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SUBJECT: Discusses util concern re unreviiewed safety question concerning standby gas treatment.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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September 29, 1989
G02-89-176

Docket No. 50-397

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

Gentlemen:

SUBJECT: **NUCLEAR PLANT NO. 2,**
UNREVIEWED SAFETY QUESTION
REGARDING STANDBY GAS TREATMENT

In a recent review of the capability of the WNP-2 Standby Gas Treatment (SGT) System to perform as stated in its licensing documentation the Supply System has identified a concern for WNP-2 with respect to establishing secondary containment pressure under certain circumstances.

The WNP-2 FSAR requirement for SGT performance is to reestablish secondary containment to -0.25 inches w.g. within 120 seconds of initiation (150 seconds after the event, e.g. FSAR Table 6.9-29). The analyses for control room habitability and offsite consequences for a LOCA assume that the -0.25 inches w.g. is achieved for the purpose of terminating unfiltered secondary containment release and assume a SGT performance characteristic for the balance of the release. Using a methodology for analyzing the pressures throughout secondary containment that is considered more accurate than that performed to support the licensing of WNP-2, we have identified conditions when the pressure requirement is not within the specified time. In summary, adverse meteorological conditions (moderate wind and low temperature) coincident with a DBA LOCA and assumed failure of one train of SGT create a condition that is not within the licensing basis consideration for secondary containment performance.

In view of this concern, a Justification for Continued Operation (JCO) has been performed for WNP-2 and is attached. The conclusion of this JCO is that operation of the plant can continue while final resolution of this issue is achieved. The important conclusions of this JCO are:

- Using 1) an actual capacity value for SGT flow of 5600 cfm, rather than the design basis value of 4460 cfm, 2) an actual secondary containment leakage of 1475 cfm rather than the maximum allowable value of 2240 cfm and 3) with reasonably conservative meteorology, the calculated offsite releases and control room doses are within the guideline values of 10CFR100 and the limits of GDC 19 respectively and the negative pressure is also achieved within an acceptable time period relative to the resultant doses.

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- With the above assumptions and by incorporating the recently allowed provision of Standard Review Plan 6.5.5, rev. 0, relative to credit for iodine scrubbing within the suppression pool, the resulting control room and offsite doses are comparable to those stated in the WNP-2 Safety Evaluation Report.

- As stated above, with the current FSAR analysis methodology, the resulting dose is increased but remains within the 10CFR100 and GDC 19 limits.

To confirm the above mentioned actual secondary containment leakage value has remained representative of the plant condition a test was run on September 26, 1989. The leakage was found to be 1228 cfm thus confirming the 1475 cfm value used for the JCO.

Notwithstanding the conclusions of the Justification for Continued Operation, the Supply System has reviewed this condition relative to the requirements of 10CFR50.59 and has determined that it represents an unreviewed safety question. Relative to guidance provided in NSAC-125, "Guidelines for 10CFR50.59 Safety Evaluations," dated June 1989, we have concluded that this situation represents an increase in the consequences of an accident previously evaluated (i.e. the design basis LOCA). While credit for iodine scrubbing in the suppression pool would allow for a different conclusion, NSAC-125 specifically provides that for plants licensed before an SRP was adopted by the NRC, the acceptance limit for a 50.59 safety evaluation is established by the plant-specific FSAR or safety evaluation report. SRP 6.5.5 was published subsequent to the issuance of the WNP-2 operating license and has not yet been adopted as the licensing basis acceptance limit for WNP-2.

As such, the purpose of this letter is to provide the NRC early notification of this unreviewed safety question. We see 50.59 as primarily a process to seek prior NRC approval. Since the situation described above already exists, immediate concern in this case is the status of plant safety relative to continued operation which has been addressed in the JCO.

Part 50.59(c) does require approval of an Unreviewed Safety Question by the NRC staff. This situation will require a change to the FSAR to describe both the capability of SGT under various conditions and to provide the supporting offsite and control room dose calculations.

We believe it will be necessary to work closely with the staff to evaluate this FSAR change and the requirements for the final resolution of this issue and are providing this notification to commence this dialogue.

Very truly yours,

GC Sorensen

G. C. Sorensen, Manager
Regulatory Programs

AGH/bk

cc: JB Martin - NRC RV
NS Reynolds - BCP&R
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JUSTIFICATION FOR CONTINUED OPERATION

NCR. NO. 288-357

1.0 Introduction & Component Identification

Niagara Mohawk Corp. filed an LER on NMP-2 with the NRC in Mid-'87 following discovery that assumptions used to evaluate secondary containment differential pressure draw-down time following a postulated LOOP/LOCA were not conservative. Upon review of WNP-2 calculations of draw-down time, it was found that the WNP-2 analysis was also non-conservative. Like NMP-2, an assumed failure of certain emergency power buses cause delay in the ability to achieve the negative Secondary Containment differential pressure. Further, the original WNP-2 analysis does not consider adverse environmental conditions that increase Secondary Containment leakage.

The equipment affected by this problem is theStandby Gas Treatment System filter trains (EPN SGT-FU-1A and SGT-FU-1B).

2.0 Accident Conditions

The SGT and Secondary Containment act to minimize and control radiological releases from the plant. Unfiltered release of Primary Containment leakage, and other radioactive gasses and particulates resulting from accidents outside the Primary Containment, is prevented by maintaining the Secondary Containment negative with respect to atmospheric pressure, and by filtering the effluent gasses from the Secondary Containment. Secondary Containment pressure boundary integrity is assured by testing inleakage and SGT capability. The SGT and Secondary Containment integrity are relied upon to ensure that 10CFR100 site boundary dose limits are not exceeded and to ensure that control room personnel exposure is within GDC 19 limits.

3.0 Component Safety Function

The SGT system is required to have the flow and pressure head capacity to maintain Secondary Containment at a -0.25" water gauge differential pressure, discharging Secondary Containment inleakage and Primary Containment outleakage through

high efficiency filters and charcoal bed filters. This capability is required to be met by Technical Specifications assuming a post-accident single active failure. Secondary Containment inleakage must be maintained below 2240 cfm at -0.25" differential to assure that the technical specifications are met. The SGT is also used under certain conditions to filter primary containment purge gasses.

4.0 Status of Component

The SGT is operable, and Secondary Containment leakage is within Technical Specification limits.

5.0 Justification For Continued Operation

The WNP-2 FSAR states that the secondary containment will be maintained at minimum differential pressure of -0.25" W.G. following a postulated LOCA, and that this differential will be established within two minutes following the accident. Recent analysis (Calculation ME-02-89-09), based upon Standby Gas Treatment, Secondary Containment, Standby Service Water, and weather modeling, shows that during post-LOCA, or adverse weather, differential pressure of the Secondary Containment may not always meet the FSAR commitments. Certain combinations of post-LOCA single active failures and winter weather conditions[1] act to minimize SGT performance, and increase Secondary Containment leakage. Wind increases the demand on the SGT to hold the leeward side and roof of the Reactor Building sufficiently negative while simultaneously increasing the differential pressure, and thus the inleakage, on the windward side of the building. Differential temperature between the inside and outside of the Building creates a differential pressure gradient from the bottom to the top of the Secondary Containment due to the density difference of the air inside and outside the Building. As a result, the lower portion of the building must be held at a high differential pressure (up to -0.75") to assure that a -0.25" differential exists at the Building roofline. This overall greater

[1] Analysis uses the lowest monthly average temperature for January of 12°F in combination with with the highest average monthly wind for January of 10.3 mph. On the average, temperature is below 12°F approximately 1.6% of the calendar year, and below 0°F approximately 0.1% of the calendar year. Wind conditions above 10.3 mph should provide sufficient dispersion to preclude the need for maintaining the -0.25" differential and therefore negates designing the SGT for worst case wind conditions.

differential pressure proportionally increases Building inleakage. The effects of wind and winter temperatures result in the inability to hold the upper portion of the Secondary Containment at a -0.25" differential in cold and mildly windy weather, and lengthens the time required to reach -0.25" differential in warmer and less windy weather.

Analysis shows that the time required to reach the steady state differential pressure condition is a function of the assumed meteorological conditions at the time of a postulated LOCA, the assumed type of single active failure coincident with the LOCA, and the Standby Service Water (SSW) temperature. The transient analysis clearly indicates that the limiting single active failure is the assumed loss of one SGT train. Based upon single train design basis SGT flow and maximum Technical Specification allowable Secondary Containment leakage, the upper-most surface areas of the Reactor Building cannot be maintained at a quarter inch water gauge negative pressure with respect to atmospheric pressure during low temperature and high wind conditions. High SSW water temperature acts to extend the time required to reach a steady state condition, but does not effect the final steady state differential pressure.

Surveillance requirements are relied upon to periodically demonstrate system performance and to discover potential degradation. The performance criteria, stipulated in the LCO's, neither specifies environmental conditions nor does it specifically permit application of any compensation for wind, temperature differential, etc. Verbatim compliance with the existing text would not require testing under the most adverse weather conditions, or require adjustment to compensate for them. The fact that there may be environmental conditions that challenge the design criteria for the systems should only require design changes if the resultant dose is unacceptable. It should be assumed that the criteria is sufficient to satisfy all WNP-2 testing requirements. In this case, the SGT and Secondary Containment performance criteria are potentially in error. The Supply System is not, however, at liberty to modify the criteria without prior NRC approval. That approval process may adjust the system performance criteria or it may simply rely on the existing test criteria to demonstrate conservative performance during the anticipated testing conditions. Given that the systems are believed to perform their intended function, and that is to limit dose, the Secondary Containment and SGT systems are functional.

With two fans redundantly powered in each train, the SGT is not susceptible to many of the single active failures that have relatively high probability of occurrence, e.g. failure of an emergency diesel generator to start. If one train does fail to start automatically, remote manual initiation and process monitoring can occur though the control room. A design review of the system to determine the susceptibility of an SGT train to single failure has not been performed. Until that occurs, the likelihood of failure, or what would be necessary to remedy failure susceptibilities, is not known. (Local control may not be possible due to the post-LOCA radiation fields that are postulated to be present in the vicinity of the SGT trains.) From a failure analysis perspective, the SGT train design at WNP-2 does have features that provide more reliable operation than are dictated by the minimum design requirements.

Testing conducted during the past calendar year of SGT flow/differential pressure capability[2], and testing of Secondary Containment integrity[3] show that the SGT is capable of performance beyond design basis requirements, and that the Secondary Containment is significantly more leak-tight than required by Technical Specifications. Actions have been taken over the past twelve months to further tighten the Secondary Containment boundary against leakage, e.g. REA and ROA isolation valve seals have been replaced and the railroad bay door seals have been adjusted. Reanalysis using documented realistic performance values for SGT flow capability and Secondary Containment leakage shows that the post-LOCA pressure stabilizes at -0.32" with an outside temperature of 12°F with a coincident 10.3 mph wind, which is well below the required -0.25". However, the -0.25" level is not reached for approximately 3.5 minutes after the accident. Additional margin to the design basis requirements is also available from the actual leakage performance of the Primary Containment. Table 1 outlines the results of analysis based upon licensing basis SGT and Secondary Containment performance followed by reanalysis results based on realistic SGT and Secondary Containment performance.

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[2] Procedure TP-8.3.108 titled SGT Functional Test With Varying Conditions, Control Number 88-805, Test Conducted August 29, 1988.

[3] Technical Specification 3/4.6.5.1 compliance, test conducted 12/01/88.

Table 1

Parametric Evaluation Of Secondary Containment/ SGT Performance

Evaluation Description	Outside Temp. (°F)	Wind Speed (mph)	SGT Flow (cfm)	Sec. Cont. Leakage (cfm)	Roof Line Stdy State Pressure (" H_2O)	Time To Reach -0.25" (minutes)
Design Basis Performance Of SGT and Secondary Containment	12	10.3	4460	2240	-0.02	Never
Realistic Secondary Containment Leakage, Design Basis SGT Flow	12	10.3	4460	1475	-0.156	Never
Design Basis Sec. Cont. Leakage, Realistic SGT Capability	12	10.3	5600	2240	-0.12	Never
Realistic Sec. Containment and Realistic SGT Capability	12	10.3	5600	1475	-0.323	3.5
Reanalysis For Coldest Temperature Capability						
Realistic Sec. Containment and Realistic SGT Capability	-23	0	5600	1475	-0.25	< 10
Realistic Sec. Containment and Realistic SGT Capability	-8	10.3	5600	1475	-0.25	< 10
Reanalysis With 5% Margin						
Realistic Sec. Containment and Realistic SGT Capability	12	10.3	5320	1475	-0.282	4
Realistic Sec. Containment and Realistic SGT Capability	12	10.3	5600	1549	-0.295	3.6

Table 1 demonstrates that the plant can be maintained at the required negative pressures (albeit the time is greater than two minutes) with the current leak-tightness of the Secondary Containment and SGT capability at very low winter temperatures, i.e. -8°F with a 10 mph wind, and -23°F without wind. Provided that the leak-tightness of Secondary Containment and/or the flow capability of SGT do not degrade by more than 5%, a differential of -0.25" can be maintained at 12°F with a 10 mph wind. Requirements for residence time in the SGT charcoal filters is met with at the 5600 cfm flowrate for design basis active and passive failure scenarios.

Provided that the SGT set point pressure is sufficiently negative, and the controllers are set in manual, the existing SGT pressure control loop instrumentation will assure that the SGT trains operate at maximum flow during all meteorological conditions. Existing loop instrumentation controls Secondary Containment pressure during windy conditions up to existing REA or SGT capacity.

Current NRC requirements for radiological analysis do not allow SGT credit until a full -0.25" differential pressure is established at all secondary containment boundary surfaces. A review of existing radiological analyses indicates that both the post-LOCA offsite and control room doses will increase as a result of delayed re-establishment (beyond two minutes) of the -0.25" differential. However, reanalysis using current rules that allow credit for iodine scrubbing within the suppression pool are expected to result in offsite doses equivalent to those outlined by the FSAR, assuming a ten minute "no SGT credit" period to re-establish the full -0.25". The current condition of the SGT and Secondary Containment do not meet the FSAR description under all reasonable environmental conditions; however, the resultant doses are within the 10CFR100 and GDC 19 requirements.

Short term actions required to implement this JCO include:

a) Resolve SGT operating mode and set point issues.
b) Review and propose modification recommendations for the plant operating procedures.
c) Reportability Review
d) Communication with the NRC.

6.0 Conclusion

Given the current state of Secondary Containment integrity, the SGT can provide adequate differential pressure control with an adequate margin applied for variations in Secondary Containment leak-tightness and SGT flow performance. Based upon realistic test data, the Secondary Containment pressure differential will remain greater than -0.25" during severely cold winter conditions; with temperatures as low as -23°F without wind and -8°F with a coincident 10 mph wind.

Although formal calculations have not been prepared, study calculations show that both offsite and onsite post accident doses remain well below 10CFR100 limits, and not significantly different than the results now documented in the FSAR.

9/20/89	9/20/89
Originator/Date	Manager/Date
89-38	J W Baker
POC Mtg. No.	POC Chairman/Date