm.

Although there are other documented occurrences of low flow alarms no other previous occurrences of improper configuration of the Hydrogen Monitoring system could be found.

## G. COMPONENT FAILURE DATA:

One component was found failed. Solenoid operated Servo Valve SV3 (Unit 1 train B water trap drain valve) was found failed in the open position. The failure of this valve, although not a result of this event, would also have prevented the Hydrogen Monitor from performing its Post-Accident Sampling function as designed.