NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
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EXPIRES: 8/31/85

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Palisades Plant | 0 5 0 0 0 2 5 5 | 1 OF 6 |

TITLE (4) Degraded Sealing Capability of Inner Door of Personnel Air Lock

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (6) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAMES | |
| 0 3 | 0 7 | 9 5 | 9 5 | – 0 0 2 | – | 0 4 | 0 6 | 9 5 | N/A | 0 5 0 0 0 |
| | | | | | | | | | N/A | 0 5 0 0 0 |

| OPERATING MODE (9) | N | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check one or more of the following)* (11) | | | |
|---|---|---|---|---|---|
| POWER LEVEL (10) | 1 0 0 | 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) | X 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)(x) | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (AREA CODE) |
|---|---|
| Paul J Gire | 6 1 6 7 6 4 - 8 9 1 3 |

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 |
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| SUPPLEMENTAL REPORT EXPECTED (14) | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
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| 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 7, 1995, while the plant was operating at 100% power, a pressure test was in progress on the personnel air lock door seals. The inner door seals were being tested and the required test pressure of 15 psig quickly dropped during the initial stabilization period of the test. The operator performing the test was instructed by the Control Room Supervisor to enter the personnel air lock to gain access to the inner door and verify it was closed tightly. Based on the calculated results of the inner door seals leak rate, the temporary opening of the outer door for this two minute entry into the air lock violated containment integrity requirements.

The cause of this event was an error in judgement by the Control Room Supervisor that resulted from ineffective teamwork and not maintaining a questioning attitude which led to the inappropriate action taken.

Corrective actions include: Discussions with Operations shift personnel on the need to establish teamwork and to anticipate and plan for contingencies; and an evaluation of the post-test airlock door seal maintenance activities to determine why the personnel air lock inner door seals did not successfully pass the pressure leak test.

## Event Description

On March 7, 1995, while the plant was operating at 100% power, a pressure test was in progress on the personnel air lock [NH;AL] door seals. The Technical Specification Surveillance Procedure (TSSP) DWO-13, "LLRT - Local Leak Rate Test for Inner and Outer Personnel Air Lock Door Seals ", was required to be completed within 72 hours after the air lock doors were opened. DWO-13 is the between-the-seals test for the Personnel Air Lock Doors. The doors had been opened to remove test equipment and restore air lock components to pre-test conditions after the completion of the semi-annual full pressure air lock test, SO-4A, " Personnel Airlock Penetration Leak Test."

The personnel air lock inner door seals were being tested first and the required test pressure of 15 psig quickly dropped during the initial stabilization period of the test. The Auxiliary Operator (AO) performing the test contacted the Control Room Supervisor (CRS) regarding the unexpected pressure drop for the inner door seals. The CRS instructed the AO to enter the personnel air lock to gain access to the inner door and verify it was closed tightly. The other two licensed senior reactor operators on the shift were not consulted prior to this decision. The AO entered the personnel air lock through the outer door and leaving the outer door in the open position verified the inner door was closed tightly. The inner door was found in the fully closed position and the AO exited the air lock and closed the outer door. The outer door was open for approximately two minutes. Based on the calculated results of the inner door seals leak rate, the temporary opening of the outer door for this two minute entry into the air lock violated containment integrity requirements. Containment Integrity must be maintained unless the reactor is in a cold shutdown condition. Containment integrity also requires that at least one door in the personnel air lock is properly closed and sealed. For the two minute period, the outer door was open and the inner door was not properly sealed per the testing acceptance criteria.

During the evaluation of this event it has also been determined that during previous restoration activities from the air lock full pressure test, the outer door had been open for short time periods with the inner door seals degraded. Palisades Technical Specifications do not presently contain allowances for temporary entries into air locks through an operable air lock door to gain access to an inoperable air lock door for repairs.

The Shift Supervisor (SS) was performing a plant walkdown when he was notified of the air lock testing problem. When the SS arrived at the personnel air lock after the AO had reclosed the outer door, it was realized that containment integrity may have been violated. The SS confirmed the temporary loss of containment integrity when he had the AO perform another DWO-13 local leak rate test to quantify the leak rates for the inner and outer doors. The outer door between-the-seals leak rate was acceptable at 468 cc/min, however the inner door leak rate was estimated at 89,840 cc/min. The SS had the personnel air lock card reader de-energized to restrict any further entries, and the outer door was wired closed.

Palisades Technical Specification 4.5.2.b.(2) requires the air lock between-the-seals leak rates to be maintained below 2.3% of the containment design leakage, (0.023 $L_a$) which equates to 2500 cc/min. If air lock door leakage is greater than 0.023 La then repairs shall be initiated immediately to restore the air lock leakage to less than 0.023 $L_a$ within a 7 day period. Additionally, Palisades Technical Specification 4.5.2.b.(1) requires the total leakage from all penetrations and isolation valves be maintained below 0.60 $L_a$ which equates to 65,200 cc/min. The total containment leakage at this particular time was the summation of the inner door leakage rate of 89,840 cc/min plus the total measured leakage for all other containment penetrations, 11,428 cc/min, which leads to a total of 101,268 cc/min or 0.93 $L_a$. According to Technical Specifications, if air lock door seal leakage results in one door causing total containment leakage to exceed 0.60 $L_a$, the door shall be declared inoperable and the remaining operable door shall be immediately locked closed and tested within four hours. A 48 hour action statement is applicable in this case to restore the inoperable door leakage to below 0.60 $L_a$.

The inner air lock door was declared inoperable at 0515 hours and the event was recognized as being immediately reportable due to the principal safety barrier (containment) being degraded. A one-hour nonemergency notification was made per 10 CFR 50.72.(b)(1)(ii). The personnel air lock inner door was accessed for repairs by entry through the alternate containment emergency escape air lock. Minor adjustments were made to the inner door seals and an adjustment was made to a door latching bracket to ensure the brackets closing forces were evenly distributed. The cause for the excessive between-the-seals leakage was a failure to restore the inner door seals from the compression set that occurs during the full pressure air lock test. The inner door was declared operable at 1515 hours that same day based upon a successful between-the-seals leakage test result of 39.9 cc/min.

## Analysis Of The Event

Based on the evaluation of this event, it has been determined that, there were several short duration entries and exits through the outer air lock door that occurred during the time period that the inner door seals were degraded. The inner and outer door seals have always experienced a compression set caused by the clamping and pressure forces that are exerted on the door seals during the performance of the full air lock pressure test. The compression set does not affect the safety performance of the air lock doors but it does complicate the restoration from full pressure tests. The maintenance procedures that follow the full air lock pressure test require the restoration of one air lock door at a time to ensure containment integrity is maintained. The outer door is opened and the outer door seals are restored to their normal position. This restoration is only required to allow the door seals to pass the subsequent between-the-seals testing. A seal contact check is completed to provide verification that the outer door seals integrity has been restored and the outer door is closed. The door clamps are then removed from the inner door and

it is opened to reposition its door seals to their original condition. The restoration of the sealing capability is also verified on the inner door by a similar seal contact check. The inner door is closed and at this time the repairmen exit through the outer door.

The opening of the personnel air lock outer door during the periods when excessive inner door leakage existed did not significantly degrade containment integrity for the following reasons:

1. The between-the seals test, DWO-13, applies a pressure of 15 psig between the two door seals. The leak rate is then calculated by using the pressure drop in the annulus between the two seals over a period of time. This testing cannot distinguish if the leakage is past just one seal or a combination of two seals. The actual maximum leak rate from containment past the two door seals in series would be 50% of the leak rate measured during the between-the-seals test. From this perspective, the measured between-the-seals leakage rate of 89,840 cc/min would equate to a maximum containment leakage rate past both seals of 44,920 cc/min which is 0.41 $L_a$.

2. Additionally, containment pressure during an actual accident would assist the sealing force on the personnel air lock door and would significantly enhance the sealing capability of the inner door seals. The between-the-seals test pressure is applied in a direction opposite the postulated containment accident pressure and tends to unseat the door. The fail safe design capability of the air lock doors is demonstrated by the leak rate measured during the full air lock pressure test just prior to the door seals testing. Door clamps are installed on the inner door to simulate the closing force of the containment internal pressure. The leak rate for the entire air lock at 55 psig was measured at 26 cc/min. This significantly lower leak rate is more indicative of the design basis performance of an inner door with two seals in series and design differential pressure against the door.

3. The personnel air lock outer door was opened for only a short duration, about two minutes, and was under the direct control of an AO. The actions of the Operations personnel were consistent with the allowed actions in Standard Technical Specifications (NUREG 1432) which allow temporary entries and exits through the one operable door of an air lock to provide access to the inoperable door for repairs.

The post-test adjustments to the door seals and contact checks are performed solely to restore the air lock door functionality for satisfactory completion of the between-the-seals test. It is very likely that the door seals will always function to significantly limit containment leakage during an event when a pressure differential forces the doors closed. It is evident from this particular event

that the seal contact check does not necessarily ensure that the restored seals will always pass the between-the-seals test. The between-the-seals test is a more conservative test, with respect to verification of door operability than the full pressure air lock test. Therefore, the doors can perform their design function yet not pass the between-the-seals test. At this time there appears to be no alternate testing method available that would more appropriately test the door seals and not contain excessive conservatism like the between-the-seals test method.

## Cause Of The Event

The cause of this event was an error in judgement when the CRS instructed the AO to open the outer air lock door to verify the inner door was closed tightly. The error in judgement by the CRS resulted from ineffective teamwork and a lapse in maintaining a questioning attitude which led to the inappropriate action taken. The CRS knew that the previous full pressure air lock test had resulted in a minimum leak rate and the gasket contact checks were satisfactory. This led the CRS to believe that the most likely cause of inner door leakage was due to the inner door not being tightly secured. Gasket integrity was not suspected to be the cause based on the previous satisfactory testing results. Though the leak rate was not initially quantified, the CRS did not recognize that the obtained DWO-13 leak rate could have contributed to the total containment leak rate such that the total leak rate could have exceeded 0.6 $L_a$ (65,200 cc/min). Therefore the CRS, thinking the personnel air lock inner door had exceeded 0.023 $L_a$ but not considering that it may have exceeded 0.6 $L_a$, instructed the Auxiliary Operator to enter the personnel air lock to access the inner door and verify it was closed tightly.

Though a pre-job briefing was not required or conducted for this activity, pretest planning should have facilitated a pre-determined and thoughtful response to this event. The pre-planning effort should have addressed DWO-13, section 5.3.2 requirement that states "If pressure decays rapidly, omit stabilization and take readings at frequent intervals." Also, Technical Specifications, section 4.5.2, which describes actions required if leakage exceeds 2500 cc/min, should have been researched and understood prior to commencing the test. Teamwork was not utilized by the CRS in that other resources such as the Shift Supervisor and Shift Engineer were not notified or consulted. This negated any input these individuals may have had based on their experience and knowledge. The working copy of DWO-13 was with the AOs and was not referred to by the CRS. The CRS did not maintain a questioning attitude to gather the needed information to make the appropriate decision.

A contributor to this event was the maintenance restoration activities that failed to adequately prepare the inner door seal for the DWO-13 test. The failure of the personnel air lock inner door seals resulted from the "set" taken by the seals when the strongbacks were installed for SO-4A testing. This seal "set" condition is caused by the installation of the strongbacks. The

tightening of the strongbacks drives the seal bead approximately three-eights of an inch into the door seal groove. The seal remains in this compressed condition for the entire period the test is being performed (approximately five hours). When the strongbacks are removed the seals do not quickly and fully rebound to their pretest condition. This condition was documented to the NRC in letters dated September 21, 1987 and November 15, 1990. It is also discussed in the Technical Specification Surveillance Procedure SO-4 Basis Document. In 1985 seal material changes were investigated and no improvements were determined to be available. In 1986 Palisades began performing seal contact checks and seal adjustments subsequent to air lock testing (strongback removal) in attempt to restore the seals to their pretest condition.

A second contributor to this event is the rigid existing Palisades Technical Specification requirements that allow no flexibility to access an inoperable air lock door through the operable door. Standard Technical Specifications (NUREG 1432) allow periodic short entries through operable air lock doors to complete repairs to an inoperable airlock door. The short duration of the entries, and the design capabilities of airlock doors were recognized during the development of Standard Technical Specifications (NUREG 1432), and thus they allow the entries under administrative controls for a one week period.

## Corrective Actions

The following corrective actions have been taken:

1. Palisades Work Order No. 24510545 performed troubleshooting and adjusted the latching brackets of the personnel air lock inner door. Subsequent DWO-13 testing resulted in acceptable leak rates.

2. The Shift Operations Superintendent issued Daily Orders, on March 8, 1995, and discussed with each shift the need to establish teamwork and provide advance anticipation and planning for contingencies. No further actions required.

The following corrective actions will be taken:

1. Evaluate the airlock door seal preparation activities of Maintenance Procedure CLP-M-4.

2. Continue with the planned actions and commitments to institute Standard Technical Specifications for the Palisades Plant. Our plans and commitments in this area have been communicated to the NRC in separate correspondence.