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SUBJECT: Responds to NRC 970129 ltr re violations noted in insp rept 50-305/96-10 on 961002-1120.Corrective actions:shift crew briefings,plan of actions to prevent personnel errors & improve overall performance developed on each shift.

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February 28, 1997

10 CFR 2.201

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

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Reply to Notice of Violation, Inspection Report 96-010

Reference: Letter from J. M. Caldwell (NRC) to M. L. Marchi (WPSC) dated January 29, 1997 (NRC Integrated Inspection Report 50-305/96010 and Notice of Violation)

In the reference, the Nuclear Regulatory Commission (NRC) provided Wisconsin Public Service Corporation (WPSC) with the results of the NRC inspection activities conducted October 2 through November 20, 1996.

During the inspection, NRC identified two Severity Level IV violations. The violations were cited due to three examples of operator failure to follow procedures, and the failure to include two Class 2 containment spray suction pressure relief valves in the in-service testing (IST) program. These are contrary to the requirements in the Technical Specifications regarding procedure use and in-service testing of ASME Class 2 valves.

Attached is our response to the notice. If you should have any questions, please contact me or a member of my staff for clarifications.

Sincerely,

for Mark L. Marchi
Manager - Nuclear Business Group

IE01

GIH
Attach.

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cc: US NRC Senior Resident Inspector
US NRC Region III

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ATTACHMENT 1

Letter from M. L. Marchi (WPSC)

To

Document Control Desk (NRC)

Dated

February 28, 1997

Re: Reply to Notice of Violations, Inspection Report 96-010

NRC Notice of Violation 96-010-001

Technical Specification 6.8.a requires implementation of procedures that meet the requirements of ANSI 18.7-1976, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants." Section 5.2.2, "Procedure Adherence," of ANSI 18.7-1976, requires that procedures be followed.

Surveillance Procedure (SP) 33-098,(Revision AL), "Safety Injection Pump and Valve Test," required, in part, that residual heat removal (RHR) valve RHR-300B, "RHR Pump B Supply to Safety Injection (SI) Pump B" to be opened.

Operating Procedure N-EHV-39, "4160 VAC Supply and Distribution System Operation," (Revision L), Section 4.2.2, requires, in part, that while transferring power supply to Safeguards Bus 5 from the Tertiary Auxiliary Transformer (TAT) to the Reserve Auxiliary Transformer (RAT), that the RAT Position 43 switch is to be placed into the manual position.

Surveillance Procedure (SP) 33-191, (Revision N), "Safety Injection Flow Test," Sections 6.4.1 and 6.4.5 required, in part, that valves SI-11280, "SI Pump A Suction Pressure Gauge Isolation Valve" and SI-11281, "SI Pump B Suction Pressure Gauge Isolation Valve" to be open and recording pump suction pressure at local instruments PI-927 and PI-926.

Contrary to the above:

a. On November 14, 1996, an operator failed to follow SP 33-098 and opened valve SI-300B instead of valve RHR-300B.

b. On November 11, 1996, an operator failed to follow procedure N-EHV-39 and did not place the RAT Position 43 into the manual position before transferring the Safeguards Bus 5 power supply from the TAT to the RAT.

c. On October 11, 1996, requirements of SP 33-191 were not followed. The safety injection pump suction pressure gauges were not placed in service by opening isolation valves SI-11280 and SI-11281 during the surveillance.

WPSC Response

Wisconsin Public Service Corporation (WPSC) does not contest this violation. WPSC agrees that these examples of personnel errors resulted in failure to perform required procedure steps. WPSC's assessment of the consequences of the failures concluded that none resulted in degraded plant equipment nor were any systems, structures or components adversely challenged. Therefore, the events individually or combined had no safety significance. However, WPSC has concluded a weakness in personnel performance is evident.

Reason For Violation

WPSC has conducted an extensive root cause investigation of these events. The results of our investigation found that in each of the events, the operator involved had reviewed the procedure prior to performing the task, and was following the procedure in a manner he considered adequate for the task when the error was made. The errors were the result of inadequate procedure usage techniques and the failure of barriers such as self-checking, teamwork, and pre-task briefings that are intended to prevent these types of errors.

Shortly after the occurrence of the third event (SI-300B mispositioning), a team was formed to study these and similar events. The objective of this team was to develop long and short term corrective actions to address the increased incidence of events caused by operator error. A root cause analysis was performed on each of the three events cited in the violation. The results of the analyses are summarized as follows:

SI-300B (NOV example "a")

The primary cause of this event was that the operator's procedure reading/usage technique was not meticulous. While reviewing the procedure steps prior to performing the task, the operator focused on the valve number and train - 300B - instead of focusing on the entire valve designation - RHR-300B. When the task was performed, although he applied self-checking techniques, the operator again focused on the valve number 300B and incorrectly opened SI-300B instead of RHR-300B. Contributing to this event is the fact that these two valves have similar designations and are located about six inches apart on the control panel. One difference between the two control switches is that one, SI-300B, has a switch cover. The intended purpose of the cover is to preclude this type of event. However, in this case the switch cover was ineffective in preventing the operator from opening the wrong valve.

Secondary causes of this event included a faulty mental model, inadequate self-checking, lack of an adequate briefing, faulty teamwork, and a sense of over-confidence. The faulty mental model was created when the operator focused on "300B" instead of RHR-300B. Better self-checking by the operator, a pre-task briefing, and better teamwork by the shift crew may have helped him to expand his focus from the valve to the entire system, thus breaking the faulty mental model. Also, a good pre-task briefing may have discussed the similarity and close proximity of the RHR-300B and SI-300B control switches. The simplicity of the task, combined with the fact that the operator had opened the correct valve at least two times earlier in the shift, created a sense of over-confidence within the operator and the shift crew that may have contributed to the event.

Safeguards Bus 5 (NOV example "b")

There were two primary causes of this event. First, the operator's procedure usage and self-checking techniques were inadequate. The operator had reviewed the procedure and walked through the required actions prior to performing the switching operation. The operator had the procedure in-hand while performing the operation, but was not following it closely enough and as a result missed two steps. The operator did not apply effective self-checking techniques and thus did not detect his error. Second, the operator was performing the task too quickly due to concerns about minimizing the time the transformers were in parallel. This limited the effectiveness of the operator's self-checking and procedure usage technique.

Secondary causes of this event include a faulty mental model, lack of a pre-task briefing with other members of the shift crew, faulty teamwork, and a sense of over-confidence. A faulty mental model was created when the operator positioned the oncoming power supply breaker control switch to CLOSE and assumed the breaker closed without verifying the breaker indicating light. Although the transformer load indications did not match his expectations, he decided this must be due to the light system load, and opened the running power supply breaker. The operator did not adequately question the discrepancy between system indications and his mental model.

A pre-task briefing would have presented an opportunity to review the indications to be checked during the switching operation, and it may have clarified communication expectations for the task. This may have established more effective teamwork among the crew members and provided backup support for the operator performing the switching operation. The operator performing the bus switching expected a second operator who was observing the evolution to verify load changes on the incoming transformer, but failed to communicate that expectation. The simplicity of the task, combined with the fact that the operator had recently performed the task several times, created a sense of over-confidence within the operator and the shift crew that may have contributed to the inadequate self-checking, lack of pre-task briefing, and faulty teamwork.

SI Flow Test (NOV example "c")

The primary root causes for this event included inadequate procedure reading and usage techniques by the Nuclear Auxiliary Operator (NAO), and a sense of over-confidence on the part of the NAO. The NAO, who was using a copy of the procedure as a checklist to help him perform the task, checked off steps on his informal copy prior to actually performing the steps. Although this was not determined to be falsification of records, it was identified as a poor work practice. When he performed the procedure steps in the field, the NAO failed to identify that two actions were required when performing the steps related to recording the SI pump suction pressure (open valve and record pressure). Later, when the procedure directed him to close the valves, the NAO assumed he had closed the valves in a previous step and did not further question the condition.

Secondary root causes for this event included poor communications aggravated by limitations in quality and quantity of communications equipment, faulty teamwork, and a lack of an adequate pre-task brief. Multiple, independent communications from other shift crew members and other departments took place with the NAO while preparing for and during the performance of the SI flow test. This resulted in the NAO being distracted several times during the test. In addition, inadequate verification of directions given to and information received from the NAO was noted. The control room operator (NCO) directed the NAO to perform specific step numbers without detailing the actions required. The NAO reported completion of the step numbers without detailing specific actions taken.

Communications during the test were conducted using the in-house "Gaitronics" telephone system. Alternative communications equipment which can be used by the operator in the field are sound powered phones with headsets and wireless radio operated headsets. The alternative communications equipment in this case were not used due to a lack in quality of the sound powered phones in noisy areas and a limited number of wireless units. Although communications equipment limitations were identified, better communications techniques would have overcome any equipment limitations.

Faulty teamwork was noted in some instances. When questioned by the NAO regarding the suction pressure instrument not changing as the Refueling Water Storage Tank was being pumped down, the NCO performing the test did not follow up on the NAO's questions/concerns. The NCO did not relay those concerns to the Control Room Supervisor (CRS) or Shift Supervisor (SS). The NAO did not further question the NCO when his concern was dismissed. Faulty teamwork was also noted on the part of the NAO, who assumed additional tasks without providing feedback on his work load to the CRS. The CRS and SS were not aware of multi-tasking on the part of the NAO.

The pre-task briefing was inadequate for this task. The briefing for the SI flow test was included at the end of the briefing for another task. The task was not considered complex enough by on-shift supervision to warrant an extensive brief. However, this briefing was consistent with past operating practice at KNPP.

Based upon the evaluations of the individual events, the team concluded the common causes of the events to be:

1) Inadequate Procedure Reading/Usage Techniques

In each of the three events, the operator had reviewed the procedure and had a copy of the procedure with him when the error was made. Each operator was using the procedure in a manner he considered to be adequate for the task; however, their procedure reading or implementation techniques allowed them to misread or completely miss steps.

2) Sense of Over-confidence

The operators were performing tasks that they considered relatively simple. In two of the events, the operators had recently performed the tasks several times. The simplistic, routine, or repetitive nature of the tasks led to a sense of over-confidence on the part of the operators and the shift crews involved in these events. The sense of over-confidence resulted in the operators and crews involved failing to implement proper procedure reading/usage and self-checking techniques, teamwork, and adequate pre-task briefings.

3) Faulty Teamwork

Several opportunities for effective use of teamwork were missed in the events. The operators involved were performing their tasks essentially independently, with little interaction with other crew members, including shift management. This limited the ability of other crew members to question their actions or catch mistakes.

4) Lack of Adequate Pre-task Briefing

The failure to perform an adequate pre-task briefing resulted in a failure to discuss past problems encountered while performing the tasks, a failure to clarify expectations for communications, and a failure to discuss expected system response. Discussing these items may have enhanced teamwork and could have prevented the events.

5) Inadequate Self-checking

Self-checking techniques such as STAR (Stop-Think-Act-Review) were not effectively applied. If the operators had stopped to think about the task they were performing, verified the correct system, train and component valve number, checked multiple indications of successful task performance, and confirmed the expected system response, the missed/misread procedure steps likely would have been caught and these events would have been prevented.

6) Faulty Mental Model

In each of the events, the operators formed a mental model of the situation that was based on inaccurate or incomplete information. This faulty mental model led the operators to ignore indications of incorrect task performance caused by missing or misreading the procedure steps.

Corrective Actions

A team was formed to study these and similar events to determine common root causes and to recommend corrective actions to prevent recurrence of similar events. The activities of this team are documented using the Kewaunee Assessment Process (KAP #0534). In addition, separate evaluations of these three events were conducted in parallel to determine and correct special causes of the events. These activities are documented by KAP #0441 (SI-300B event), KAP #0417 (Bus 5 event), and KAP #0342 (SI-flow test event). The team recommended that the following short term corrective actions be taken while further study was performed to develop effective long term corrective actions. The short term corrective actions taken are:

1) Shift crew briefings were conducted by the Plant Manager and Superintendent-Plant Operations. The purpose of the briefings was to ensure that all operations personnel understood the nature of the events, including the preliminary root causes, and that the events represented an unacceptable level of performance at KNPP.

2) Each shift crew developed a plan of actions that they could take to help prevent personnel errors and improve overall human performance on shift. The crews are currently implementing these plans and providing input to the development of long term corrective actions

3) A meeting of all shift supervisors, control room supervisors, and operations management was held to discuss the recent operational events, clarify management expectations concerning procedure usage and compliance, and to share ideas for improvement from the crew action plans. The common actions agreed upon were: 1) to improve communications during task performance, 2) to improve the quality and frequency of shift briefings, and 3) to clarify job performance expectations among shift crew members, between operations department management and the shift crews, and between operations department and other departments.

4) Copies of "The Industrial Operator's Handbook" by H.C. Howlett were purchased and provided to each of the shift crews as a reference to help improve the level of human performance. This handbook provides guidance on vital elements of successful systematic plant operations. This handbook was instrumental in the efforts of the team that is responsible for evaluating these three events.

5) Pocket guides to help improve self-checking (STAR) techniques were printed and distributed to all shift crew personnel. Training, to supplement the pocket guides, on the use of self-checking techniques, common cues for when self-checking should be applied, and the top ten most often occurring precursors to error, was presented to operators in Licensed Operator Requalification training.

6) Training on pre-task briefing techniques was scheduled and is being conducted as part of the current operator requalification training series as part of a lesson encompassing INPO's SOER 96-1, "Control Room Supervision, Operational Decision Making and Teamwork."

The team formed to study these events is continuing to evaluate the need for additional corrective actions to prevent recurrence of similar events. Currently identified corrective actions to be taken are:

1) A system of measures will be developed to determine the effectiveness of corrective actions.

2) An alternative to the control switch cover for preventing inadvertent operation of the SI-300 valves is being evaluated.

Additional corrective action recommendations will be included in the team's final report.

Compliance Schedule

All of the short term corrective actions listed above are completed. The final report for KAP 0534, including the long term corrective action recommendations, are scheduled to be completed by April 30, 1997. A system of measures will be implemented to track the effectiveness of these corrective actions. The final reports for each of the individual events (KAPs 0342, 0417, and 0441) with specific corrective action recommendations are scheduled to be completed by March 31, 1997.

NRC Notice of Violation 96-010-002

Technical Specification 4.2.a.2 requires in-service testing (IST) of ASME Code Class 1, 2, and 3 valves in accordance with Section XI of the ASME Boiler and Pressure Code and applicable Addenda as required by 10 CFR 50.55a(f). 10 CFR 50.55a and the licensee's IST plan specified Section XI, addenda through 1988 and editions through 1989 and references OMa-10-1987, "Inservice Testing of Valves in Light-Water Reactor Power Plants." OMa-10-1987 required testing of class 1, 2 and 3 relief valves that provide system overpressure protection per OM-1-1987, "Requirements for inservice Performance Testing of Nuclear Power Plant-Pressure Relief Device."

Contrary to the above, on November 18, 1996, NRC inspectors identified that Class 2 containment spray suction pressure relief valves ICS-20A and ICS-20B were not included within the IST program and consequently were not tested as required.

WPSC Response

WPSC does not contest this violation. WPSC recognizes the importance of testing safety/relief valves and had begun testing them prior to recognizing requirements to do so. Testing to date has shown that there have been some valves which lifted below their set value. Of these, none resulted in a failure of the associated systems' capability of performing its intended function. Therefore, no safety significant concerns are evident.

Reason For Violation

These valves were not included in the IST plan in the past because the valves themselves do not "..perform a specific function in shutting down a reactor to the cold shutdown condition or in mitigating the consequences of an accident" as delineated in the scope of Section XI, IWV-100.

When the third ten year interval was developed for KNPP, which began June 16, 1994, the code followed was ASME/ANSI OMa-1988 Addenda to ASME/ANSI OM-1987 Edition. The scope of OM-10, "Inservice Testing of Valves in Light-Water Reactor Power Plants," includes the statement, "The pressure-relief devices covered are those for protecting systems or portions of systems which perform a required function in shutting down a reactor to the cold shutdown condition, in maintaining the cold shutdown condition, or in mitigating the consequences of an accident." WPSC considered the change in the wording of the scope from Section XI to OM-10 as an increase in scope and did not include the valves based on discussion in the Statements of Consideration (57 FR 34666) for the adoption of the new code which states, "... the intent of this rulemaking is to maintain the existing scope of 50.55a for pump and valve testing."

There continues to be discussion in the nuclear industry as to the requirements of including all safety/relief valves that are located in Code Class 1, 2, and 3 piping in IST programs and testing them accordingly. However, after reviewing the requirements in response to the subject of this notice, WPSC agrees that it is prudent, and conservative, to test these valves in accordance with the revised wording of OM-10.

Corrective Actions

ICS-20A and ICS-20B were tested during the current refueling/maintenance outage. WPSC will also add ICS-20A and ICS-20B to the IST plan.

An initial review of other safety/relief valves located in Code Class piping was performed. This review identified 32 additional valves that fall within the expanded scope of OM-10. Therefore, WPSC will include these valves in the IST plan and test them accordingly. Of the 34 valves, 23 have been tested and/or replaced within the last five years.

WPSC is currently evaluating the grouping of the valves which should be included in the IST plan. According to OM-1, for class 2 and 3 relief valves, 25% of each type and manufacturer are required to be tested prior to 48 months from the start of the first ten year period. For KNPP, this would require 25% to be tested prior to June 16, 1998. Based upon the results of the grouping evaluation, WPSC will, if necessary, perform testing to meet the scheduling requirements of OM-1.

Included in the additional 32 valves are nine valves that could be classified as "thermal relief" valves. WPSC is aware of a proposed ANSI/ASME OM Code Case for thermal relief valves. WPSC will follow this issue and may submit a Relief Request in the future based on this code case.

Compliance Schedule

If any testing is determined to be necessary to meet the scheduling requirements of OM-1, it will be performed during the current refueling/maintenance outage. The current outage does not have a scheduled completion date at this time.

A total of 34 valves will be added to the IST plan and included in the next revision of the plan. A recent NRC inspection identified other concerns which will also require changes to the IST plan. To reduce submittals for review and approval, WPSC will incorporate all of these changes and make one submittal. This submittal will be made by August 30, 1997.