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 AUTH. NAME: FULLER, R.E. AUTHOR AFFILIATION: Washington Public Power Supply System
 BAKER, J.W. Washington Public Power Supply System
 RECIP. NAME: RECIPIENT AFFILIATION

SUBJECT: LER 92-008-00: on 920301, setpoint error was discovered. Caused by Analysis Deficiencies. NRC was verbally notified. W/920331 ltr.

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 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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March 31, 1992
G02-92-076

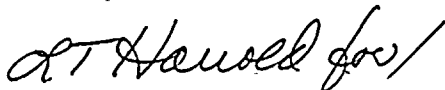
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**SUBJECT: NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21
LICENSEE EVENT REPORT NO. 92-008-00**

Transmitted herewith is Licensee Event Report No. 92-008-00 for the WNP-2 Plant. This report is submitted in response to the report requirements of 10CFR50.73 and discusses the items of reportability, corrective action taken; and action taken to preclude recurrence.

Sincerely,



J. W. Baker
WNP-2 Plant Manager (Mail Drop 927M)

Enclosure

cc: Mr. John B. Martin, NRC - Region V
Mr. C. Sorensen, NRC Resident Inspector (Mail Drop 901A, 2 Copies)
INPO Records Center - Atlanta, GA
Ms. Dottie Sherman, ANI
Mr. D. L. Williams, BPA (Mail Drop 399)

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)

Washington Nuclear Plant - Unit 2

DOCKET NUMBER (2)

0 5 0 0 0 3 9 7

PAGE (3)

1 OF 7

TITLE (4)

Standby Gas Treatment System Fan Flow Limiter Setpoint Error

| 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 NUMBERS (5) | | |
| 0 | 3 | 0 | 1 | 9 | 2 | 9 | 2 | -- | 0 | 0 | 8 | -- | 0 | 0 |
| 0 | 3 | 0 | 1 | 9 | 2 | 9 | 2 | -- | 0 | 0 | 8 | -- | 0 | 5 |
| 0 | 3 | 0 | 1 | 9 | 2 | 9 | 2 | -- | 0 | 0 | 8 | -- | 0 | 5 |

OPERATING MODE (9) 4 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

| | | | | | |
|------------------|---|-------------------|------------------|----------------------|--|
| POWER LEVEL (10) | 0 | 20.402(b) | 20.405(c) | 50.73(a)(2)(iv) | 77.71(b) |
| | | 20.405(a)(1)(i) | 50.36(c)(1) | 50.73(a)(2)(v) | 73.73(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) | 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 |
| R. E. Fuller, Compliance Engineer | |
| AREA CODE | |
| 5 0 9 3 7 7 - 4 1 4 8 | |

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 |
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SUPPLEMENTAL REPORT EXPECTED (14)

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ABSTRACT (16)

On March 1, 1992, a Plant Technical Engineer determined the setpoint for the Standby Gas Treatment (SGT) System fan flow limiters could trip the fan motor thermal overloads (TOL) and prevent the SGT System from performing its safety function under highly unlikely design conditions. Operability determination of the SGT System at the setpoint used the wrong instrument reference calibration condition and did not consider instrument loop uncertainties. The setpoint error was discovered by the Engineer during a review of the SGT System.

The SGT System was declared inoperable and the Technical Specification Action Statement (TSAS) 3.6.5.3(b) for the SGT System was entered. The NRC was verbally notified at 1545 hours PST on March 1, 1992 per 10 CFR 50.72(b)(2)(iii)(C).

The root cause of this condition was Analysis Deficiencies.

Review of systems for possible similar actual vs. standard flow problems has been completed and outstanding issues resolved. Investigation into instrument setpoint accuracy is ongoing.

The safety significance of this condition is considered negligible. The likelihood of a sustained low voltage condition occurring during an accident that would require the SGT System to perform its safety function coincident with worst-case operating conditions is considered very low.

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| LICENSEE EVENT REPORT (LER) TEXT CONTINUATION | | | | | | | | | | | |
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| | | | | | | | Year 92 | Number 008 | Rev. No. 00 | | |
| TITLE (4) Standby Gas Treatment System Fan Flow Limiter Setpoint Error | | | | | | | | | | 2 | OF 7 |

Plant Conditions

Power Level - 0%

Plant Mode - 4 (Cold Shutdown)

Event Description

On March 1, 1992, a Plant Technical Engineer determined the setpoint for the Standby Gas Treatment (SGT) System fan flow limiters could trip the fan motor thermal overloads (TOL) and prevent the SGT System from performing its safety function under highly unlikely design conditions. Operability determination of the SGT System at the setpoint used the wrong instrument reference calibration condition and did not consider instrument loop uncertainties. The setpoint error was discovered by the Engineer during a review of the SGT System.

The SGT fan flow limiter setpoint was 5600 ICFM (Indicated Cubic Feet per Minute) on the flow recorders, SGT-FR-2A1, 2A2, 2B1, 2B2. The analysis showed that the mass flow rate at the setpoint under extreme air stream conditions combined with instrument loop uncertainties could be higher than intended. Further, the analysis determined that the high mass flow rate under the combination of extremely unlikely design conditions (low voltage) could cause the SGT System fan motor TOLs to trip.

Immediate Corrective Action

The SGT System was declared inoperable and the Technical Specification Action Statement (TSAS) 3.6.5.3b for the SGT System was entered. This condition precludes fuel handling activities, core alterations, or operations with a potential for draining the reactor vessel. The NRC was verbally notified at 1545 hours PST on March 1, 1992 per 10 CFR 50.72(b)(2)(iii)(C) as a condition alone that could have prevented the fulfillment of the safety function of structures or systems needed to control the release of the radioactive material.

Further Evaluation and Corrective Action

A.. Further Evaluation

1. This event is considered reportable per 10 CFR 50.73(a)(2)(v)(C) as a condition alone that could have prevented the fulfillment of the safety function of structures and systems that are needed to control the release of radioactive material. The SGT System may not have performed its safety function under the combination of extremely unlikely design conditions.
2. There were no structures, components, or systems inoperable prior to the discovery of the condition which contributed to the condition.

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3. To obtain a relative change in mass flow rate of compressible fluids for different conditions, the indicated volumetric flow rate of the air stream condition is corrected to a reference condition, i.e., temperature, pressure, and relative humidity. If the air stream conditions are at precisely the same conditions the instrumentation was calibrated to, the relative changes in indicated volumetric flow rate are proportional to the relative changes in mass flow rate.

The SGT System flow rate instrumentation was calibrated at air stream conditions of 212°F, 16.73 psia, and 0% RH. Prior calculations incorrectly assumed the reference air stream calibration condition was 90°F, 14.89 psia, and 0% RH.

The indicated flow rate on the recorders at air stream temperatures below approximately 120°F is lower than the corresponding standard flow rate. At air temperatures above approximately 120°F the indicated flow rate is higher than the standard flow rate. As the air stream temperature decreases for a constant indicated flow rate, the corresponding standard flow rate increases. An increase in standard flow rate corresponds to an increase in mass flow rate. As the mass flow rate through a fan increases, the current draw on the motor increases.

In addition to the error in assumed calibration condition, instrument loop inaccuracies also had not been considered. This error also contributed to underestimation of mass flow.

The rated TOL trip point for the SGT fan motors (36.5 amps) is based on a temperature of 104°F. As the temperature of the TOL decreases, the trip point increases.

Operability of the SGT System with respect to fan motor TOLs is dependent upon the worst combination of demand flow rate through a fan, air stream conditions, instrument loop uncertainties, motor terminal voltage, and TOL temperature. For the 5600 ICFM flow limiter setpoint, the worst case demand flow rate was determined to be 6340 SCFM. The corresponding current draw on the fan motor was determined to be 38 amps at 400 VAC, i.e., low voltage conditions. (Low voltage conditions are defined to be the motor terminal voltage when the network voltage is just above the undervoltage transfer relay setpoint and the associated emergency bus is supporting all of its LOCA loads.) Therefore, the setpoint of 5600 ICFM could result in tripping of all of the SGT System fan motors and failure of the SGT System under highly unlikely extended low voltage conditions.

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4. A Justification for Continued Operation (JCO), Revision 1, regarding Secondary Containment operability was in effect at the time the setpoint error was discovered. Upon review of WNP-2 calculations of Secondary Containment drawdown time following a postulated LOOP/LOCA, the analyses were found to be nonconservative. The original analyses did not consider an adequate time delay for Secondary Containment drawdown to -0.25-inch w.g. Also, adverse environmental conditions that increase Secondary Containment leakage were not considered in the analyses. To achieve an acceptable drawdown time under the worst case conditions, the SGT System maximum allowed flow rate needed to be increased. The JCO was based on the SGT System fan flow limiter setpoint of 5600 ICFM.

In most cases, the actual standard flow through the SGT trains will be higher than the indicated flow. If the indicated value is not corrected to standard conditions with reference to the actual instrument calibration condition, erroneously low and inconsistent mass flow rate values will be used. In addition, the SGT fan flow limiter accuracy error (430 ICFM @ 5600 ICFM) needs to be included in any evaluation that relies on the setpoint value.

The indicated recorder readings were corrected with reference to the wrong instrument calibration condition. This resulted in predicting low mass flow rate values. In addition, the instrument loop uncertainties were not evaluated to determine the highest probable mass flow rate based on SGT System measurements. The nonconservative low mass flow rate data were then used in surveillance tests to determine the acceptability of Reactor Building leakage. This could have potentially resulted in underpredicting the time to reach a negative 0.25-inch w.g. Reactor building pressure.

As a result of the potential failure of the SGT System under extremely unlikely conditions and possible erroneous Reactor Building leakage data, the JCO, Revision 1, was declared invalid. New evaluations were initiated to determine the appropriate SGT System flow limiter setpoint value and verify acceptable Secondary Containment leakage.

5. The root cause of this condition was Analysis Deficiencies. The Instrument Setpoint Change Request (ISCR) analysis that supported the change of the SGT System setpoint from 4457 ICFM to 5600 ICFM corrected the indicated flow values with reference to the wrong instrument calibration condition and did not include instrument loop uncertainties. These errors led to incorrect conclusions regarding actual mass flow. Hence, the impact of mass flow rate on fan motor loads was not properly evaluated.

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6. The Revisions 0 and 1 of the JCO had determined that 10CFR100 and GDC19 dose limits could be satisfied provided the Reactor Building drawdown to -0.25-inch w.g. occurred within 10 minutes. Based on corrections of indicated flow values to standard conditions with reference to the correct instrument calibration condition, consideration of instrument loop uncertainties, low voltage, charcoal bed residence time and adverse environmental conditions, the new fan flow limiter setpoint was determined to be 5380 ICFM. The minimum flow rate based on combination of the uncertainties in the negative direction satisfies the 10 minute drawdown requirement.

The worst case demand flow rate for the fan motor TOLs at the new setpoint was calculated to be 6340 SCFM based on combination of the uncertainties in the positive direction, and air stream conditions of 60°F, 14.89 psia, and 0% RH. The TOL trip margin was assumed not to increase with decreasing building air temperature. The peak current draw on the fan motor was determined to be 39 amps at 400 VAC.
7. The TOLs for the fan motors were replaced with TOLs having a trip point of 45 amps. The fan 40A motor fuses were also replaced with 45A rated fuses. Therefore, the SGT System was determined capable of performing its safety function under all design conditions at the new flow limiter setpoint of 5380 ICFM.
8. The SGT System fan flow limiter setpoint was changed to 5380 ICFM.
9. To achieve Secondary Containment drawdown within 10 minutes at the new fan flow limiter setpoint under all design basis conditions, the Standby Service Water (SSW) pond temperature must be maintained at or below 72°F. All appropriate Plant procedures were changed to ensure the temperature of the SSW ponds would be maintained in compliance with the JCO while the Plant is in Modes 1, 2, 3, or 4.
10. Review of other systems for possible errors related to indicated flow (CFM) versus standard flow (SCFM) has been completed. Outstanding issues are resolved.
11. Secondary Containment leakage was determined to be acceptable using SGT System indicated flow data corrected to the correct instrument reference calibration condition.
12. Revision 2 of the JCO was approved with new offsite dose calculations at the new fan flow limiter setpoint. The revised JCO was discussed with the NRC. However, NRC approval was not required based on a 10 CFR 50.59 review that determined an Unreviewed Safety Question did not exist.

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B. Further Corrective Action

Evaluation of setpoints for equipment in harsh environments has been completed per the WNP-2 Setpoint Methodology Program. Although beyond the scope of our original Setpoint Methodology Program, the Supply System is planning to extend its review to selected nonharsh environment setpoints. Progress of this effort will be dependent on resource availability and overall corporate priorities. Based on current planning, this is estimated to be a 4-1/2 year effort.

Safety Significance

The safety significance of this condition is considered negligible. The likelihood of a low voltage condition occurring on the network during an accident that would require the SGT System to perform its safety function coincident with abnormally high switchgear room temperatures is considered very low. In addition, the voltage would have to remain just above the setpoint of the degraded voltage relay for an extended period time.

Under nominal operating conditions the existing SGT System fan TOLs would not have been expected to trip. Any postulated accident requiring SGT would probably occur when the Reactor Building motor control center room temperature would be near its average value of 75°F. The corresponding current draw on the fan motor would be 38 amps at the fan flow limiter setpoint of 5600 ICFM and 400 VAC. The TOL trip limit is 36.5 amps at 104°F. At 75°F building air temperature, the trip limit increases approximately 15% or to 42 amps. The fan motor fuses were rated at 40 amps. Therefore, it is highly unlikely the SGT System would have failed to perform its safety function with the previous limiter setpoint at 5600 ICFM. There is similar margin under design basis conditions.

Similar Events

LER 92-02 describes a condition where the indicated flow measurements for the Main Steam Leakage Control (MSLC) System were being used to satisfy the Technical Specification surveillance requirements. The Technical Specifications required flow test values at standard conditions. Therefore, the indicated values should have been corrected to standard conditions.

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IIIS Information

Text Reference

IIIS Reference

| <u>System</u> | <u>Component</u> |
|---------------|------------------|
| SB | FI |
| BH | FAN |
| BH | FU |
| BH | FCO |
| BH | FI |

Main Steam System Flow Indicator
 Standby Gas Treatment System Fan
 Standby Gas Treatment System Fan Thermal Overloads
 Standby Gas Treatment System Flow Limiters
 Standby Gas Treatment System Flow Indicator