UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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August 18, 2005

EA-05-065

Randall K. Edington, Vice
President-Nuclear and CNO
Nebraska Public Power District
P.O. Box 98
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION - NRC INSPECTION
REPORT 05000298/2005012 AND INVESTIGATION REPORT 4-2004-006

Dear Mr. Edington:

On July 18, 2005, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Cooper Nuclear Station. The purpose of the inspection was to follow up on the unplanned power change due to loss of feedwater heating on July 7, 2003. The enclosed inspection report documents the inspection findings which were discussed on August 12, 2005, with Mr. S. Minahan, General Manager of Plant Operations, and other members of your staff.

The issues discussed in this report were the subject of an investigation conducted by the NRC's Office of Investigations (NRC Investigation Report 4-2004-006) into whether plant operators and managers willfully failed to follow procedures that required the reactor to be scrammed. Specifically, the investigation examined the circumstances involving a plant transient on July 7, 2003, during which concurrent high level alarms were received for Moisture Separators A and C.

The NRC carefully reviewed the information developed by the Office of Investigations, including the transcribed interviews of several operators and managers familiar with the events. The NRC did not come to a conclusion that operations personnel willfully failed to follow procedures, but has concluded that procedural violations occurred. Specifically, the NRC has concluded that operators failed to scram the reactor when concurrent moisture separator high level alarms were received and, subsequently, deviated from procedural requirements to scram the reactor after these conditions had cleared.

Thus, based on the results of the investigation and this inspection, the NRC has identified two issues that were evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that violations are associated with these issues. These violations are being treated as noncited violations (NCVs), consistent with Section VI.A of the Enforcement Policy. These NCVs are described in the enclosed inspection report. If you contest the violations or their significance, you should provide a response within

30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator, Region IV, the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001, and the NRC Resident Inspector at Cooper Nuclear Station.

The NRC's conclusions in this case differ from those reached by NPPD following this event in July 2003. This raises questions regarding your expectations for operators in respect to procedural adherence and the circumstances under which operators may deviate from procedures. Please review the following questions and determine whether you are satisfied that your program is adequate: (1) How are operators currently trained to implement manual scram actions? (2) What are your expectations and standards for procedural adherence with regard to manual scram actions? and (3) What is your current assessment of operator actions taken following the July 2003 event and would these actions have met your current standards and expectations? Once you have completed this review, we would like the opportunity to further discuss these questions with you.

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

/RA/

Wayne Walker, Chief
Project Branch C
Division of Reactor Projects

Docket: 50-298
License: DPR-46

Enclosure:
NRC Inspection Report 05000298/2005012
w/attachment: Supplemental Information

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SISP Review Completed: _wcw___ ADAMS: : Yes ☐ No Initials: __wcw__
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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket.:	50-298
License:	DPR 46
Report:	05000298/2005012
Licensee:	Nebraska Public Power District
Facility:	Cooper Nuclear Station
Location:	P.O. Box 98 Brownville, Nebraska
Dates:	July 5-18, 2005
Inspectors:	S. Schwind, Senior Resident Inspector
Approved By:	W. Walker, Chief, Branch C, Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000298/2004012; 07/05/05 - 07/18/05; Cooper Nuclear Station; Personnel Performance During Nonroutine Evolutions.

The report documents the NRC's inspection of operator response to a feedwater transient which occurred on July 7, 2003. The inspection identified two Green noncited violations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process." The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a noncited violation of Technical Specification 5.4.1 regarding the failure to follow station procedures which required operators to manually scram the reactor on concurrent high level alarms in Moisture Separators A and C. On July 7, 2003, operators received these alarms but did not scram the reactor.

  This finding involved human performance during an event and was more than minor since it could be reasonably viewed as a precursor to a significant event. The purpose of a manual scram on high moisture separator levels is equipment protection for the main turbine; however, the failure of operators to manually scram the reactor under other circumstances could challenge reactor safety. The finding was determined to be of very low safety significance since all mitigation equipment was available during the transient. This finding also had crosscutting aspects associated with human performance since procedural guidance was clear and operators still failed to manually scram the reactor. The licensee entered this condition in their corrective action program as Resolve Condition Report 2004-0327 (Section 1R14).

- Green. The inspectors identified a noncited violation of Technical Specification 5.4.1 regarding the failure to follow station procedures which required operators to manually scram the reactor even though the conditions requiring that action had just cleared. On July 7, 2003, operators failed to manually scram the reactor upon recognition that procedures required this even though the high moisture separator alarms had just cleared.

  This finding involved human performance during an event and was more than minor since it could be reasonably viewed as a precursor to a significant event. The finding was determined to be of very low safety significance since all mitigation equipment was available during the transient. This finding also had crosscutting aspects associated with human performance since procedural guidance was clear and operators still failed to manually scram the reactor. The licensee entered this condition in their corrective action program as Resolve Condition Report 2004-0327 (Section 1R14).

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Mitigating Systems

1R14 Personnel Performance During Nonroutine Plant Evolutions

a. Inspection Scope

The inspectors performed a follow-up inspection regarding operator response to a feedwater transient which occurred on July 7, 2003. The equipment deficiencies and human performance errors which led to this event were discussed in NRC Integrated Inspection Report 05000298/2003006. The inspectors reviewed control room logs, alarm printouts, alarm response and abnormal procedures, and condition reports associated with the event. This information was used to develop a time line of the event, to determine the procedural requirements in effect at the time and whether operators adequately implemented those requirements, and to determine if corrective actions for this event were adequate.

b. Findings

Introduction. Two Green, noncited violations were identified regarding the failure to follow station procedures. In the first instance, operators failed to manually scram the reactor in accordance with station procedures upon receipt of two high level alarms in the moisture separators. The second instance involved the failure to manually scram the reactor in accordance with station procedures even though the alarm conditions had cleared.

Description. On July 7, 2003, during restoration of the level control valve for Feedwater Heater A-5 (CD-LCV-60A) following corrective maintenance, the valve went fully closed due to errors made during the restoration. Since the plant was operating at 100 percent power, this caused a high level in Feedwater Heater A-5 and subsequent high levels in Moisture Separators A and C. These personnel errors were discussed in NRC Integrated Inspection Report 05000298/2003006.

The moisture separators remove excess moisture from the high pressure turbine exhaust before it enters the low pressure turbines. The condensate from Moisture Separators A and C drains into Feedwater Heater A-5 and then cascades through the remaining feedwater heaters before draining to the condenser. Each heater has a level control valve on its drain line to maintain the optimum water level in the heater for plant efficiency. A high water level in the moisture separators is a concern since it can lead to moisture carryover into the low pressure turbines, resulting in turbine damage. Industry events have demonstrated that turbine damage can lead to fires and damage to adjacent equipment with the potential to affect reactor safety.

The following time line of the feedwater transient was developed using the control room logs and a printout from the control room annunciator system. All times are in military format and in reference to the annunciator system.

15:59:17	Feedwater Heater A-5 high level alarm Feedwater Heater A-5 high level trip
16:00:41	Reactor power peaks at 2473 MW (103.8 percent) due to a reduction in feedwater heating
16:00:51	Feedwater Heater A-5 flash section high level alarm
16:01:24	Moisture Separator C high level alarm
16:01:37	Moisture Separator A high level alarm
16:03:18	Moisture Separator A high level alarm clear
16:03:27	Moisture Separator A high level alarm
16:03:41	Moisture Separator C high level alarm clear
16:04:00	Moisture Separator A high level alarm clear
16:04:18	Operators commence a rapid power reduction by reducing reactor recirculation flow
16:05:00	Shift Manager logged that the plant is in a “safe, stable condition” and that “it would not be a prudent, conservative decision to direct a scram and challenge the plant with that additional transient.”
16:05:18	Reduction of total reactor core flow to 53.46E6 lbm/hr complete
16:06:37	Moisture Separator C high level alarm
16:07:00	Moisture Separator C high level alarm clear
16:30:38	Feedwater Heater A-5 high level alarm clear

Upon receipt of the initial high level alarm on Feedwater Heater A-5, operators appropriately entered Alarm Procedure 2.3_A-2, “Panel A - Annunciator A-2,” Revision 6. At hour 16:01:24, the same procedure directed a rapid power reduction due to the flash section high level alarm concurrent with a moisture separator high level alarm. It also directed concurrent entry into Abnormal Procedure 2.4EX-STM, “Extraction Steam Abnormal,” Revision 3. At hour 16:01:37, both procedures directed a manual reactor scram based on high level alarms in both Moisture Separators A and C. Operators failed to perform a manual reactor scram.

Based on operator statements documented in Significant Condition Report 2003-1432, following the rapid power reduction, operators reviewed Alarm Procedure 2.3_A-2 to verify their actions and realized that they failed to manually scram the reactor; however,

both moisture separator high level alarms had cleared. Conduct of Operations Procedure 2.0.1.2, "Operations Procedure Policy," Revision 13, step 7.1.5, stated:

> When a plant condition triggers specific action step(s) and the condition clears before the specified action(s) can be taken, the action shall still be executed.

Operators were aware of this requirement and there was a discussion in the control room regarding this requirement. In their written statements, one crew member recommended that the reactor should be scrammed while another recommended the opposite based on plant conditions. At this point, the shift manager called his supervisor to request clarification of the procedure. Ultimately, the decision was made not to scram the reactor despite this procedure requirement.

The inspectors reviewed Significant Condition Report 2003-1432, which documented a root cause evaluation regarding this event. The root cause evaluation concentrated on the operator errors in restoration of the feedwater heater drain valve. It did not extensively evaluate control room operator response to the event. The evaluation did describe the failure of control room operators to recognize and perform scram actions as a contributing cause which prolonged the transient. The failure to recognize and perform the scram actions contained in Alarm Procedure 2.3_A-2 and Abnormal Procedure 2.4EX-STM was, by itself, a separate condition which should have been evaluated and corrective action prompted in accordance with the licensee's corrective action program. On April 29, 2004, upon recognition that this aspect of the event had not been properly evaluated, the licensee initiated Resolve Condition Report (RCR) 2004-0327 to document and evaluate this concern. However, the apparent cause evaluation associated with RCR 2004-0327 concentrated on the failure to implement Abnormal Procedure 2.4EX-STM; it did not explicitly address the failure to follow Alarm Procedure 2.3_A-2. Furthermore, it stated:

> Subsequent to the event, Station Management conducted a review of the event. This review concluded that the operators should have been aware of the scram actions that existed in the procedure. However, the crew was appropriately and methodically following their procedures to stabilize plant conditions as expected. Once reaching the section in the procedure that required the scram action to be taken, the conditions were no longer present. The actions of the crew at that point to stop, verify stable plant condition, evaluate equipment performance and validate the appropriateness of the guidance was the correct action to take.

This evaluation did not consider step 4.11 of Alarm Procedure 2.3.1, "General Alarm Procedure," Revision 37, which stated:

> Annunciator steps should be performed in sequence unless mitigating circumstances warrant altering the sequence. To support priorities during event mitigation, it's acceptable to perform steps out of sequence.

The applicable section of Alarm Procedure 2.3_A-2, regarding high level alarms in the moisture separators, was clearly marked with the words “Scram Actions” in the margins, denoting that scram actions were required by this procedure. In addition, the scram actions, located on the second page of the applicable section, were in bold faced print. Based on this, and the statement in Alarm Procedure 2.3.1, the conclusion drawn in RCR 2004-0327 was not supported with regard to implementation of Alarm Procedure 2.3_A-2. Nevertheless, the inspectors concluded that corrective actions, which included reformatting the alarm response procedures and additional crew training, were adequate to prevent recurrence of this event.

The inspectors questioned the logic used to justify not implementing the requirements of Conduct of Operations Procedure 2.0.1.2 by not manually scramming the plant even though the high level alarms had cleared. This conclusion was based, in part, on a control room log entry at 16:05. The entry stated that the plant was safe and stable and that it would not be a prudent, conservative decision to direct a scram and challenge the plant with that additional transient. This would have been a reasonable argument for not manually scramming the reactor; however, as demonstrated by the time line, high level alarms were still occurring on Moisture Separator C and Feedwater Heater A-5, and the reactor was not yet in a steady state condition following the rapid power reduction. Therefore, the inspectors did not agree that the plant was in a stable condition. Furthermore, the logic used in this argument is only valid if the crew fully understood the technical basis for manually scramming the reactor under these circumstances and that they had verified that all of the conditions necessitating the scram were no longer present.

The inspectors reviewed Notification 10257705, which documented the crew’s decision not to follow the guidance in Conduct of Operations Procedure 2.0.1.2. This condition was evaluated concurrently with RCR 2000-0738, which was reopened to further evaluate specific industry operating experience regarding instances where operators failed to take manual scram actions. As a result, Conduct of Operations Procedure 2.0.1.2 was revised to provide allowances for the shift manager to forego certain immediate manual actions if the plant condition necessitating the action clears immediately.

Analysis. The failure to manually scram the reactor in accordance with Alarm Procedure 2.3 A-2 and Abnormal Procedure 2.4EX-STM was considered to be a performance deficiency. An additional performance deficiency occurred when operators failed to implement the requirements of Conduct of Operations Procedure 2.0.1.2 following recognition that they failed to manually scram the plant when required. Both findings affected the Mitigating Systems Cornerstone since they involved human performance post-event and they were more than minor since they could be reasonably viewed as a precursor to a significant event. Although these were considered separate performance deficiencies, the same significance determination analysis applies to both. The purpose of a manual scram on high moisture separator levels is equipment protection for the main turbine; therefore, it was not considered a safety function for the purposes of determining the significance of the findings. Consequently, the findings were determined to be of very low safety significance (Green) based on the Significance Determination Process Phase 1 screening worksheet for at-power situations, since

neither finding represented a design or qualification issue, there was no loss of safety function, and the findings were not potentially risk significant due to external events.

Both findings also had crosscutting aspects associated with human performance. This assessment was based on the fact that there was clear procedural guidance to manually scram the reactor but operators failed to implement that guidance.

Enforcement. Technical Specification 5.4.1 requires the licensee to establish, implement, and maintain written procedures recommended by Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Appendix A recommends procedures for general plant operation and abnormal, off-normal, or alarm conditions.

Alarm Procedure 2.3_A-2, "Panel A - Annunciator A-2," Revision 6, and Abnormal Procedure 2.4EX-STM, "Extraction Steam Abnormal," Revision 3, each required operators to manually scram the reactor upon receipt of concurrent high level alarms on Moisture Separators A and C. Contrary to this, on July 7, 2003, operators failed to manually scram the reactor when these alarms were received concurrently. These are considered to be two examples of a violation of Technical Specification 5.4.1; however, since it was of very low safety significance and because the licensee entered it into the corrective action program as RCR 2004-0327, this violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000298/2005012-01, Failure to Implement Manual Scram Actions.

In addition, Conduct of Operations Procedure 2.0.1.2, "Operations Procedure Policy," Revision 13, required that, when plant conditions trigger specific action steps and the condition clears before specified actions can be taken, the actions shall still be executed. Contrary to this, on July 7, 2003, operators failed to manually scram the reactor in accordance with Alarm Procedure 2.3_A-2 and 2.4EX-STM even though the alarm conditions had cleared. This was considered to be a separate violation of Technical Specification 5.4.1; however, since it was of very low safety significance and because the licensee entered it into their corrective action program as RCR 2004-0327, this violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000298/2005012-02, Failure to Implement Manual Scram Actions.

4OA6 Meetings, Including Exit

On August 12, 2005, the inspectors presented the results of this inspection to Mr. S. Minahan, General Manager of Plant Operations, and other members of his staff who acknowledged the findings.

The inspectors confirmed that proprietary information was not provided by the licensee during this inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

S. Minahan, General Manager of Plant Operations
M. Bergmeier, Supervisor, Operations Support Group
K. Chambliss, Operations Manager
J. Flaherty, Site Regulatory Liaison
P. Fleming, Licensing Manager
J. Roberts, Director, Nuclear Safety Assurance

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000298/2005012-01	NCV	Failure to Implement Manual Scram Actions
05000298/2005012-02	NCV	Failure to Implement Manual Scram Actions