Enclosure to Serial: RNPD/91-0349

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
H. B. STEAM ELECTRIC PLANT, UNIT NO. 2	0 5 0 0 0 2 6 1	1 OF 0 5

TITLE (4)

BREACH OF CONTAINMENT INTEGRITY DUE TO FAILURE OF THE PERSONNEL AIR LOCK DOOR

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 NAMES	DOCKET NUMBER(S)
0 3	1 9	9 0	9 0	— 0 0 6	— 0 1	0 2	0 8	9 1		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	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)	X 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 (12)

NAME	TELEPHONE NUMBER
David Crook - Senior Specialist - Regulatory Compliance	AREA CODE

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	
B	B D	A L	3 1 0	Y							

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 fifteen single-space typewritten lines) (16)

On March 18, 1990, Unit No. 2 was operating at 60 percent power. Licensee Operations personnel received an alarm on "A" Penetration Pressurization System (PPS) header flow. Due to previous occurrences, containment personnel air lock inner door leakage was suspected to be the cause. On March 19, 1990, Licensee Maintenance personnel entered the containment personnel air lock to repair the inner door seal. The Licensee entered Plant Technical Specification 3.0 in order to enter the airlock. Repairs to the inner door seal and latch mechanism were made, and the air lock was returned to service.

An investigation into the cause of the leakage was initiated, but the root cause could not be confirmed at that time due to the fact that the operating status of the Plant limited work on the airlock. Resolution of the issue was actively pursued during the 1990 refueling outage when access to the airlock was readily available. As a result of this investigation, it was determined that the airlock leakage was attributed to the continuous application of pressure in the innerspace of the double gasket seals in a direction which is opposite to that which the airlock is designed to resist.

This LER is submitted pursuant to 10CFR50.73(a)(2)(i)(B).

NRC Form 366A
(9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
H. B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2	0 5 0 0 0 2 6 1	9 0	0 0 6	0 1	0 2 OF 0 5

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

I. Description of Event

On March 18, 1990, Unit No. 2 was operating at sixty percent power.[1] At 2339 hours, Licensee Operations personnel received an alarm on "A" Penetration Pressurization System (PPS) Header flow. Due to previous occurrences (Reference LER-90-004-00), containment personnel air lock leakage was suspected as the cause. PPS to the air lock was isolated to investigate for leakage. This action confirmed that the leakage source was the air lock. PPS to the air lock was then restored. The exterior of the outer air lock door was then leak checked, and no leakage was found. This indicated that the leakage source was at the inner air lock door. PPS to the air lock was again isolated.

On March 19, 1990, at 1020 hours, Licensee Operators restored PPS to the air lock to facilitate troubleshooting. At 1346 hours, Technical Specification 3.0 was entered, and the outer air lock door was opened to further investigate the leakage source. The leakage source appeared to be at the inner door seal, which was "bulged" out from its seating surface.[2] In addition, the door latch plate appeared to have slipped slightly. At 1424 hours, the containment personnel air lock was secured, and Technical Specification 3.0 was exited. The Licensee then initiated an investigation into the possible causes of the leakage, and to formulate necessary corrective actions. However, a thorough investigation could not be completed at the time due to the limited availability of the airlock while the Plant was at power operations.

At 1639 hours on March 19, 1990, Licensee Operators entered Technical Specification 3.0 in order to enter the containment air lock to affect repairs. The inner door seal was returned to its correct position, and the door latch plate was re-aligned. At 1740 hours, the repair effort was completed, the air lock was secured, and Technical Specification 3.0 was exited.

This report is submitted pursuant to 10CFR50.73(a)(2)(i)(B) as a condition prohibited by the Plant's Technical Specifications.

---

[1]H. B. Robinson Unit No. 2 is a Westinghouse Pressurized Water Reactor nuclear power plant in commercial operation since March, 1971.

[2] Containment Personnel Air Lock EIIS Codes: System-BD; Component-AL; Manufacturer-310.

• U.S. GPO 1988-0-624-638/455

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
H. B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2	0 5 0 0 0 2 6 1	9 0	— 0 0 6	— 0 1	0 3 OF 0 5

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

II. Cause of Event

The investigation into the root cause of this condition revealed several causal factors. The factors are described as follows:

1. Frequency of Containment Entries

Past practices at H. B. Robinson have included containment entries on a daily to weekly basis. Present practices, which were implemented during mid-1989, limit routine entries to a monthly basis. A small PPS leak into the air lock will increase internal air lock pressure to the point that the interior door could be pushed off its seals, thus increasing the leakage rate and eventually moving the latch plate. The air lock manufacturer suggests that the latch would not withstand more than 8-10 psi before it would slip. Frequent containment entries would relieve air lock pressure, and thus prevent pressure build-up. Longer time intervals between entries could allow pressure to increase past the capacity of the latch plate bolts to allow slippage.

2. Ball Valve and Shaft Seal leakage repairs

In December, 1989, the ball valves used to relieve pressure from each air lock door were refurbished to eliminate excessive valve leakage (reference LER-89-015-00). During this repair effort, shaft seal leakage was identified, and repairs were affected. These small leakage paths may have provided sufficient pressure relief from the interior of the air lock, thus preventing pressure build-up.

3. Containment Pressure Relief

Each case of "A" PPS pressure exceeding scale has been closely preceded by a containment pressure relief. Pressure build-up in the containment vessel would force the interior door onto its seals, while air lock pressurization would be forcing the door off its seals. The loss of pressure from the containment during a pressure relief would increase the differential pressure across the door, and therefore would unseat the seal. An increase in the frequency of containment pressure reliefs may be indicative of excessive door seal leakage into the containment vessel.

4. Continuous Pressurization of the Door Seals

H. B. Robinson is one of the few plants that continuously pressurizes the space between the double gasket door seals with 42 psi PPS pressure, and has operated in this manner since 1971.

• U.S. GPO: 1988-0-624-538/455

If previous door leakage paths (ball valves, shaft seals, frequent containment entries, etc.) were providing relief, the elimination of these leakage paths, combined with the continuous pressurization of the door seals, could cause the door seals to eventually slip.

At the time of the initial report, data was been in an attempt to identify any relationship between containment pressure relief, containment entries, and the door leakage episodes. Analysis of this data indicated that a relationship between these factors did exist; however, due to the limited amount of data available at the time, the nature of this relationship could not be well defined. Therefore, although probable causes of this condition were identified, the root cause was not confirmed. The root cause analysis was completed during the 1990 Refueling Outage when work could be performed on the airlock with the Plant in cold shutdown condition. The results of this analysis are described in section VI, "Supplemental Information".

III. Analysis of Event

Technical Specification 3.6.1.a states that Containment Integrity shall not be violated unless the reactor is in cold shutdown condition. Technical Specification 1.7.c states that containment integrity is defined to exist when at least one door in the personnel air lock is properly closed and sealed. The Plant was considered to be operating in a "condition prohibited by the Plant's Technical Specifications" as discussed in NUREG 1022, Supplement 1, when Technical Specification 3.0 was entered on March 19, 1990, to affect the necessary repairs.

This condition is considered to have minimal safety significance. It is unlikely that the Technical Specification limit for total containment leakage would have been exceeded (0.1 weight percent of containment volume in 24 hours) for the following reasons:

1. The PPS leakage escaped into containment via the inner door assembly when the outer door was closed. This would prevent containment atmosphere from entering the air lock.

2. Both doors are normally closed when the reactor is above 200 degrees, except for brief periods of containment inspection and minor maintenance activities. Then only one door at a time can be opened due a the mechanical interlock.

3. The door configuration is such that for both the inner and outer doors, an increase in containment pressure (i.e. during an accident) will increase sealing pressure on the door.

IV. Corrective Actions

On March 22, 1990, Licensee Operations personnel initiated a process to vent the personnel air lock once per shift in order to relieve any existing pressure build-up. Containment integrity is maintained during the venting process because at least one door is shut and sealed. This activity was considered to be a short-term measure, and was to continue until the root cause is could be confirmed and a permanent repair completed.

V. Additional Information

A. Failed Component Information

This condition is attributed to a failure of the containment air lock. The air lock is manufactured by Chicago Bridge and Iron Company, EIIS Codes: System-BD; Component-AL; Manufacturer-310.

B. Previous Similar Events

LER-90-004-00

LER-89-015-00

VI. Supplemental Information

During the 1990 Refueling Outage, major maintenance was performed on the mechanical components within the airlock. As part of the maintenance activities, a root cause analysis of the previous airlock leakage concerns was completed. As a result, it was confirmed that the leakage results from excessive pressurization of the inner space between the door seals, which ultimately causes the door to be forced off of its seals.

In order to correct this design problem, a modification is being proposed to use PPS only to check the airlock for leakage following a CV entry. This will require a Technical Specification change in order to eliminate continual pressurization of the door seals, and is intended to conform to the Standard Technical Specifications.