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November 16, 1995
GO2-95-247

Docket No. 50-397

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

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NPF-21**
RESPONSE TO NRC BULLETIN 95-02

References:

1) NRC Bulletin 95-02, dated October 17, 1995, " Unexpected Clogging of Residual Heat Removal (RHR) Pump Strainer While Operating in Suppression Pool Cooling Mode"

2) NRC Bulletin 93-02, dated May 11,1993, "Debris Plugging of Emergency Core Cooling Suction Strainers"

3) INPO Significant Operating Report, dated July 11, 1995, "SOER 95-1, Reducing Events Resulting From Foreign Material Intrusion"

4) Letter OG95-673-161, RR Sagaro, Chairman, BWROG ECCS Suction Strainer Committee to BW Owners Group Representatives, "Utility Response to NRC Bulletin 95-02 Regarding ECCS Suction Strainer Plugging from Operational Debris" dated November 6, 1995

This letter provides the requested 30-day response to Reference 1. WNP-2 has maintained a program of cleaning and inspection of the primary containment suppression pool since inception of power operation with the most recent inspection performed during the annual maintenance and refueling outage in May 1995. Based on that and other factors, we have determined that all pumps drawing suction on the suppression pool are operable. The attachment provides the details and bases for this conclusion, and includes the other information requested by Reference 1.

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RESPONSE TO NRC BULLETIN 95-02

Should you have any questions or desire additional information regarding this matter, please call me or D. A. Swank at (509) 377-4563.

Sincerely,

J. V. Parrish (Mail Drop 1023)
Vice President, Nuclear Operations

CJF/lam

Attachments

cc: LJ Callan - NRC RIV
KE Perkins, Jr. - NRC RIV, Walnut Creek Field Office
NS Reynolds - Winston & Strawn
JW Clifford - NRC
DL Williams - BPA/399
NRC Sr. Resident Inspector - 927N

ATTACHMENT

REPORT ON ACTIONS RESPONSIVE TO NRC BULLETIN 95-02

Requested Action No. 1:

Verify the operability of all pumps which draw suction from the suppression pool when performing their safety functions (e.g., ECCS, containment spray, etc.) based on an evaluation of suppression pool and suction strainer cleanliness conditions. This evaluation should be based on the pool and strainer conditions during the last inspection or cleaning and an assessment of the potential for the introduction of debris or other materials that could clog the strainers since the pool was last cleaned.

Response:

Operability of the Emergency Core Cooling System (ECCS) pumps depends in part on the net positive suction head (NPSH) required to support operation in an accident. The available NPSH for the Low Pressure Core Spray (LPCS), High Pressure Core Spray (HPCS), and three Residual Heat Removal (RHR) pumps is approximately 40 feet, assuming a 50% suction strainer blockage at design flowrates, with suppression pool water conditions per Regulatory Guide 1.1. The required NPSH for these pumps is approximately 14 feet, as depicted in the FSAR. Although the Reactor Core Isolation Cooling (RCIC) system is not safety related, it does draw suction from the suppression pool in some modes of operation. The available NPSH for the RCIC pump is approximately 60 feet with a pool temperature of 140°F consistent with the RCIC system design conditions, and the required NPSH is approximately 20 feet. Consequently, the design provides adequate NPSH margin for the ECCS and RCIC pumps with 50% suction strainer blockage. Suppression pool and suction strainer conditions are such that the RHR, LPCS, HPCS, and RCIC strainers are observably clear, and there is no indication of the presence of fibrous materials in the suppression pool. Water-leg pumps for the ECCS systems draw suction through the same suction strainers and are therefore protected to the same degree as the larger ECCS pumps. Consequently suppression pool cleanliness conditions are such that NPSH margins are not impaired. Based on the above, WNP-2 has determined that the RCIC and all ECCS pumps are operable. Details follow.

Underwater areas were visually inspected by divers in 1986 and 1989 to verify the integrity of corrosion-resistant coatings on underwater structures and piping, and to examine the suction strainers for blockage by debris. A thin layer of loose sediment was found on the strainers in both inspections, which is not a safety concern because the sediment is composed of small particles which could pass freely through the suction strainers and respective ECCS system if they become suspended in the pool water. There was no evidence of fibrous materials that could combine with the sediments. The strainers were found to be free of debris except for two scraps of duct tape, small amounts of string, and a tie wrap found on one of the RHR strainers in 1989, potentially affecting less than 1% of the strainer surface. The material was removed by the diver.

In response to Reference 2, WNP-2 determined that no fibrous air filters or other temporary sources of fibrous materials that could be dislodged by a LOCA were, or had been, located inside

primary containment. An inspection of suppression pool was performed during the refueling outage in 1993. Visible debris was removed by divers, leaving the suppression pool generally free of debris but with a layer of sediment. There was no evidence of the presence of fibrous materials in the water or in the debris. A thin layer of sediment was observed on the upper surface edges of the obtruding perforated plates of the suction strainers, but there was no indication of any fibrous matting on the strainer surfaces that could combine with the sediment to restrict flow. All suction strainers were observed to be generally free of debris, except for small amounts of duct tape fragments on one RHR strainer, which covered less than 1% of the strainer surface. The debris was removed by the divers, leaving the strainers for the RHR, LPCS, RCIC, HPCS, and Fuel Pool Cooling (FPC) system observably clear of material that potentially could obstruct flow through the strainers. The 1993 underwater inspection confirmed that the suction strainers had remained unobstructed and in good condition since the 1989 inspection. No operational difficulties have ever occurred to give any indication of strainer blockage.

As previously reported in WNP-2 Licensee Event Report 93-27, the reactor automatically scrammed on August 3, 1993 from full power due to closure of the Main Steam Isolation Valves as a result of an error made during performance of a surveillance test. The Main Steam Relief Valves (MSRVs) opened automatically, venting the reactor to the suppression pool. The MSRVs were used by the operators to control reactor pressure during the early stages of the event. The RHR systems were started promptly in suppression pool cooling mode to reduce suppression pool temperatures which were elevated due to the action of the MSRVs. Suppression pool cooling was secured on August 5. During the two day period in suppression pool cooling mode, no operational difficulties occurred to give any indication of RHR suction strainer blockage. This event preceded removal of debris and sediments from the suppression pool in 1994, and indicates that the sediments stirred up by operation of the MSRVs did not contain fibrous material in amounts that could result in strainer blockage, and that the amount and type of debris present did not have an identifiable effect on the strainers.

The WNP-2 suppression pool was cleaned of debris and sediments in 1994. An underwater visual inspection performed prior to the cleaning operation indicated the accumulated sediment ranged in thickness up to 6 inches, with the greater thicknesses being localized in structural support areas and lesser thicknesses (1/8 to 1/4 inches) being generalized accumulations over open floor areas. The suction strainers were not obstructed. There was no indication of fibrous material matting on the suction strainers, and no indication of fibrous material either in the sediment or in suspension in the pool.

As part of the 1995 refueling outage closeout, minor amounts of debris were removed from the suppression pool floor areas by divers. The suction strainers for the RCIC, FPC, RHR, LPCS, and HPCS systems were specifically examined as part of the 1995 inspection and were observed to be unobstructed and in good condition, with no indication of fibrous material. The cleanup and inspection were associated with the WNP-2 Foreign Materials Control Program which establishes controls on materials brought into the primary containment during maintenance activities, as discussed under Requested Action No. 4 below.

In summary, inspections performed in 1986, 1989, 1993, 1994 and 1995 demonstrated that RHR, LPCS, and HPCS suction strainers are and have been unobstructed and in generally good condition, and are thus able to support ECCS system safety functions. A reactor scram occurring in 1993 involving opening of the MSRVs and RHR operation in suppression pool cooling mode did not result in any operational difficulties as would occur if strainer blockage had occurred indicative of the presence of fibrous materials. Control of items brought into the primary containment was exercised under the WNP-2 Foreign Materials Control Program after the suppression pool underwater inspection performed on May 29, 1995. The RHR system has operated in suppression pool cooling mode for approximately 120 hours since June 10, 1995, and no operational difficulties have occurred indicative of suction strainer blockage. In aggregate this record indicates that NPSH margins indicated in the FSAR are not impaired. Based on the above, WNP-2 has determined that all ECCS pumps are operable.

Requested Action No. 2

The operability evaluation in requested action 1 above should be confirmed through appropriate test(s) and strainer inspection(s) within 120 days of the date of this bulletin.

Response:

The WNP-2 FPC System design includes the capability to draw suppression pool water through a strainer located in the suppression pool and passing it through filter-demineralizer units before returning it to the suppression pool. The FPC suction strainer, located approximately 2 feet above the bottom of the suppression pool, is physically smaller but of the same perforated plate design as the ECCS system strainers, and has the same sized strainer passages. The FPC filter-demineralizers are capable of removing suspended particulates to sizes substantially smaller than fibrous materials that would be expected to mat on the surface of ECCS suction strainers, and therefore act to maintain suppression pool particulates at a low level.

The FPC system is operated in suppression pool cleaning mode for 3 continuous days each month to assure that chloride levels in the suppression pool water are less than 0.5 ppm. Currently, this operational mode is initiated as a periodic pre-defined maintenance item.

The procedure followed in aligning the FPC system to clean the suppression pool requires that the process flow rate be set at 575 ± 25 gpm. The maximum water volume of the suppression pool allowed by the Technical Specifications is 128,827 cubic feet. Consequently, the water volume of the suppression pool is filtered through the FPC system approximately 2.5 times each month, resulting in removal of approximately 90% of any suspended impurities and particulates present in the pool water at the beginning of the monthly clean-up cycle. If the FPC suction strainers were blocked by debris or fibrous material, the required flow would be difficult to establish, thereby providing indication to the operators of unusual suppression pool conditions. Consequently, use of the FPC in suppression pool cleaning mode constitutes a monthly monitoring of suppression pool cleanliness. It should be noted that suppression pool cleanliness is also

monitored by operation of the RHR system in suppression pool cooling mode and periodic surveillance testing of the LPCS and RHR systems.

Reference 1 requested an inspection of the WNP-2 suppression pool by February 13, 1996. Such an inspection would require an unscheduled shutdown of the reactor without a commensurate safety benefit. Deferral of the requested inspection for a short period should not result in a significant risk to public health and safety because (1) cleaning and inspection activities recently conducted have established that the ECCS systems are operable, (2) no evolutions have occurred to pose the potential of introduction of mobile debris into the suppression pool since the last inspection, and (3) cleanliness of the suppression pool is monitored and improved through monthly operation of the FPC system in suppression pool cleaning mode. Therefore, WNP-2 proposes to perform the requested inspection of the suppression pool and suction strainers as part of the Foreign Materials Control (FMC) program closeout for the Spring 1996 outage, currently scheduled to begin in April. This inspection will be performed on a annual basis, as indicated in the response to Requested Action No. 3 below. The suppression pool and suction strainers will be inspected, and any significant debris will be removed. Samples of any debris removed from the suction strainers will be analyzed to support identification of the source of the material. Consistent with the recommendations of Reference 4, samples of the pool water and sediments will be taken and analyzed for the presence of fiber. If fiber is found in amounts that potentially could block suction strainers, the sediment will be removed from the suppression pool by underwater vacuuming.

Requested Action No. 3

Schedule a suppression pool cleaning. The schedule for cleaning the pool should be consistent with the operability evaluation in requested action 1 above. In addition, a program for periodic cleaning of the suppression pool should be established, including procedures for the cleaning of the pool, criteria for determining the appropriate cleaning frequency, and criteria for evaluating the adequacy of the pool cleanliness.

Response:

As discussed above, suppression pool cleanliness has been a significant and continuing activity at WNP-2. Based on a number of inspections, WNP-2 does not believe that any significant amount of fibrous materials is present in the suppression pool. However, the inspections will be continued on a annual basis to monitor the integrity of underwater corrosion resistant coatings and to identify and remove any debris that may have accumulated. All identified debris will be removed that could result in blockage of more than 1% of any suction strainer.

The sediments found in the pool are mobile but are not generally in suspension. Sediment particles alone are not a safety concern because they are small, and if suspended could pass freely through the suction strainers and respective ECCS system. WNP-2 will utilize the criterion outlined above in the response to Requested Action No 2 to initiate sediment removal. Sediment removal operations will be performed under written procedures.

Requested Action No. 4

Review FME procedures and their implementation to determine whether adequate control of materials in the drywell, suppression pool, and systems that interface with the suppression pool exists. This review should determine if comprehensive FME controls have been established to prevent materials that could potentially impact ECCS operation from being introduced into the suppression pool, and whether workers are sufficiently aware of their responsibilities regarding FME. Any identified weaknesses should be corrected. In addition, the effectiveness of the FME controls since the last time the suppression pool was cleaned and the ECCS strainers inspected, and the impact that any weaknesses noted may have on the operability of the ECCS should be assessed.

Response:

The FMC program has been developed over a period of years based on thoughtful consideration of maintenance activities and lessons learned through incidents at WNP-2 and other utilities. Thus, weaknesses in the FMC processes are addressed as they are identified.

The program is currently governed by plant procedures entitled "Foreign Material Control Around The Spent Fuel Pool, the Reactor Cavity, and the Dryer-Separator Pit," "Foreign Material Controls For Systems and Components," and "Drywell/Wetwell Foreign Material Control." The scope of the procedures is as indicated by the titles. Specific functions of the program for the drywell/wetwell areas include (1) maintaining control of all items taken into the drywell which could fit through the suppression pool downcomer openings and thus could fall into the suppression pool from the drywell, and (2) maintaining control of items taken into the wetwell which could clog ECCS system suction strainers, damage ECCS pump internals, or interfere with the LOCA based pressure suppression function of the primary containment. The FMC process involves logging of mobile items used in the containment to support outage maintenance activities, and requires identification and removal of all such items from the drywell and suppression pool at the close of an outage. The procedure for the drywell/wetwell area is applied during outages after completion of an inspection and inventory of mobile items in the drywell and prior to the suppression pool underwater inspection that has been utilized to provide added confidence in the adequacy of FMC processes for the primary containment.

Workers are trained for implementation of the three procedures cited above, participate in industry-events training in response to incidents involving FMC problems at WNP-2 and other utilities, and participate in specific scenarios such as valve disassembly for packing replacement to practice FMC when systems have been breached for maintenance. This training emphasizes the importance of continual attention to control of foreign materials, and heightens worker awareness of the importance of FMC as a means to assure that operability of systems, structures, and components is not inadvertently impaired.

Requested Action No. 5

Consider additional measures such as suppression pool water sampling and trending of pump suction pressure to detect clogging of ECCS suction strainers.

Response:

An abnormal condition procedure entitled "ECCS Suction Strainer Plugging" provides specific guidance to operators as to actions to be taken if a suction pressure alarm is received in the Control Room, indicating possible ECCS or RCIC suction strainer blockage. This procedure was developed as part of the response to Reference 2.

Test data acquired during performance of quarterly surveillance tests of the three RHR subsystems and the LPCS systems are routinely trended to detect potential performance degradation, including possible NPSH losses due to suction strainer blockage. Testing is performed under the In-Service Test Program for Pumps and Valves. Data obtained and trended includes pump suction and discharge pressures and system flowrates. The surveillance test procedures specify the expected values for suction pressure on the test data sheets and an action limit that, if encountered, would require preparation of a Problem Evaluation Request to identify potentially unacceptable suction pressure conditions for appropriate resolution. The trended data is routinely evaluated so that a gradual decline in system performance can be identified before reaching unacceptable levels. No NPSH degradation has been identified to date, which is consistent with the results of underwater suction strainer inspection. Surveillance testing of the RCIC and HPCS systems are normally performed with the systems suction aligned to the Condensate Storage Tank instead of the suppression pool. NPSH data for those systems are also trended, but have no relationship to suppression pool cleanliness conditions.