ENERGY NORTHWEST

P.O. Box 968 ■ Richland, Washington 99352-0968

October 12, 2000
GO2-00-176

Docket No. 50-397

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NPF-21**
**LICENSEE EVENT REPORT NO. 2000-006-00**

Transmitted herewith is Licensee Event Report No. 2000-006-00 for WNP-2. This report is submitted pursuant to 10 CFR 50.73 and discusses the items of reportability, corrective action taken, and action to preclude recurrence.

Should you have any questions or desire additional information pertaining to this report, please call me or Mr. PJ Inserra at (509) 377-4147.

Respectfully,

D.K. Atkinson

DK Atkinson
(Acting) Vice President, Operations Support/PIO
Mail Drop PE08

Attachment

cc: EW Merschoff - NRC RIV
JS Cushing - NRC NRR
NRC Senior Resident Inspector - 988C (2)
INPO Records Center
DL Williams - BPA/1399
TC Poindexter - Winston & Strawn

IE22

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Washington Nuclear Plant - Unit 2 | 50-397 | 1 of 6 |

TITLE (4)

Plant Outside Design Basis for Control Room Emergency Filtration System Unfiltered In-leakage Based Upon Tracer Gas Testing

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV. NUMBER | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 09 | 13 | 2000 | 2000 | 006 | 00 | 10 | 12 | 2000 | FACILITY NAME | DOCKET NUMBER |

| OPERATING MODE | 1 | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| POWER LEVEL | 100 | | 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 |
| | | | 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 (Include Area Code) |
|---|---|
| JD Arbuckle, Licensing Technical Specialist | (509) 377-4601 |

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

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX | | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
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| SUPPLEMENTAL REPORT EXPECTED (14) | | | EXPECTED | MONTH | DAY | YEAR |
|---|---|---|---|---|---|---|
| | YES (If yes, completed EXPECTED SUBMISSION DATE). | X NO | | | | |


ABSTRACT:

During September 8 through 11, 2000, a series of special tests, using a tracer gas decay methodology, were performed to determine the total in-leakage into the control room and the associated impact on control room dose. These tests were performed in support of a proposed Technical Specification amendment request that is being developed for removal of main steam leakage control system testing requirements and resolution of a long-standing issue pertaining to secondary containment/standby gas treatment system performance, using alternative source term methodology.

On September 13, 2000, test results were evaluated and a preliminary assessment showed that the maximum combined train measured unfiltered in-leakage (plus the measurement uncertainty) for the control room emergency filtration system was 220 cfm. This is in excess of the current licensing and design basis limit of 10.55 cfm. The impact of this unfiltered in-leakage increase on control room dose was evaluated and it was determined that the design basis thyroid dose of 30 rem to the control room operators would have been exceeded during post-accident conditions.

An operability assessment was prepared which concluded that the as-found in-leakage did not render the control room emergency filtration system inoperable. In addition, a follow-up interim compensatory measure included direction regarding the administration of potassium iodide, in accordance with requirements contained in abnormal operating procedures, to reduce the calculated control room thyroid dose below the 30-rem limit in the event of a design basis accident. Final resolution of this issue will be addressed by implementation of alternative source term methodology. A feasibility study, using alternative source term methodology, has shown that in-leakage rates in excess of 220 cfm (approximately 300 cfm) would result in control room doses below the regulatory limit. This is a design basis analysis issue and no plant hardware changes are required. The safety consequences associated with this event were minimal.

Event Description

During September 8 through 11, 2000, a series of special tests, using a tracer gas decay methodology, were performed to determine the total in-leakage into the control room and the associated impact on control room dose. These tests were performed in support of a proposed Technical Specification amendment request that is being developed for removal of main steam leakage control system [SB] testing requirements and resolution of a long-standing issue pertaining to secondary containment [NG]/standby gas treatment system [BH] performance, using alternative source term methodology.

The testing was also performed in response to NRC-industry initiative efforts to resolve the generic issue of the validity of control room unfiltered air infiltration rate assumed by licensees in control room habitability assessments. Tracer gas tests conducted at several nuclear power facilities have shown that control room envelope integrity to be inconsistent with the licensing and design basis. The concern is that the actual control room boundary may not be as leak-tight as assumed in design calculations, thereby, allowing a larger radiological dose to the operations staff than previously analyzed. An NRC-industry task force has been established to assist the coordination and resolution of industry issues associated with control room habitability and several public workshops have also been held to address the problem.

On September 13, 2000, tracer test results were evaluated and a preliminary assessment showed that the measured unfiltered in-leakage for the control room emergency filtration (CREF) system [VH], as determined by the tracer gas testing, was as follows:

- CREF Train A $76 \pm 24$ cfm
- CREF Train B $83 \pm 37$ cfm

These values are in excess of the current licensing and design basis limit of 10.55 cfm. The impact of this increase on control room dose was evaluated and determined to exceed the design basis thyroid dose limit of 30 rem to the control room operators during post-accident conditions. With an unfiltered in-leakage rate of 220 cfm [(76 + 24) + (83 + 37)], the post-accident thyroid dose to control room operators would have been approximately 70 rem.

Immediate Corrective Action

As an interim compensatory measure, until the proposed Technical Specification amendment request that implements alternative source term at WNP-2 is approved by the staff, Abnormal Operating Procedure ABN-FAZ was revised to include direction regarding the administration of potassium iodide to control room operators in the event of a design basis accident. This action reduces the calculated control room thyroid dose to 29.4 rem during accident conditions, which is below the regulatory limit of 30 rem (assuming 925 cfm).

Further Evaluation

1. This event is reportable in accordance with 10 CFR 50.73(a)(2)(ii) as, "Any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded; or that resulted in the nuclear power plant being: . . . (B) In a condition that was outside the design basis of the plant." The increase in the design basis limit for unfiltered control room emergency filtration system in-leakage had the result of the design basis thyroid dose of 30 rem to the control room operators being exceeded during post-accident conditions.

2. The current licensing basis for control habitability indicates that there is only a small margin to the 10 CFR 50, Appendix A, GDC 19 control room personnel thyroid dose limits. Therefore, an increase in actual in-leakage would result in exceeding the dose criteria for control room personnel during design basis events.

   The identification of in-leakage greater than the licensing basis placed the control room emergency filtration system and associated heaters, dampers, fans and ducting in a degraded, non-conforming, but operable condition. Accordingly, a Follow-Up Assessment of Operability (FAO) [similar to a Justification for Continued Operation] was prepared to allow continued plant operation in this condition. The FAO, which was based upon an evaluation of control room dose for several accident scenarios, concluded that the as-found in-leakage did not render the control room emergency filtration system inoperable (based upon 10 CFR 50, Appendix A, GDC 19).

   This determination of operability was based on meeting the definitions in the Technical Specification Bases 3.7.3, "Control Room Emergency Filtration (CREF) System," description for the associated Limiting Condition for Operation. The system heaters, fans, dampers and ducting still perform their intended functions. The emergency charcoal filters still remove most of the iodine introduced into the control room through the selected remote intakes. The control room is also still capable of remaining pressurized under emergency conditions as demonstrated by testing pursuant to Technical Specification Surveillance Requirement SR 3.7.3.4.

   In addition, as part of the operability determination, an assessment was performed which concluded that potassium iodide could be administered to the control room staff, as an interim compensatory measure, to meet GDC 19 requirements by blocking iodine doses to the thyroid (limiting organ dose). A calculation was performed which documented projected control room doses following a design basis LOCA with maximum control room in-leakage, crediting 90% potassium iodide blocking effectiveness. The calculation listed the 30-day control room personnel doses for the design basis LOCA, with a control room in-leakage rate of 925 cfm and the following license basis assumptions: 1) 0.74 scfh secondary containment bypass rate; and 2) 90% potassium iodide blocking effectiveness for thyroid radioiodine uptake for control room personnel. In addition very conservative atmospheric dispersion values were used for the control room air intakes. Under the analyzed worst-case conditions, it was concluded that GDC 19 control room dose criteria were met (29.4 rem to the thyroid versus the 30 rem criterion), with administration of potassium iodide within two hours following initial exposure to the contaminated control room atmosphere.

3. The control room physical boundary is constructed of thick concrete walls, ceiling and floor. The normal entrance and exit doors are arranged in an air lock configuration, and other access points are secured and monitored. All of the doors are made of steel and fitted with gaskets and seals to restrict air leakage. The control room HVAC system consists of normal HVAC and emergency control room emergency filtration system components, with some common ducts.

   The normal HVAC system is comprised of two independent trains that consist of a main circulation fan, an air handler containing a roll filter, cooling coils and heater, and the ducts connecting these together. The fans and air handlers are located in the mechanical room on 525-ft elevation of the radwaste building directly above the control room. They are not inside the control room boundary, but the majority of the interconnecting ductwork is located within the control room boundary. In this system, the fan is not located inside the air handler but rather outside and upstream of the air handler, which keeps the air handling unit pressurized with leakage outward.

   The control room emergency filtration system is constructed of welded, solid ducting rather than flextube or other assembled duct structure. The control room emergency filtration system houses the HEPA and carbon filters components that filter the outside air prior to introducing it into the control room HVAC system when in the pressurization mode. The filter housing is a sealed, leak-tight enclosure. All doors and equipment access panels are gasketed and secured with bolted fasteners. The ducts connecting the control room emergency filtration system to the control room HVAC system is made of heavy gauge steel with welded seams. Duct connections are constructed with flanged joints and rubber gaskets covered with 3M 800 sealer. When the control room is in the pressurization mode, there is a negative pressure gradient inside the duct from the control room emergency filtration system to the main HVAC fan. The duct joints were tested with soap bubble solution to determine if there was any obvious in-leakage and none was observed. The control room emergency filtration system has the capability to pressurize the control room to greater than 0.5-inch wg in conjunction with the main recirculation fan.

   Given the robust design of the control room emergency filtration system, it is not anticipated that the measured in-leakage would increase over time.

Root Cause

The reason for this event is the use of different test methodologies in determining control room in-leakage rates. The current surveillance for control room in-leakage is performed on a component basis, i.e., filter bypass leakage is measured. The tracer gas test is an integrated test. Ingress/egress was also allowed during the tracer gas test. Therefore, a portion of the in-leakage and/or uncertainty is due to the door effects.

Further Corrective Action

As previously discussed with the NRC, the Technical Specification amendment request associated with the implementation of alternative source term methodology at WNP-2 will be submitted for staff review by June 30, 2001.

This is a design basis analysis issue and no plant hardware changes are required in the resolution of the problem. Final resolution of this issue will be addressed by implementation of alternative source term methodology at WNP-2 and as part of the proposed Technical Specification amendment request. A feasibility study, using alternative source term methodology, has shown that in-leakage rates in excess of 220 cfm (approximately 300 cfm) would result in control room doses below the regulatory limit. We are also continuing to follow the NRC-industry initiative efforts to resolve generic issues related to control room habitability.

Assessment of Safety Consequences

The safety consequences associated with this event are minimal. The control room emergency filtration system is designed to provide a radiologically controlled environment to ensure the habitability of the control room for the safety of control room operators under all plant conditions. Two independent control room emergency filtration subsystems are each capable of fulfilling the safety function. The ability of the system to maintain the habitability of the main control room is explicitly assumed for certain accidents. System operation ensures that the radiation exposure of control room personnel, through the duration of any one of the postulated accidents, does not exceed the limits set by GDC 19 of 10 CFR 50, Appendix A.

The increased in-leakage is a concern during the design basis LOCA source term accident, which is the bounding design basis accident for control room doses. Calculated control room doses could also be impacted for other design basis accidents that credit control room emergency filtration or isolation (e.g., main steam line break, fuel handling accident, and control rod drop accident). However, 10 CFR 50, Appendix A, GDC 19 criteria are met for these other design basis accidents without any additional mitigation. The GDC 19 criteria can also be met for the design basis LOCA source term accident with the administration of potassium iodide to control room personnel.

This is a design basis analysis issue and no plant hardware changes are required in the resolution of this issue. The control room emergency filtration system is considered operable but degraded. The system is capable of performing its specified safety function to pressurize and filter control room air during accident conditions. The Technical Specification surveillances for the system are current and demonstrate satisfactory results. The instrumentation and controls, power, etc., are all capable of performing their support functions. The safety design basis requirements are met and maintained and demonstrated in calculations except for control room dose. A feasibility study, using alternative source term methodology, was also performed which showed that in-leakage rates in excess of 220 cfm (approximately 300 cfm) would result in control room doses below the regulatory limit.

A sensitivity analysis, using representative design basis assumptions, was also performed and demonstrated that 300 cfm unfiltered in-leakage to the control room results in doses within the GDC 19 criteria using alternate source term methodology. This 300 cfm in-leakage value is greater than the test results, plus the measurement uncertainty. Accordingly, this event had minimal impact on the health and safety of either the public or plant personnel.

Safety System Functional Failure

This event did not result in a safety system functional failure pursuant to NEI 99-02, "Regulatory Assessment Performance Indicator Guideline."

Similar Events

There have been no similar events.