

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report No: 50-255/97014(DRS)

Licensee: Consumers Energy Company
212 West Michigan Avenue
Jackson, MI 49201

Facility: Palisades Nuclear Generating Plant

Location: 27780 Blue Star Memorial Highway
Covert, MI 49043-9530

Dates: October 28 through November 19, 1997

Inspectors: J. Lennartz, Senior Resident Inspector
M. Parker, Senior Reactor Analyst
B. Fuller, Resident Inspector
C. Brown, Resident Inspector

Approved by: Melvyn Leach, Chief, Operator Licensing
Division of Reactor Safety

EXECUTIVE SUMMARY

Palisades Nuclear Generating Plant NRC Inspection Report 50-255/97014

This inspection was conducted to review the events and circumstances surrounding the incident regarding the removal of power from all control rod drive relays to perform maintenance on a single control rod (#38). The inspectors reviewed selective procedures and representative records, and interviewed personnel.

Operations

- Multiple apparent violations regarding conduct of operation activities occurred which included: (1) the breakdown in crew communications; (2) the failure to ensure that equipment could be removed from service by ensuring that Technical Specification limiting conditions for operations were met prior to removing the equipment from service; (3) the failure to complete the required risk-based assessment prior to maintenance; (4) the failure to perform operability testing following maintenance activities that had the potential to affect equipment operability; and (5) the failure to perform post maintenance testing prior to declaring equipment operable.

The causes of the failures included: (1) the crew's failure to question the appropriateness of removing power from all the control rods with the plant at power; (2) the crew's apparent "false sense of comfort" regarding control rod #38 repairs; (3) the crew's poor knowledge of Technical Specification 3.10.4.b; and (4) the Operations Manager's, Shift Supervisor's, and Shift Engineer's apparent lack of understanding that the removal of control rod drive relay contacts was a maintenance activity that could affect equipment operability.

There were several missed opportunities to identify the inappropriate tagout and that work was performed outside the work order's scope. Also, the number of failures that occurred indicated a programmatic breakdown in the conduct of operations activities surrounding the control rod #38 repairs. (Section O1)

- Fortuitously, the 12 hour action statement requirements of Technical Specification 3.10.4.b was satisfied on October 17, 1997. The inspectors identified a concern regarding the Nuclear Control Operators failure to question the appropriateness of removing power from all the control rods with the plant at power. (Section O4)
- The October 17, 1997, "A" shift licensed operators' knowledge and understanding of T/S 3.10.4 was poor. (Section O4)

Maintenance

- Multiple apparent violations regarding maintenance activities occurred which included: (1) the failure to satisfy the control rod drive system conditions required by the maintenance procedure; (2) the failure to identify that the maintenance activity could not

be performed as scheduled; (3) the failure to replan the work order prior to expanding the work scope; (4) the failure to revise the testing requirements after the work scope was changed; and (5) the failure to document the work performed.

The causes of the failures included: (1) the Lead Electrical Repairman's inadequate review of the work order due to the apparent "false sense of comfort" regarding control rod #38 repairs; (2) the Lead Electrical Repairman acting as the Assigned Supervisor removed one level of independent review for the work order; (3) the Lead Electrical Repairman's, System Engineer's, and Shift Supervisor's apparent lack of understanding that the removal of control rod drive relay contacts was a maintenance activity that could affect control rod operability; and (4) the Lead Electrical Repairman's apparent lack of understanding that documenting the removal, inspection, and reinstallation of control rod drive relay contacts was required.

The number of failures that occurred indicated a programmatic breakdown regarding maintenance activities during control rod #38 repairs. (Section M1)

REPORT DETAILS

I. Operations

O1 Conduct of Operations

a. Inspection Scope (92701)

The inspectors conducted personnel interviews and reviewed selective portions of the following procedures and representative records:

1. Condition Report (CR) C-PAL-97-1467, "CRDM (control rod drive motor) #39 Slow to Withdraw."
2. CR C-PAL-97-1490, "Improper Movement From Control Rod Drive (CRD) #38."
3. CR C-PAL-97-1493, "12 Hour Limiting Condition For Operation (LCO) Per Technical Specification 3.10.4 Entered To Repair CRD #38."
4. CR C-PAL-97-1517, "Work Repairs Outside Scope of Work Authorization Document."
5. CR C-PAL-97-1593, "Incorrect Operability Determination Regarding Control Rod #3 and One Group III Rod."
6. Control Room Reactor and Shift Supervisor logs for October 16, 17, and 20, 1997.
7. Administrative Procedure 4.00, "Operations Organization, Responsibilities and Conduct," Revision 20.
8. Administrative Procedure 4.02, "Control of Equipment," Revision 15.
9. Administrative Procedure 5.01, "Processing Work Requests/Work Orders," Revision 21.
10. Administrative Procedure 5.19, "Post Maintenance Testing," Revision 6.
11. Technical Specification (T/S) 3.10.4

b. Observations and Findings

Sequence of events, with conduct of operations implications, surrounding the incident of removing power from all the control rods to conduct repairs to control rod #38.

October 16, 1997, "C" (evenings) shift:

At approximately 9:00 pm, the control room crew identified improper operation, inward movement with an outward signal, of Group IV control rod #38 with the plant at 80% power during a planned power escalation. Further rod movements were stopped with all Group IV rods aligned with control rod #38. The Shift Engineer and the Shift Supervisor referenced T/S 3.10.4.b in response to the identified problem. Control rod #38 was declared inoperable at 9:02 pm due to the inability to move the control rod outward with its operator (joystick). The crew immediately generated CR C-PAL-97-1490 which documented the status of control rod #38 and referenced the appropriate T/S. At this

time, no T/S entry was required as T/S 3.10.4 allowed one control rod to be inoperable while at power.

The Shift Supervisor contacted System Engineering, the Operations Superintendent (Acting Operations Manager), and Electrical Maintenance regarding the problem. The Shift Supervisor and Operations Superintendent determined that control rod #38 would be tagged out to make the necessary repairs. The Shift Supervisor then initiated a work request (No. 273748) which documented the need to repair control rod #38.

At approximately 11:30 pm, the System Engineer arrived on-site and directed the work planner to copy the work order that was used two nights earlier to perform similar repairs to control rod #39. The work order (No. 24714120) developed specified that control rod #38 control rod drive contacts were to be cleaned or replaced, as necessary. Also, information regarding the inoperable status, and the plans to tagout and repair control rod #38, were communicated to the on-coming crew during the shift turnover. The on-coming Shift Engineer reviewed T/S 3.10.4.b regarding control rod operability during (or shortly after) shift turnover. The Shift Engineer concluded, after reviewing the T/S, that the control rods were operable based on their ability to trip and proper alignment. However, the Shift Engineer did not discuss, at this time, either the T/S or his conclusion with any other crew members.

October 17, 1997; "A" (midnight) Shift:

Following turnover, the "A" Shift Supervisor understood that only control rod #38 would be tagged out to perform the necessary repairs and the entire "A" shift crew was aware that work was to be performed to control rod #38 only. The Control Room Supervisor turned over "at the controls" duties to the Shift Engineer shortly after turnover and became involved in planning the work order's tagout.

The Control Room Supervisor, the System Engineer, and the Lead Electrical Repairman discussed the required tagout. The System Engineer indicated there was no way to tag out only one rod and that the options were to work control rod #38 "hot" (energized) or to deenergize all the control rod drive relays by deenergizing the control rod drive panel (C-15). The Control Room Supervisor was not in agreement with working control rod #38 hot. The Lead Electrical repairman then suggested, and the Shift Engineer endorsed, using a tagout like the one that was used a couple nights earlier to perform the repairs on control rod #39. That tagout deenergized the control rod drive panel (C-15) and consequently removed power from all control rods. The Control Room Supervisor accepted this suggestion and directed the extra Nuclear Control Operator to retrieve the tagout. However, none of the individuals recognized that the tagout used during control rod #39 repairs was inappropriate for the plant conditions which existed during control rod #38 repairs. Control rod #39 repairs were performed while the plant was in a shutdown condition. However, the plant was operating at 80% power during control rod #38 repairs.

Prior to tagout issuance, the Shift Supervisor questioned the Control Room Supervisor regarding whether or not the tagout for control rod #38 had been determined. The

Control Room Supervisor responded to the Shift Supervisor with only a "yes" which went unquestioned by the Shift Supervisor.

Administrative Procedure 4.00, at Step 4.2.3.b.6, required the Control Room Supervisor to keep the Shift Supervisor informed of plant and equipment status. The licensee identified that the Control Room Supervisor's failure, on October 17, 1997, to inform the Shift Supervisor that power would be removed from all of the control rods was an apparent violation of this requirement (50-255/97014-01a). The cause of this failure appeared to be a breakdown in crew communications and a lack of questioning attitude by the Shift Supervisor.

At approximately 1:40 am, the extra Nuclear Control Operator completed the tagout. The Control Room Supervisor briefed the control room crew, except the Shift Supervisor, regarding the tagout and its implications. The Control Room Supervisor assumed that the Shift Engineer heard the brief; however, the Shift Supervisor was on the phone briefing the Operations Superintendent on the status of control rod #38 repairs. The crew members briefed fully understood that control rod movement from the "joystick" would be disabled and that the rods were trippable. At this time, the Nuclear Control Operators questioned the contingency actions for any subsequent plant transients that may require rod movement. The crew determined that the reactor would be tripped for any subsequent plant transient that required rod movement. However, the Nuclear Control Operators failed to question the appropriateness of removing power from all the control rods while at 80% power.

T/S 3.10.4.b, Amendment 169, stated, in part, that a control rod is considered inoperable if it cannot be moved by its operator and if more than one control rod becomes inoperable with the plant at power then the reactor shall be placed in hot shutdown within 12 hours. The tagout deenergized the control rod drive panel which precluded control rod movement by its operator (joystick). However, none of the crew members, including the Shift Engineer who had previously reviewed T/S 3.10.4.b, recognized that deenergizing the control rod drive panel required entry into the T/S. Also, the Control Room Supervisor approved the tagout without referencing T/Ss.

At 2:13 am, the tagout was completed by the extra Nuclear Control Operator and at 2:20 am, it was issued by the Balance of Plant Nuclear Control Operator to the Lead Electrical repairman. Administrative Procedure 4.10, Revision 6, at Step 7.2.2, required the Shift Supervisor to ensure that equipment may be removed from service by ensuring that the T/S requirements, including the Limiting Conditions for Operations and Action Statements, were met. The inspectors identified that the Shift Supervisor's failure, on October 17, 1997, to ensure that the control rods may be removed from service by ensuring that the T/S requirements were met prior to removing the control rods from service was an apparent violation of this requirement (50-255/97014-01b). This resulted in the failure, at this time, to enter the required 12 hour action statement of T/S 3.10.4.b to place the plant in hot shutdown. The causes of this failure appeared to be the crew's failure to question the appropriateness of removing power from all the control rods while at power, breakdown in communications, and poor knowledge of T/S 3.10.4.b.

In addition, Administrative Procedure 4.02, Revision 15, at the NOTE before step 1 of Attachment 8, "Safety Assessment For Removal of Plant Equipment (SSCs) From Service," required that Attachment 8, or an equivalent risk-based assessment, be completed for maintenance activities that met all of the following conditions:

- (1) entry into unplanned maintenance outages,
- (2) involved high safety significant systems identified in Attachment 10,
- (3) would render the system incapable of performing its Maintenance rule function, and
- (4) did not occur with the equipment positioned in its designed safety position prior to removing its power source.

The maintenance on control rod #38 met all the above conditions; however, the crew failed to complete the required risk-based assessment. The inspectors identified that the failure, on October 17, 1997, to complete Administrative Procedure 4.02, Attachment 8, or an equivalent risk-based assessment, prior to performing the maintenance on control rod #38, was an apparent violation of this requirement (50-255/97014-01c). This failure was caused by the crew's apparent "false sense of comfort" regarding control rod #38 repairs.

At 2:23 am, the Shift Engineer reviewed and released the control rod #38 work order (#24714120) to the Lead Electrical Repairman. (Specific maintenance activities are discussed in Section M1 of this report). Prior to completion of control rod #38 repairs, the Shift Supervisor investigated a concern by the System Engineer that additional control rods may need similar repairs. The Lead Electrical Repairman removed and reinstalled the control rod drive relay contacts for control rods #3, #40, and one unidentified Group III rod. The Shift Supervisor and the System Engineer directed and observed this activity. These additional contacts were inspected by the System Engineer and the Shift Supervisor to investigate the System Engineer's concern.

At this time (approximately 4:00 am), the Shift Supervisor realized that power had been removed from all the control rods. However, the Shift Supervisor, the System Engineer, and the Lead Electrical Repairman failed to recognize that removing, inspecting, and reinstalling the three additional control rod drive relay contacts were maintenance activities performed outside the scope of control rod #38's work order (this issue is discussed further in Section M1 of this report). Also, at this time, the Shift Supervisor failed to recognize the required entry into T/S 3.10.4.b due to all rods being inoperable.

The Shift Supervisor discussed the additional control rod drive relay contacts that were removed, inspected, and reinstalled with the Shift Engineer. However, the Shift Engineer, who had previously reviewed and approved the control rod #38 work order, also failed to recognize that maintenance had been performed outside the scope of control rod #38's work order.

At 6:20 am, the tagout had been cleared, control rod #38 post maintenance testing was completed satisfactorily, and control rod #38 was declared operable. Also, while not part of any post maintenance testing, control rod #40 moved satisfactorily when it was

exercised by the control room crew to investigate the additional control rod concerns. However, post maintenance testing was not performed, at this time, on control rod #3 or the one unidentified Group III control rod.

Administrative Procedure 4.02, Revision 15, at Step 9.3.b, required operability testing to be performed on safety-related equipment following any maintenance activity which had the potential to affect the equipment's operability. The inspectors identified that the failure, on October 17, 1997, to perform post maintenance testing on control rod #3 and the one unidentified Group III control rod, following removal, inspection, and reinstallation of the control rod drive relay contacts was an apparent violation of this requirement (50-255/97014-01d). This failure was caused by the Shift Supervisor's and Shift Engineer's apparent lack of understanding that removal, inspection, and reinstallation of control rod drive relay contacts was a maintenance activity that had the potential to affect control rod operability.

At approximately 6:30 am, the Shift Supervisor referenced T/Ss in response to the additional control rod concerns and recognized that a required entry into T/S 3.10.4.b was missed at 2:15 am when power was removed from all the control rod drives. The crew was informed of the missed required entry into T/S 3.10.4.b and the appropriate log entries were made. The Shift Engineer generated CR C-PAL-97-1493 which documented the missed T/S required entry and the Shift Supervisor briefed plant management at the daily meeting. In addition, the licensed operators on shift during control rod #38 repairs were removed from licensed duties for a period of about four days to conduct remediation training.

Monday October 20, 1997:

At approximately 1:00 pm, a Maintenance Trainer identified, during interviews with maintenance personnel, that work had been performed outside the scope of control rod #38's work order. The licensee initiated these interviews, as corrective actions, to investigate the causes surrounding the inappropriate tagout that was used on October 17, 1997, for control rod #38 repairs. The on-shift Shift Supervisor was informed and CR C-PAL-97-1517 was generated. This CR documented the completed operability determination for control rods #3, #40, and the one unidentified Group III rod which were worked outside the scope of control rod #38's work order on October 17, 1997. The control rods were declared operable based on the determination that the control rod drive relay contacts removed were only inspected and that no maintenance was performed.

The inspectors identified that the maintenance activities performed on control rods #3, #40, and the one unidentified Group III rod on October 17, 1997, had the potential to affect the control rods' operability. Also, the inspectors identified that post maintenance testing had not been performed on control rod #3 and the one unidentified Group III rod prior to declaring the control rods operable. Control rod #40 moved satisfactorily when it was exercised on October 17, 1997, and therefore, its operability status was not in question. However, the status of control rod #3 and the one unidentified Group III rod had not been determined. Therefore, two rods were inoperable, based on the failure to

perform post maintenance testing to prove operability. Two inoperable rods, while at power, required entry into T/S 3.10.4.b. However, the licensee, again, failed to recognize the required T/S entry.

At approximately 5:43 pm, control rods #3, #40, and all Group III rods were tested satisfactorily after the Operations Manager determined that post maintenance testing would be necessary to "verify" that the operability determination was accurate. However, the licensee failed to recognize that the maintenance had the potential to affect operability and therefore, post maintenance testing was required to "prove" operability. Instead, the licensee tested the control rods to "verify" the completed operability determination.

Administrative Procedure 5.19, Revision 6, at Step 5.2.e, required the Operations Manager to ensure that Post Maintenance Testing was properly authorized, performed, reviewed, and documented prior to declaring the equipment operable. The inspectors identified that the Operations Manager's failure, on October 20, 1997, to ensure that post maintenance testing was completed for control rod #3 and the one unidentified Group III rod prior to declaring them operable was a violation of this requirement (50-255/97014-01e). This failure was caused by the Operations Manager's apparent lack of understanding that the removal, inspection, and reinstallation of control rod drive relay contacts was a maintenance activity that had the potential to affect control rod operability.

Friday October 31, 1997:

At approximately 11:00 am, the NRC conducted a technical debrief with licensee management to discuss the inspection's observations and findings. Following the technical debrief, the Shift Supervisor generated CR C-PAL-97-1593. This CR documented that the October 20, 1997, operability determination regarding control rod #3 and the one unidentified Group III rod (CR C-PAL-97-1517) was incorrect. Also, the CR documented that T/S 3.10.4.b should have been entered at 1:00 pm, on October 20, 1997, upon discovery that the contacts for control rod #3 and the one unidentified Group III rod had been removed, inspected, and reinstalled. The T/S was exited at 5:43 pm that same day following the post maintenance testing. Appropriate log entries were completed in the Shift Supervisor's log to document that control rod #3 and the one unidentified Group III rod were inoperable on October 20, 1997, from 1:00 pm until 5:43 pm.

T/S 6.4.1.a, Amendment 174, requires, in part, that written procedures shall be implemented regarding the applicable procedures recommended in Regulatory Guide (RG) 1.33, Revision 2, Appendix A, "Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors," February 1978.

RG 1.33, Revision 2, Appendix A, states, in part, that the following are typical safety-related activities that should be covered by written procedures: authorities and responsibilities (Section 1.b); equipment control (Section 1.c); and control of

maintenance (Section 9.e). The following examples represent an apparent violation of this requirement (50-255/97014-01):

(1) the Control Room Supervisor's failure, on October 17, 1997, to inform the Shift Supervisor that power would be removed from all of the control rods to conduct maintenance on control rod #38 was an apparent violation (50-255/97014-01a) of Administrative Procedure 4.00, Revision 20, which was a procedure required by Section 1.b of RG 1.33;

(2) the Shift Supervisor's failure, on October 17, 1997, to ensure that the control rods may be removed from service by ensuring that the T/S requirements were met prior to removing the control rods from service was an apparent violation (50-255/97014-01b) of Administrative Procedure 4.10, Revision 6 which was a procedure required by Section 1.c of RG 1.33;

(3) the failure, on October 17, 1997, to complete Administrative Procedure 4.02, Attachment 8, or an equivalent risk-based assessment prior to performing the maintenance on control rod #38 was an apparent violation (50-255/97014-01c) of Administrative Procedure 4.02, Revision 15, which was a procedure required by Section 1.c of RG 1.33;

(4) the failure, on October 17, 1997, to perform post maintenance testing on control rod #3 and the one unidentified Group III control rod following removal, inspection, and reinstallation of the control rod drive relay contacts was an apparent violation (50-255/97014-01d) of Administrative Procedure 4.02, Revision 15, which was a procedure required by Section 1.c of RG 1.33;

(5) the Operations Manager's failure, on October 20, 1997, to ensure that post maintenance testing was completed for control rod #3 and the one unidentified Group III rod prior to declaring them operable was an apparent violation (50-255/97014-01e) of Administrative Procedure 5.19, Revision 6, which was a procedure required by Section 9.e of RG 1.33;

c. Conclusions

There were multiple violations regarding conduct of operation activities which included: (1) the breakdown in crew communications; (2) the failure to ensure equipment could be removed from service by ensuring that T/S limiting conditions for operations were met prior to removing equipment from service; (3) the failure to complete the required risk-based assessment prior to maintenance; (4) the failure to perform operability testing following maintenance activities that had the potential to affect equipment operability; and (5) the failure to perform post maintenance testing prior to declaring equipment operable.

The failures were caused by the following: (1) the crew's failure to question the appropriateness of removing power from all the control rods while at power, (2) the crew's apparent "false sense of comfort" regarding the control rod #38 repairs; (3) the

crew's poor knowledge of T/S 3.10.4.b; and (4) the Operations Manager's, Shift Supervisor's, and Shift Engineer's apparent lack of understanding that the removal of control rod drive relay contacts was a maintenance activity that could affect equipment operability.

The inspectors concluded that the licensee missed several opportunities to identify the inappropriate tagout and that work was performed outside the work order's scope. Also, the number of failures that occurred indicated a programmatic breakdown in the conduct of operations activities surrounding the control rod #38 repairs.

O4 Operator Knowledge and Performance

a. Inspection Scope (92701)

The inspectors conducted personnel interviews and reviewed selective portions of the following procedures and representative records:

1. Condition Report (CR) C-PAL-97-1467, "CRDM (control rod drive motor) #39 Slow to Withdraw."
2. CR C-PAL-97-1490, "Improper Movement From Control Rod Drive (CRD) #38."
3. CR C-PAL-97-1493, "12 Hour Limiting Condition For Operation (LCO) Per Technical Specification 3.10.4 Entered To Repair CRD #38."
4. CR C-PAL-97-1517, "Work Repairs Outside Scope of Work Authorization Document."
5. CR C-PAL-97-1593, "Incorrect Operability Determination Regarding Control Rod #3 and One Group III Rod."
6. Control Room Reactor and Shift Supervisor logs for October 16, 17, and 20, 1997.
7. Technical Specification (T/S) 3.10.4

b. Observations and Findings

The inspectors observed the following regarding licensed operator performance and knowledge:

- The October 17, 1997, "A" shift crew's knowledge and understanding of T/S 3.10.4.b was poor in that the crew equated rod alignment and the rods ability to trip with operability. The crew failed to recognize that the control rods were inoperable when they could not be moved by their operator (joystick) during control rod #38 repairs. This resulted in the failure to identify a required entry into the 12 hour action statement of T/S 3.10.4.b to place the plant in hot shutdown when power was removed from all the control rods while at 80% power. However, fortuitously, T/S 3.10.4.b requirements were not violated in that power was removed from the control rods for only a three hour period.

- The licensee had not encouraged the Nuclear Control Operators (licensed reactor operators) to be pro-active during crew discussions regarding T/S implementation.
- The operators had an apparent lack of understanding that removal, inspection, and reinstallation of control rod drive relay contacts was a maintenance activity which had the potential to affect control rod operability. This resulted in the failure to identify a required entry into the 12 hour action statement of T/S 3.10.4.b to place the plant in hot shutdown on October 20, 1997, after it was discovered that additional control rod drive relay contacts had been removed, inspected, and reinstalled. However, fortuitously, the control rods moved satisfactorily when tested.
- The crew failed to question the appropriateness of removing power from all the control rods while at power.
- There was an apparent "false sense of comfort" regarding control rod #38 repairs. The crew's participation in similar repairs to control rod #39 which were completed successfully without incident two nights earlier contributed to this "false sense of comfort."

c. Conclusions

The licensee fortuitously satisfied the 12 hour action statement requirements of T/S 3.10.4.b on October 17, 1997. The Nuclear Control Operators' failure to question the appropriateness of removing power from all the control rods with the plant at power was a concern. The October 17, 1997, "A" shift licensed operators' knowledge and understanding of T/S 3.10.4 was poor which contributed to the failures regarding conduct of operations activities described in Section O1 of this report.

II. Maintenance

M1 Conduct of Maintenance

a. Inspection Scope (92701)

The inspectors conducted personnel interviews and reviewed selective sections of the following procedures and representative records:

1. Nuclear Work Order #24714085 for CRD #39 repairs.
2. Nuclear Work Order #24714120 for CRD #38 repairs.
3. Administrative Procedure 5.01, "Processing Work Requests/Work Orders," Revision 21.
4. Administrative Procedure 5.19, "Post Maintenance Testing," Revision 6.
5. Maintenance Procedure CRD-E-32, "CRDM [Control Rod Drive Motors] Control Relays Cleaning and Inspection," Revision 7.

b. Observations and Findings

Sequence of events, with maintenance activities implications, surrounding the incident of removing power from all the control rods to conduct repairs to control rod #38.

October 17, 1997:

The plant was at 80% power, the control rods were withdrawn with the control rod drive clutch energized. The work order's tagout had been issued and it specified that control rod drive panel (C-15) be deenergized. Power was removed from all control rod drive relays with panel C-15 deenergized. At approximately 2:23 am, the Shift Engineer reviewed and released control rod #38's work order (#24714120) to the Lead Electrical Repairman. The work order specified to clean or replace, as necessary, the control rod drive relay contacts for control rod #38 and also specified post maintenance testing for control rod #38.

The Lead Electrical Repairman, as the "Assigned Supervisor," signed the maintenance procedure, CRD-E-32, at step 5.1.1, signifying that all applicable prerequisites were met and proceeded to perform control rod #38 maintenance. However, the system conditions specified in the procedure were not met. Maintenance Procedure CRD-E-32, Revision 7, at Step 3.4.2.e, required that no more than one control rod relay set and related fuses be removed from service while the plant was at power with the rods withdrawn and the control rod drive clutch energized. The licensee identified that, on October 17, 1997, the failure to satisfy the control rod drive system conditions specified in maintenance procedure CRD-E-32 during the maintenance on control rod #38 was an apparent violation of this requirement (50-255/97014-02a).

In addition, Administrative Procedure 5.01, Revision 21, Attachment 2, "Work Order Scheduling, Performance, and Completion," at Step 2.3.c, required the Assigned Supervisor to review scheduled work orders to determine that the work could be performed as scheduled, and if not, notify the Shift Supervisor. The licensee identified that the Assigned Supervisor's (Lead Electrical Repairman) failure, on October 17, 1997, to identify that the work could not be performed as scheduled, was an apparent violation of this requirement (50-255/97014-02b).

The above failures were caused by the Lead Electrical Repairman's inadequate review of the work order due to the apparent "false sense of comfort" regarding the control rod #38 repairs. The Lead Electrical Repairman had completed control rod #39 repairs two nights previously without incident which contributed to this "false sense of comfort." Also, the Lead Electrical Repairman acting as the Assigned Supervisor removed one level of independent review for the work order. This reduced the management oversight of control rod #38 repairs. The licensee's procedures apparently allowed this reduction in management oversight of maintenance activities conducted on "A" shift. This item will be reviewed in future inspections. (50-255/97014-03)

Following completion of control rod drive #38 repairs, the Lead Electrical Repairman removed, inspected, and reinstalled the control rod drive relay contacts for control rods #3, #40, and one unidentified Group III rod. This activity was directed and observed by the Shift Supervisor and the System Engineer in order to investigate other possible control rod problems. However, removal, inspection, and reinstallation of these contacts was not specified in the work order.

Administrative Procedure 5.01, Revision 21, Attachment 2, at Step 6.1, "Expansion of Job Scope," required the work order to be replanned, per the requirements of procedure 5.01, if the Assigned Supervisor determined that the work required to correct the problem was not adequately described in the work order job plan. The licensee identified that the Assigned Supervisor's failure, on October 17, 1997, to replan the work order (#2471420) prior to removing the three additional control rod drive relay contacts was an apparent violation of this requirement (50-255/97014-02c). This failure was caused by the Lead Electrical Repairman's apparent lack of understanding that removal, inspection and reinstallation of control rod drive contacts was a maintenance activity.

At 6:20 am, the tagout had been cleared, control rod #38 post maintenance testing was completed satisfactorily, and control rod #38 was declared operable. Also, while not part of any post maintenance testing, control rod #40 moved satisfactorily when it was exercised by the control room crew to investigate additional control rod concerns. However, post maintenance testing was not performed, at this time, on control rod #3 or the one unidentified Group III control rod.

Administrative Procedure 5.19, Revision 6, at Step 5.4.c, required the Maintenance Supervisor to ensure that the specified testing was revised, as necessary, if the scope of maintenance performed was changed after initial planning. The licensee identified that the Maintenance Supervisor's failure, on October 17, 1997, to revise the specified testing when the scope of the maintenance changed after initial planning was an apparent violation of this requirement (50-255/97014-02d). This failure was caused by the Lead Electrical Repairman's, System Engineer's, and Shift Supervisor's apparent lack of understanding that the removal of control rod drive relay contacts was a maintenance activity that could affect control rod operability.

Additionally, following the maintenance, the Lead Electrical Repairman documented only the maintenance performed on control rod #38. The Lead Electrical Repairman failed to document that three additional control rod drive relay contacts were removed, inspected, and reinstalled as well as failed to document the three additional control rod drive relay contacts' condition that was observed during the inspection.

Administrative Procedure 5.01, Revision 21, at Step 5.11.b, required the Repairperson to document the "as found" conditions and the repairs/adjustments made. The inspectors identified that the Lead Electrical Repairman's failure, on October 17, 1997, to document that the control rod drive relay contacts for control rods #3, #40, and the one unidentified Group III control rod were removed, inspected, and reinstalled was an apparent violation of this requirement (50-255/97014-02e). This failure was caused by

the Lead Electrical Repairman's apparent lack of understanding that documenting the removal, inspection, and reinstallation of control rod drive relay contacts was required.

Monday October 20, 1997

At approximately 1:00 pm, a Maintenance Trainer identified, during interviews with maintenance personnel, that work had been performed outside the scope of control rod #38's work order. The licensee initiated these interviews, as corrective actions, to investigate the causes surrounding the inappropriate tagout that was used on October 17, 1997, for control rod #38 repairs. The on-shift Shift Supervisor was informed and CR C-PAL-97-1517 was generated. (This item is discussed further in Section O1 of this report.)

T/S 6.4.1.a, Amendment 174, requires, in part, that written procedures shall be implemented regarding the applicable procedures recommended in Regulatory Guide (RG) 1.33, Revision 2, Appendix A, "Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors," February 1978.

RG 1.33, Revision 2, Appendix A, states, in part, that the following are typical safety-related activities that should be covered by written procedures: maintenance that can affect the performance of safety-related equipment (Section 9.a), and control of maintenance (Section 9.e). The following examples represent an apparent violation of this requirement (50-255/97014-02):

- (1) the failure to satisfy the control rod drive system conditions specified in Maintenance Procedure CRD-E-32, a procedure required by Section 9.a of RG 1.33, during the maintenance on control rod #38 was an apparent violation of this requirement (50-255/97014-02a);
- (2) the Assigned Supervisor's (Lead Electrical Repairman) failure, on October 17, 1997, to identify that the work could not be performed as scheduled was an apparent violation (50-255/97014-02b) of Administrative Procedure 5.01, Revision 21, Attachment 2, which was a procedure required by Section 9.e of RG 1.33;
- (3) the Assigned Supervisor's failure, on October 17, 1997, to replan the work order (#2471420) prior to removing the three additional control rod drive relay contacts was an apparent violation (50-255/97014-02c) of Administrative Procedure 5.01, Revision 21, Attachment 2, which was a procedure required by Section 9.e of RG 1.33;
- (4) the Maintenance Supervisor's failure, on October 17, 1997, to revise the specified testing when the scope of the maintenance performed was changed after initial planning was an apparent violation (50-255/97014-02d) of Administrative Procedure 5.19, Revision 6, which was a procedure required by Section 9.e of RG 1.33;

(5) the Lead Electrical Repairman's failure, on October 17, 1997, to document that the control rod drive relay contacts for control rods #3, #40, and the one unidentified Group III control rod were removed, inspected, and reinstalled was an apparent violation (50-255/97014-02e) of Administrative Procedure 5.01, Revision 21, which was a procedure required by Section 9.e of RG 1.33;

c. Conclusions

There were multiple violations regarding maintenance activities which included: (1) the failure to satisfy the control rod drive system conditions required by the maintenance procedure; (2) the failure to identify that the maintenance activity could not be performed as scheduled; (3) the failure to replan the work order prior to expanding the work scope; (4) the failure to revise the testing requirements after the work scope was changed; and (5) the failure to document the work performed.

The failures were caused by the following: (1) the Lead Electrical Repairman's inadequate review of the work order due to the apparent "false sense of comfort" regarding control rod #38 repairs; (2) the Lead Electrical Repairman acting as the Assigned Supervisor removed one level of independent review for the work order; (3) the Lead Electrical Repairman's, System Engineer's, and Shift Supervisor's apparent lack of understanding that the removal of control rod drive relay contacts was a maintenance activity that could affect control rod operability; and (4) the Lead Electrical Repairman's apparent lack of understanding that documenting the removal, inspection, and reinstallation of control rod drive relay contacts was required.

The number of failures that occurred indicated a programmatic breakdown regarding maintenance activities during control rod #38 repairs.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to licensee representatives during an exit meeting on November 19, 1997, to convey the NRC's conclusion regarding the apparent violations. The licensee acknowledged the findings and did not indicate that any materials examined during the inspection should be considered proprietary.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

T. Bordine, Licensing Manager
R. Fenech, Senior Vice President, Nuclear Generation
K. Haas, Acting Director, Engineering
D. Malone, Operations Superintendent
R. Massa, Shift Supervisor
T. Palmisano, Site Vice President
J. Pomaranski, Maintenance and Construction Manager
G. Szczotka, Manager, Nuclear Performance Assessment

NRC

P. Prescott, Resident Inspector
R. Schaaf, Project Manager, NRR

INSPECTION PROCEDURES USED

IP 71707: Plant Operations

IP 92701: Followup

ITEMS OPENED

50-255/97014-01a	EEI	failure to inform Shift Supervisor of changing plant status
50-255/97014-01b	EEI	failure to ensure that equipment could be removed from service
50-255/97014-01c	EEI	failure to perform risk-based assessment
50-255/97014-01d	EEI	failure to perform testing following maintenance
50-255/97014-01e	EEI	failure to perform testing prior to declaring equipment operable
50-255/97014-02a	EEI	failure to satisfy required system conditions
50-255/97014-02b	EEI	failure to identify that work could not be performed as scheduled
50-255/97014-02c	EEI	failure to replan work prior to exceeding work scope
50-255/97014-02d	EEI	failure to revise testing following work scope change
50-255/97014-02e	EEI	failure to document work performed
50-255/97014-03	IFI	reduction in management oversight of "A" shift maintenance