

LICENSEE EVENT REPORT (LER)

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

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-8 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.

FACILITY NAME (1)

Waterford Steam Electric Station Unit 3

DOCKET NUMBER (2)

05000 382

PAGE (3)

1 OF 06

TITLE (4)

Hydrogen Analyzer General Design Criterion 54 Non-Compliance

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
11	26	97	97	032	01	10	08	98	N/A	05000
									FACILITY NAME	DOCKET NUMBER
									N/A	05000

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
1	100	20.2201(b)	20.2203(a)(2)(v)	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)
C.C. Hayes, Acting Licensing Manager	(504) 739-6662

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

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

On November 26, 1997, Design Engineering determined Hydrogen Analyzer (HRA) piping penetrating containment did not meet the requirements of General Design Criteria (GDC) 54 which requires reliable redundancy to ensure containment isolation. Given noncompliance with GDC 54, operators declared outboard containment isolation valves (CIVs) HRA 110 A(B) inoperable, deactivated the valves and secured them in the isolated position per Technical Specification (TS) 3.6.3. As a result of those actions, HRA 109 A(B) and HRA 126 A(B) and both hydrogen analyzers were declared inoperable. The root cause of this condition was an inadequate design. On November 28, 1997, HRA 109 A(B), 110 A(B), and 126 A(B) were reclassified under the provisions of 10CFR50.59 from normally locked closed, automatic CIVs to remote manual, locked closed CIVs. Furthermore, surveillance procedure OP-903-031, "Containment Integrity Check," was revised to require periodic verification that the reclassified valves are secured in their proper position. This condition did not compromise the health and safety of the public.

**REQUIRED NUMBER OF DIGITS/CHARACTERS
FOR EACH BLOCK**

BLOCK NUMBER	NUMBER OF DIGITS/CHARACTERS	TITLE
1	UP TO 46	FACILITY NAME
2	8 TOTAL 3 IN ADDITION TO 05000	DOCKET NUMBER
3	VARIES	PAGE NUMBER
4	UP TO 76	TITLE
5	6 TOTAL 2 PER BLOCK	EVENT DATE
6	7 TOTAL 2 FOR YEAR 3 FOR SEQUENTIAL NUMBER 2 FOR REVISION NUMBER	LER NUMBER
7	6 TOTAL 2 PER BLOCK	REPORT DATE
8	UP TO 18 -- FACILITY NAME 8 TOTAL -- DOCKET NUMBER 3 IN ADDITION TO 05000	OTHER FACILITIES INVOLVED
9	1	OPERATING MODE
10	3	POWER LEVEL
11	1 CHECK BOX THAT APPLIES	REQUIREMENTS OF 10 CFR
12	UP TO 50 FOR NAME 14 FOR TELEPHONE	LICENSEE CONTACT
13	CAUSE VARIES 2 FOR SYSTEM 4 FOR COMPONENT 4 FOR MANUFACTURER NPRDS VARIES	EACH COMPONENT FAILURE
14	1 CHECK BOX THAT APPLIES	SUPPLEMENTAL REPORT EXPECTED
15	6 TOTAL 2 PER BLOCK	EXPECTED SUBMISSION DATE

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		97	032	01		

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

REPORTABLE OCCURRENCE

On November 26, 1997, Design Engineering determined Hydrogen Analyzer (HRA) [IK] piping penetrating containment did not meet the requirements of General Design Criteria (GDC) 54 which requires reliable redundancy to ensure containment isolation. Because the noncompliance resulted in the loss of capability to withstand a single failure, at least one containment isolation valve (CIV) should have been deactivated and secured in the isolation position per Technical Specification (TS) 3.6.3. Failure to complete that action within the allowed outage time of TS 3.6.3 constitutes a condition prohibited by Technical Specifications and is reportable pursuant to 10CFR50.73(a)(2)(i)(B).

INITIAL CONDITIONS

At the time of discovery, Waterford 3 was in mode 1 at 100% power. Remote position indication for HRA 109 A(B), 110 A(B), and 126 A(B) was inoperable because the configuration of limit switches for the valves did not satisfy requirements of TS 3.3.3.6 for containment isolation position indication (see LER 97-031-00). Electrical maintenance had previously verified the valves were in the closed position.

EVENT DESCRIPTION

The HRA system [IK] provides a means for obtaining air samples from the containment atmosphere following a loss of coolant accident to monitor the level of hydrogen gas. Air samples are processed through an analyzer panel and returned to the containment atmosphere. The A train analyzer draws and returns air samples through containment penetration 66 and the B train analyzer draws and returns air samples through containment penetration 67 (see Figure 1). Each of the two sample supply lines have solenoid operated, inboard (HRA 109 A & B) and outboard (HRA 110 A & B) containment isolation valves [IK-FSV]. Each of the two sample return lines have solenoid operated outboard containment isolation valves (HRA 126 A & B), with check valves for inboard containment isolation. Each of the three solenoid isolation valves

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	382				03	06

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(109, 110, and 126) is powered from the same source, normally closed, and receives a Containment Isolation Actuation Signal (CIAS) for automatic closure via the K203 A(B) relay.

On November 26, 1997, Design Engineering determined HRA piping penetrating containment did not meet the requirements of GDC 54. GDC 54 requires piping systems penetrating primary reactor containment to be provided with redundant isolation capabilities. Because HRA 109 A(B) and 110 A(B) receive a CIAS from the same relay (K203), a single failure vulnerability exists when the valves are open for testing. Specifically, failure of the K203 A(B) relay concurrent with receipt of a CIAS would prohibit the valves from closing.

As a result of the single failure vulnerability, operators declared HRA 110 A(B) inoperable at 14:51 on November 26, 1997. TS 3.6.3 was entered for inoperable CIVs, and HRA 110 A(B) were deactivated at 17:51 in accordance with action b of the TS. The valves were deactivated by opening the HRA 60A-32 and 61B-32 breakers. Because HRA 109, 110, and 126 are each powered from the same source, opening these breakers rendered the HRA system and the 109 A(B) and 126 A(B) valves inoperable. Thus, TS 3.6.4.1 was entered as a result of having two inoperable hydrogen analyzers.

On November 28, 1997, HRA 109 A(B), 110 A(B), and 126 A(B) were reclassified from automatic CIVs to manual / remote manual, locked closed CIVs under the provisions of 10CFR50.59. The valves were restored to operable status and TS 3.6.3 and 3.6.4.1 were exited at 16:18.

CAUSAL FACTORS

The root cause of this condition was an inadequate design. The HRA system was designed with two independent trains. Each train was configured with an independent power supply. This configuration complies with GDC 41 which requires the capability to obtain samples from the containment atmosphere following a loss of onsite / offsite

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electrical power in one train. However, a failure of the K203 relay in one train concurrent with the receipt of a CIAS would result in a loss of the automatic closure function of HRA 109 A(B) and 110 A(B) if the valves were open for testing. This condition introduces a single failure vulnerability that would require the actions of an operator to isolate the containment penetration for the sample supply line. GDC 54 requires piping penetrating containment to be provided with reliable redundancy to ensure containment isolation. Because the HRA 109 A(B) and 110 A(B) were credited for automatic containment isolation, the single failure vulnerability prevents the HRA piping penetrating containment from meeting the requirements of GDC 54.

CORRECTIVE MEASURES

On November 28, 1997, HRA 109 A(B), 110 A(B), and 126 A(B) were reclassified under the provisions of 10CFR50.59 as manual / remote manual, locked closed containment isolation valves. Surveillance procedure OP-93-031, "Containment Integrity Check," was revised to include HRA 109 A(B), 110 A(B), and 126 A(B) in order to comply with TS Surveillance 4.6.1.1.a which requires verification that all deactivated automatic (or manual/remote manual) valves are secured in their required position.

SAFETY SIGNIFICANCE

HRA piping penetrations 66 and 67 had a design deficiency in which the capability to withstand a single failure was not maintained for all plant configurations. These penetrations have a required safety function to provide containment isolation during accident conditions. The CIVs associated with this function are normally closed and possess remote manual capability. Furthermore, they are fail closed valves. If the valves were opened for surveillance testing, a failure of the K203 A(B) relay concurrent with the receipt of a CIAS would require an operator to manually close the valves. Given the single failure scenario, plant safety was not compromised because of the low probability of such an event. The time frame for the scenario is within the range of limitations prescribed by TS 3.6.3. Furthermore, the design of the CIVs associated with penetrations 66 and 67 provides reasonable assurance the valves would have

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performed their required safety function. Therefore, this condition did not compromise the safety and health of the public.

SIMILAR EVENTS

A review of reportable occurrences over the past two years was conducted. One similar condition was identified that involved a single failure vulnerability and the failure to comply with TS 3.6.3. This condition was reported in LER 97-030-00.

ADDITIONAL INFORMATION

Energy Industry Identification System (EIIIS) codes are identified in the text within brackets [].

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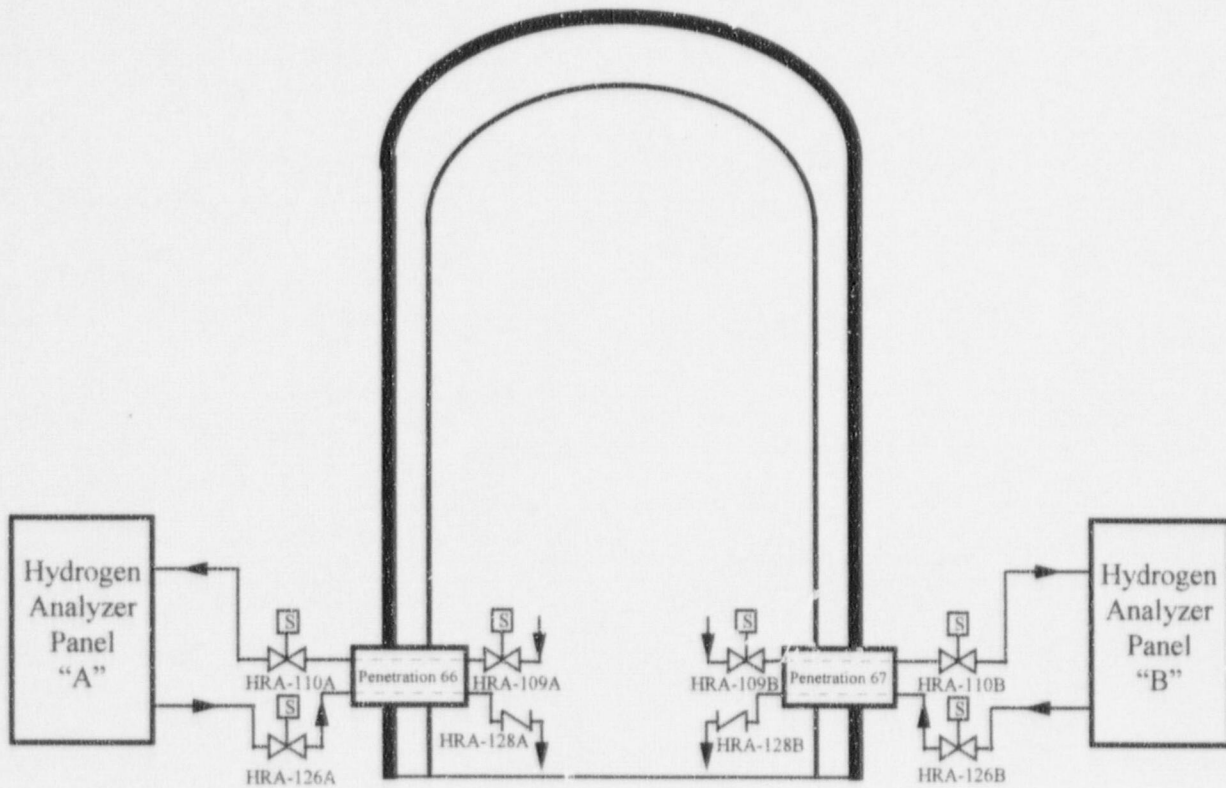


Figure 1. Simplified Drawing of Hydrogen Analyzer (HRA) System