U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-255
License No:	DPR-20
Report No:	50-255/99011(DRP)
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:	September 22 through November 3, 1999
Inspectors:	J. Lennartz, Senior Resident Inspector R. Krsek, Resident Inspector D. Passehl, Project Engineer
Approved by:	Anton Vegel, Chief Reactor Projects Branch 6 Division of Reactor Projects

EXECUTIVE SUMMARY

Palisades Nuclear Generating Plant
NRC Inspection Report 50-255/99011(DRP)

This inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a 6-week period of resident inspection activities.

Operations

- Outage planning personnel and site management consistently demonstrated a positive focus on safety during the outage. Also, a heightened awareness of plant conditions was effectively communicated to all work groups when the primary coolant system was in reduced inventory, a condition of high potential risk based on the licensees shutdown risk assessment. (Section O1.1)

- A manual valve, required to be opened in an Emergency Operating Procedure, was identified by the inspectors as obstructed by scaffolding. Consequently, valve operation was precluded. Corrective actions taken were prompt and reasonable. (Section O2.1)

- Weak procedural guidance for venting the primary coolant system to atmospheric pressure following plant cool down unnecessarily challenged the operators and radiation protection personnel. Also, control room operators demonstrated non-conservative decision making by not obtaining additional guidance when the procedure, as written, did not vent the primary coolant system to atmospheric pressure as expected. (Section O3)

- Operator performance during plant shutdown on October 15, 1999, was competent and characterized by procedure adherence. Control room operators demonstrated effective monitoring of plant status through quick recognition that Control Rod 14 failed to fall into the core following the planned manual reactor trip. Also, control room operators quickly diagnosed the loss of Instrument Bus Y30 while the primary coolant system was in a reduced inventory condition and promptly completed appropriate actions. (Section O4.3)

Maintenance

- Maintenance and engineering personnel provided prompt support to and effectively coordinated with operations personnel following an unexpected failure of Inverter ED-08. Risk reviews of the outage schedule that were conducted by Probabilistic Safety Assessment personnel demonstrated a positive focus on safety. (Sections M1.2 and M1.3)

- Operations management aggressively responded to the adverse trend regarding tagging order problems that was identified early in the outage. The corrective actions were reasonable and pro-active, in that, the actions were implemented before any actual adverse consequences occurred. Also, plant operators and work control center personnel identified several tagging order problems prior to hanging any tags which demonstrated a positive questioning attitude. (Section M7.1)

- Some tagging order problems demonstrated a lack of rigor and poor attention to detail during tagging order development. Consequently, some tagging orders were not effectively aligned with procedure requirements or were scheduled to be issued when the appropriate plant conditions did not exist. This unnecessarily challenged work control center personnel and plant operators. (Section M7.1)

- The licensee failed to perform Technical Specification 4.17.5, Item 12, within the required 18 month interval plus allowable extension. This involved calibration of safety injection and refueling water tank level indication. The licensee successfully performed the calibration 34 days late and revised procedures to prevent recurrence. This was a non-cited violation. (Section M8.1)

Engineering

- Appropriate requirements were met for a planned engineered lift of the reactor vessel head. However, during the lift evolution a lack of engineering rigor resulted in a number of minor discrepancies with the initial implementation and emergent revisions of the procedure utilized for the reactor head lift. (Section E1.1)

- Temporary Modification 99-023 that installed a splash guard on the trisodium phosphate baskets in containment was completed in accordance with plant procedures. An appropriate safety analysis was completed that supported installation of the temporary modification. (Section E1.2)

- Engineering personnel actively supported and tracked troubleshooting, inspection, and repair efforts after Control Rod 14 failed to fall into the core on October 15, 1999, following the reactor trip signal. Control Rod 14 failed to fall into core because of a failed bearing in the control rod drive mechanism. The planned scope of inspections and repairs for the control rod drive mechanisms was thorough. The licensees root cause evaluation was in progress. (Section E2.1)

Plant Support

- Radiation technicians actively challenged workers prior to entry into the radiological controlled area. Also, a heightened awareness of accumulated dose among individual work groups was evident which resulted in more interaction with radiological protection personnel to strive to maintain dose as low as reasonably achievable. (Section R1.1)

- The "Back-to-Basics" training regarding fundamental radiation work practices was effective in that the use of mock-ups reinforced radiological work practices. Also, site management actively supported the training. (Section R5)

Report Details

Summary of Plant Status

The plant operated at full power at the start of the inspection period and was shutdown on October 15, 1999, for a scheduled refueling outage. Major maintenance items that were scheduled, in addition to the refueling activities, included replacing three primary coolant pump seals, replacing one primary coolant pump motor, rebuilding one primary coolant pump, and replacing both low pressure turbines on the main turbine generator.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors noted that outage planning personnel and site management consistently demonstrated a positive focus on safety during the outage. For example:

- operations department management provided 24 hour site coverage;
- the licensee exited a scheduled primary coolant system (PCS) reduced inventory condition following an unexpected failure of instrument inverter ED-08;
- there was prompt and aggressive response to an adverse trend regarding industrial safety issues early in the outage; and
- there was prompt attention and implementation of corrective actions prior to any actual adverse safety consequences due to equipment tagging order deficiencies documented in condition reports.

Also, a heightened awareness of plant conditions was effectively communicated to all work groups when the PCS was in reduced inventory, a condition identified as high potential risk, based on the licensees shutdown risk assessment.

O2 Operational Status of Facilities and Equipment

O2.1 Pre-Outage Plant Walkdowns

a. Inspection Scope (71707, 37551)

The inspectors conducted plant walkdowns prior to the start of the refueling outage. In particular, the inspectors observed pre-outage work preparations and walked down scaffolding erected near safety-related equipment.

b. Observations and Findings

During a routine tour in the West Engineered Safeguards Room, the inspectors noted that operation of a manual valve located approximately 11 feet above the floor appeared to be hindered by scaffolding. Manual Valve FW-755 was confirmed by operations personnel as obstructed by the approved, erected scaffolding. Actions were immediately taken to move the scaffolding which obstructed operation of the valve.

Manual Valve FW-755 functioned to vent the service water system suction line to Auxiliary Feedwater Pump 8C, in the event the auxiliary feedwater pump required an alternate suction source. Emergency Operating Procedure Supplement 31, "Supply Auxiliary Feedwater Pumps from Alternate Sources," Section 7.a, required this vent valve to be opened as part of the valve line-up for this alternate suction source.

The licensee documented the issue in Condition Report 9901700 and performed a walkdown of all scaffolding onsite. The licensee's walkdown identified some minor discrepancies which were immediately corrected. The failure to ensure the approved, erected scaffolding did not interfere with the valve operation constituted a violation of minor safety significance that is not subject to formal enforcement action.

c. Conclusions

The inspectors concluded that a manual valve, required to be opened in an Emergency Operating Procedure, was obstructed by scaffolding that had been erected in preparation for the refueling outage. No actual adverse consequences resulted and the licensee took immediate corrective actions which were considered reasonable.

O3 Operations Procedures and Documentation

a. Inspection Scope (71707)

The inspectors reviewed Standard Operating Procedure - 1, "PCS," and Condition Report 9901919 to determine the significance of an apparent lack of procedural guidance. In addition, the inspectors discussed the issue with operations personnel and operations management.

b. Observations and Findings

On October 20, 1999, control room operators depressurized the PCS during the plant cool down in accordance with Standard Operating Procedure -1. Procedure Step 7.1.7b.1 directed the operators to ensure that the PCS was at atmospheric pressure. However, following initial depressurization per the procedural guidance, the PCS pressure was 27.8 pounds per square inch absolute. The procedure did not provide any additional guidance regarding the residual pressure in the PCS which was an unnecessary challenge to the operators.

Control room operators tried venting the PCS via a known vent path to the quench tank which was unsuccessful. Subsequently, control room operators opened the pressurizer

vent valves which successfully depressurized the PCS. The vent valves discharged into a funnel in containment which overflowed after the valves were opened. Consequently, about one gallon of PCS water spilled onto the floor in containment. A 1-gallon spill of PCS water was not considered significant; however, the spill unnecessarily resulted in a contaminated area that radiation protection personnel had to clean-up and decontaminate.

The inspectors noted that the control room operators did not stop and obtain appropriate procedure guidance when the procedure, as written, did not vent the PCS to atmospheric pressure as expected. While no significant adverse consequences resulted, the operators demonstrated non-conservative decision making when the procedure weakness was revealed. During discussions with operations management, the inspectors noted that the behaviors demonstrated by the operators did not meet management expectations.

The lack of appropriate procedure guidance to vent the PCS to atmospheric pressure constituted a violation of minor safety significance that is not subject to formal enforcement action. Operations personnel generated Condition Report 9901919 to document the problem in the licensee's corrective action program.

c. Conclusions

The inspectors concluded that the weak procedural guidance for venting the PCS to atmospheric pressure following plant cool down unnecessarily challenged the operators and radiation protection personnel. Also, control room operators demonstrated non-conservative decision making by not obtaining additional guidance when the procedure, as written, did not vent the PCS to atmospheric pressure as expected. The issue was appropriately entered into the licensee's corrective action program.

O4 Operator Knowledge and Performance

O4.1 Plant Shutdown

a. Inspection Scope (71707)

The inspectors observed portions of the plant shutdown and subsequent cool down to refueling operations. In addition, the inspectors reviewed applicable procedures and condition reports.

b. Observations and Findings

The inspectors noted that the plant shutdown on October 15, 1999, was deliberate and executed in accordance with plant procedures which were actively used. Also, reactor engineering personnel actively supported control room operators during the shutdown.

Control room operator's performance during the shutdown was generally characterized by strict procedure adherence and effective use of self and peer-checking. The Control Room Supervisor generally maintained effective oversight of ongoing activities.

The inspectors observed the following potential negative attributes regarding the control room operator's performance during the plant shutdown:

- The crew, on several occasions, were all located in close proximity to one another near the control boards during discussions of plant status and pending evolutions. All crew members being positioned in close proximity precluded effective monitoring of plant parameters;

- none of the crew members walked the control boards shortly after the plant shutdown to ensure that the annunciators and equipment status were as expected; and

- the Shift Engineer was utilized as the peer-checker during the reactivity manipulations and therefore, did not roam the control room. Consequently, the Shift Engineer's function to monitor overall plant status, in order to provide technical assistance to the Control Room Supervisor, was diminished.

None of the above observations regarding operator performance resulted in any adverse consequences. The inspectors discussed the observations with Operations management.

One significant equipment problem emerged during the plant shutdown. Shutdown Bank B, Control Rod 14, did not fall into the core when the reactor was manually tripped. The crew verified that the rod was inserted, as designed, by the rod control system rundown feature. Therefore, no operator action was required to insert Control Rod 14. Control room operators quickly identified the control rod's failure to fall into the core and observed the automatic control rod rundown which demonstrated effective monitoring skills.

System engineering personnel were notified and Condition Report 9901817 was generated to document the problem. (Control Rod 14 is discussed further in Section E2.1 of this report).

O4.2 Reduced Inventory Evolutions

a. Inspection Scope (71707)

The inspectors observed portions of the evolutions to establish and subsequently remove the PCS from a reduced inventory condition. In addition, the inspectors reviewed applicable procedures and condition reports.

b. Observations and Findings

On October 22, 1999, operations personnel successfully established a reduced inventory condition in the PCS. Entry into reduced inventory was methodical and accomplished with plant procedures actively being used. Also, control room operators ensured that the indicated PCS level was accurate.

Outage management appropriately highlighted entry into reduced inventory to all work groups at the outage alignment meeting. Also, highlighted notices were posted on plant entrances to increase site personnel's awareness regarding the plant's status. The overall heightened awareness during the time the PCS was in reduced inventory demonstrated a positive focus on safety.

Shortly after reduced inventory was established, several annunciators energized in the control room while control room operators were draining the PCS to the predetermined level. Control room operators quickly diagnosed that Instrument Bus Y30 was de-energized. The inspectors observed the following positive attributes regarding operator performance during this emergent equipment problem:

- control room operators immediately stopped draining the PCS;
- control room operators promptly verified that the shutdown cooling system was operating as designed to maintain PCS temperature;
- control room operators promptly referenced Off Normal Procedure 24.3, "Loss of Preferred AC Bus Y30," and completed the required actions in a timely manner; and
- applicable Technical Specifications were quickly identified and referenced.

Following discussions between operations and outage management, operations personnel re-filled the PCS to exit the reduced inventory condition. Exiting reduced inventory until the problem could be resolved demonstrated a positive focus on safety.

Loss of Instrument Bus Y30 occurred because Inverter ED-08 tripped when Breaker 11 was closed during restoration from a preventative maintenance activity. Breaker 11 powered transformer EX-63, "Reactor Protection System Control Rod Clutch Power Supply." Engineering personnel were notified and Condition Report 9902017 was generated and entered into the licensee's corrective action program.

Engineering personnel subsequently concluded that ED-08 was operable and all loads, except Breaker 11, were restored on ED-08 without incident. Breaker 11 was declared inoperable pending an evaluation by engineering personnel. The engineering evaluation was in progress at the end of this inspection period.

O4.3 Conclusions Regarding Operator Performance

The inspectors concluded that operator performance during plant shutdown was competent and characterized by procedure adherence. Control room operators demonstrated effective monitoring of plant status through quick recognition that Control Rod 14 failed to fall into the core following the planned manual reactor trip. Also, control room operators quickly diagnosed the loss of Instrument Bus Y30 while the PCS was in a reduced inventory condition and promptly completed appropriate actions. Negative attributes observed by the inspectors regarding operator performance did not result in any adverse consequences.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Maintenance and Surveillance Testing Observations

a. Inspection Scope (61726, 62707, 71707)

The inspectors observed or reviewed portions of the following maintenance work orders and surveillance activities. Also, the inspectors interviewed operations, engineering, and maintenance department personnel and, when applicable, reviewed Technical Specifications, the Final Safety Analysis Report and vendor manuals.

Work Order No.:

- 24910159 L-1 Polar Crane Post Reactor Head Move Inspection
- 24913006 ED-08 Inverter Failed / Tripped Upon Restoration of Breaker 11

Surveillance No.:

- QO-21 Quarterly Auxiliary Feedwater Pumps Inservice Test Procedure
- RT-8D Engineered Safeguards System - Right Channel
- RE-83B Service Test - Battery Number ED-02
- T-218 Service Water Pumps P-7A, P-7B, and P-7C Performance Test By Flow To Containment
- T-370 Control Rod Drive Condition Monitoring

b. Observations and Findings

The inspectors noted that procedures were at the job sites and actively being used during the observed surveillance and maintenance activities. Maintenance and engineering personnel promptly responded to the unexpected loss of Instrument Bus Y30 (Inverter ED-08) as discussed in Section O4.2 of this report. Troubleshooting, needed repairs, and subsequent restoration of Instrument Bus Y30 were completed in a timely manner and were effectively coordinated with operations personnel. Work activities performed were appropriately documented in the work order summary. The inspectors had no significant findings regarding the observed maintenance activities.

M1.2 Probabilistic Safety Assessment Group Review of Outage Schedule

a. Inspection Scope (62707, 37551)

The inspectors reviewed the Probabilistic Safety Assessment (PSA) group's comments pertaining to the risk associated with scheduled maintenance activities during the outage. Also, the inspectors reviewed the licensee's Shutdown Operations Protection Plan (SOPP) and the outage schedule.

b. Observations and Findings

The outage planning group developed the SOPP to manage the plant equipment needed for safe operation during the outage. The SOPP utilized a "defense in depth" concept in that the minimally required safety equipment per the SOPP was greater than or equal to that required by Technical Specifications.

The inspectors noted that the PSA group pre-reviewed the outage schedule in an effort to identify any potential non-compliance with the SOPP which would be indicative of increased risk. Also, the PSA group reviewed the schedule each day during the outage after any changes were made. Risk reviews of the schedule by PSA personnel provided a 3-day look ahead on a daily basis and a 2-week look ahead on a weekly basis during the outage. The PSA group utilized risk monitoring software during their review of the scheduled activities and discussed the results with outage planning and work control center personnel. The frequent risk updates provided by the PSA personnel demonstrated a positive focus on safety.

The inspectors noted that there was not a formal mechanism to provide feedback from outage planning personnel to PSA personnel. Consequently, PSA personnel were not formally informed of any changes that were made to the scheduled activities or any contingencies that were put in place to resolve a potential non-compliance. However, the inspectors noted that the PSA personnel were pro-active in that they took the initiative to ensure that any identified potential non-compliance was adequately addressed.

Also, the inspectors independently reviewed some of the work activities that the PSA group had identified as a potential non-compliance with the SOPP. The inspectors noted that appropriate contingency actions or schedule changes were in place to resolve any potential non-compliances.

M1.3 Conclusions Regarding Conduct of Maintenance

The inspectors concluded that observed maintenance and surveillance activities were completed in accordance with plant procedures. Maintenance and engineering personnel provided prompt support to and effectively coordinated with operations personnel following an unexpected failure of Inverter ED-08. Risk reviews of the outage schedule conducted by PSA personnel demonstrated a positive focus on safety.

M7 Quality Assurance In Maintenance Activities

M7.1 Equipment Tagging Problems

a. Inspection Scope (62707)

The inspectors reviewed several condition reports associated with equipment tagging problems. Also, the inspectors discussed the noted problems with operations management to assess the proposed corrective actions.

b. Observations and Findings

The inspectors noted that several condition reports were generated regarding equipment tagging order problems. For example:

- An auxiliary operator identified that an equipment tagging order released for hanging would have inadvertently affected the two primary coolant pumps that were in service, as required, for the given plant conditions. The tagging order was written prior to the outage and did not account for two primary coolant pumps being in service. The deficiency was identified before the tagging order was executed which precluded any adverse consequences. Condition Report 9901888 was initiated to document the problem.

- Work control center personnel identified that a tagging order would have inappropriately rendered Emergency Diesel Generator 1-1 inoperable when it was required to be operable per the Shutdown Operations Protection Plan. The tagging order would have removed the ventilation from service which was required support equipment for the Emergency Diesel Generator. The deficiency was identified before the tagging order was executed which precluded any adverse consequences. Condition Report 9902064 was initiated to document the problem.

- Due to a tagging order deficiency, valves in the auxiliary feedwater system were operated in a manner contrary to operating procedure guidance. The valves were normally electrically de-energized in the open position and operating procedure SOP-12, "Feedwater System," Step 4.6 stated that the valves shall not be operated electrically and that manual operation was permitted.

  However, the valves were closed using the electric motors when the tagging order was executed. Engineering personnel completed an operability recommendation following the inappropriate operation of the valves and concluded that the valves were operable. The inspectors did not identify any concerns with the operability recommendation.

  Operating the valves contrary to procedure requirements constituted a violation of minor safety significance that is not subject to formal enforcement action. Condition Report 9901988 was initiated to document the problem and the tagging order restoration was revised to require manual operation of the valves.

Plant operators and work control center personnel identified some of the deficiencies noted above prior to hanging any tags which demonstrated a positive questioning attitude. However, collectively, the tagging order problems demonstrated a lack of rigor and poor attention to detail during tagging order development. Consequently, some tagging orders were not effectively aligned with procedure requirements and some tagging orders were scheduled to be issued when the appropriate plant conditions did not exist. This unnecessarily challenged work control center personnel and plant operators.

Operations management aggressively responded to the adverse trend regarding tagging errors and implemented several corrective actions which included:

- a self-assessment which identified additional problems that were subsequently corrected prior to any actual adverse consequences;
- tagging orders were required to be reviewed and initialed by outage management before they were performed; and
- work control center personnel were required to do a point by point verification of tagging orders vice just a "scope" review which was previously required.

The corrective actions were considered reasonable and pro-active in that they were implemented before any actual adverse consequences occurred. The inspectors noted a decreasing trend in the number of tagging order problems after the corrective actions were implemented. However, the corrective actions were not in place long enough to assess the overall effectiveness.

c. Conclusions

The inspectors concluded that operations management aggressively responded to the adverse trend regarding tagging order problems that was identified early in the outage. The inspectors considered the corrective actions as reasonable and pro-active in that they were implemented before any actual adverse consequences occurred. Also, plant operators and work control center personnel identified several tagging order problems prior to hanging any tags which demonstrated a positive questioning attitude.

A lack of rigor and poor attention to detail by operations support personnel during tagging order development, contributed to the occurrence of tagging order deficiencies. Consequently, some tagging orders were not effectively aligned with procedure requirements and some tagging orders were scheduled to be issued when the appropriate plant conditions did not exist. This unnecessarily challenged work control center personnel and plant operators.

M8 Miscellaneous Maintenance Issues (92700)

M8.1 (Closed) Licensee Event Report 50-255/99-002: Technical Specification surveillance not completed within specified frequency.

On June 22, 1999, the licensee was performing an audit and discovered that Technical Specification 4.17.5, Item 12, was not completed within the required 18 month interval plus allowable extension. Specifically, Technical Specifications required performance of a channel calibration for safety injection and refueling water tank level indication. The licensee successfully performed the implementing procedure, RI-38, "Safety Injection Refueling Water Tank Level Indication," on May 25, 1993. The procedure was due to be performed again on April 15, 1995. However, the licensee did not perform the procedure until 34 days later, on May 19, 1995. The as-found results were satisfactory. The licensee determined the cause to be an administrative weakness. During the period between May 25, 1993, and May 19, 1995, the licensee received Technical Specification Amendment 162, which revised the surveillance frequency for performing the calibration from each refueling outage to every 18 months. The licensee failed to translate the revised frequency into the surveillance schedule. The licensee considered this to be an isolated instance since there were no other similar events within the past few years.

The licensee's corrective action included revising Administrative Procedure 9.20, "Technical Specification Surveillance and Special Test Program." The revision should ensure that needed changes to the scheduling program would be properly accomplished following receipt of any approved Technical Specification Amendment. In addition, the licensee reviewed all other affected surveillance requirements from Amendment 162 and found no similar problems.

The inspectors did not identify any concerns with the results of the licensee's root cause investigation and proposed corrective actions. The inspectors determined that the licensee's failure to perform Technical Specification 4.17.5, Item 12, within the required 18 month interval plus the allowable extension, is a violation of the Technical Specification surveillance requirement. This Severity Level IV violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1.a of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Condition Report 9901127. (NCV 50-255/99011-01)

III. Engineering

E1.1 Planned Engineered Lift of the Reactor Head

a. Inspection Scope (37551)

The inspectors reviewed the licensee's procedures and the engineering evaluations associated with the planned engineered lift of the reactor vessel head. The inspectors also observed the move of the reactor vessel head from the vessel to the laydown area.

b. Observations and Findings

Engineering Assistance Request 98-0680 was initiated to allow Polar Crane L-1 to lift the reactor head with additional lead shielding intact. The calculated weight of the reactor head with the additional lead shielding exceeded the rated capacity of the Polar Crane L-1. However, the American National Standard Institute Standard B30.2, "Overhead and Gantry Cranes," allowed for two planned engineered lifts per year of up to 125 percent of the rated crane capacity if certain requirements were met.

The inspectors reviewed Engineering Assistance Request 98-0680, in addition to the crane inspection and operation procedures, and determined that the applicable requirements for the planned engineered lift were met for the initial reactor head lift. The engineering analysis limited the magnitude of the planned engineered lift to 280,000 pounds. The analysis also defined the lift as from the reactor vessel to the laydown area.

During the initial lift sequence on October 25, 1999, the reactor head was lifted approximately one inch above the flange; however, the indicated lift weight was approximately 284,000 pounds. The crane operator appropriately stopped the lift and lowered the reactor head back to the flange.

After the initial lift sequence, engineering personnel concluded that breakaway forces contributed to the higher than expected weight. Therefore, an emergent procedure revision was processed to allow the reactor head to be initially lifted six inches with a static lift weight of up to 300,000 pounds to account for potential breakaway forces. Also, some lead blankets were removed from the reactor head to ensure that the total lift weight would be less than the planned engineered lift weight of 280,000 pounds.

However, during the second lift, the indicated weight was approximately 282,800 pounds, and the reactor head was appropriately set back down on the shims. The difference between the indicated weight on the first and second lift sequences was the weight of the lead blankets which had been removed. Therefore, engineering personnel subsequently determined that breakaway forces did not exist, as was previously concluded.

Prior to the next reactor head lift, the licensee removed additional lead blankets to ensure an indicated weight of less than 280,000 pounds. Subsequently, the reactor head was lifted and moved to the laydown area without any additional problems on October 26, 1999, and an indicated weight of less than 280,000 pounds.

The inspectors reviewed the emergent procedure revision made to Procedure C-PAL-RFM-004, after the first lift. The inspectors noted that Engineering Assistance Request 98-0680 provided an adequate technical basis to allow the lift weight of up to 300,000 pounds. However, the conclusion of Engineering Assistance Request 98-0680 limited the magnitude of the lift to 280,000 pounds. The Engineering Assistance Request had not been revised prior to implementing the procedure change that raised the weight limit.

In addition, the inspectors noted that Section C.22.b.4 of Procedure C-PAL-RFM-004, which was also revised for the vertical 6-inch initial lift, instructed the crane operator to stop the lift and contact the shift outage manager if the load was greater than 300,000 pounds. Consequently, the revised procedure section did not provide the necessary guidance to set the reactor head down. The inspectors determined that the crane operators job skills compensated for the procedure weakness. Also, the inspectors noted that no adverse consequences resulted from the procedure deficiencies. Therefore, the issues identified with the emergent procedure revisions were violations of minor safety significance that are not subject to formal enforcement action.

The inspectors reviewed the L-1 polar crane post inspection activities, required for planned engineered lifts, and noted the inspections were completed satisfactorily, with no significant issues identified.

c. Conclusions

The inspectors concluded that the appropriate requirements were met for a planned engineered lift of the reactor vessel head. However, during the evolution of the lift, a lack of engineering rigor resulted in a number of minor discrepancies with the initial implementation and emergent revisions of the procedure utilized for the reactor head lift.

E1.2 Temporary Modification To Trisodium Phosphate Baskets (37551)

a. Inspection Scope (37551)

The inspectors reviewed plant procedures, and the documentation and associated safety evaluation for a temporary modification that was installed on the trisodium phosphate baskets.

b. Observations and Findings

The trisodium phosphate baskets functioned to maintain a neutral containment sump solution during the recirculation phase of emergency core cooling for the purposes of iodine removal. Temporary Modification 99-023 installed a splash guard on the trisodium phosphate baskets to shield the basket's open mesh screening from borated water that was dripping from Safety Injection Tank "B" Isolation Valve, MO-3045. The water was splashing on the baskets and would, over time, dissolve trisodium phosphate in the baskets. (Leak from MO-3045 was also discussed in Section O2.1 of Report 50-255/99010 (DRP)).

The temporary modification was completed in accordance with plant procedures and the associated safety analysis adequately supported installation. Engineering personnel's operability recommendation concluded that the trisodium phosphate baskets were operable. The inspectors reviewed the operability recommendation and did not identify any concerns. Valve MO-3045 was subsequently repaired during the outage and the temporary modification was removed.

c. Conclusion

The inspectors concluded that Temporary Modification 99-023 that installed a splash guard on the trisodium phosphate baskets in containment was completed in accordance with plant procedures. An appropriate safety analysis was completed that supported installation of the temporary modification.

E2 Engineering Support of Facilities and Equipment

E2.1 Control Rod Drive Mechanism 14 Failure

a. Inspection Scope (37551, 62707)

The inspectors reviewed condition reports and associated operability recommendations pertaining to Control Rod 14 that failed to fall into the core on October 15, 1999, following the planned manual reactor trip signal. In addition, the inspectors interviewed engineering personnel.

b. Observations and Findings

Control Rod 14 failed to fall into the reactor core following the manual reactor trip signal during the scheduled plant shutdown on October 15, 1999. The control rod drive system's rundown feature subsequently inserted the rod automatically as designed. Therefore, no operator action was required to insert the rod. Engineering personnel were notified and troubleshooting actions were promptly planned.

Control Rod 14 again failed to fall into the reactor core during subsequent troubleshooting that included performance of Test T-370, "Control Rod Drive Condition Monitoring." Based on the results of T-370, engineering personnel recommended disassembly and inspection of the Control Rod 14 drive package.

Subsequent inspections revealed that the control rod drive's clutch was disengaged, indicating that the clutch had de-energized, as designed, when the trip signal was generated. However, the clutch output shaft could not be rotated in either direction because it was mechanically bound. The clutch was disassembled and the upper internal bearing was locked-up and contained hardened grease which resulted in the mechanical binding of the clutch's output shaft.

The failed upper bearing had no effect on the control rod when moving the rod using the manual operating lever. The bearing was located in an assembly that "freewheels" when the rod was moved with the motor using the manual operating lever. However, when a trip signal was generated the clutch would de-energize to disengage the upper assembly (motor) from the lower assembly and the weight of the rod would allow the rod to fall into the core.

The clutch output shaft was connected to the rod and should "spin" freely when the clutch de-energized (disengages) after a trip signal to allow the rod to fall into the core. However, the failed bearing prevented the shaft from spinning freely because of the

mechanical binding. Consequently, the upper and lower assemblies were mechanically engaged even though the clutch was disengaged. Therefore, the rod was essentially still connected to the motor.

Electrical maintenance personnel replaced the drive package with a spare drive package. Test T-370 was performed, after the drive package was replaced, and Control Rod 14 fell into the core as designed. Condition Report 9901817 was generated and entered into the licensee's corrective action program.

Based on finding the failed bearing in the drive mechanism for Control Rod 14, engineering personnel expanded the scope to inspect nine additional drive mechanisms. The drive mechanism clutch assembly and the four sets of bearings would be included in the scope. The nine drive mechanisms were selected based on torque traces, length of time since last inspection, and 1998 refueling outage rod drop times.

The expanded scope identified several drive mechanisms that had degraded bearings. Therefore, engineering personnel determined that all drive packages that had not been rebuilt since 1996 would be disassembled, inspected, and all four sets of bearings would be replaced with new bearings. The expanded scope for inspections and the resultant determination to rebuild all drive mechanisms was considered thorough. Also, the inspectors determined that engineering personnel actively supported and tracked inspection and repair activities. The licensee's root cause evaluation for the failed bearing and drive mechanism rebuilds were ongoing when the inspection period ended. The inspectors will track the root cause evaluation for the control rod drive mechanisms with Inspection Follow-up Item 50-255/99011-02.

c. Conclusions

The inspectors concluded that engineering personnel actively supported and tracked troubleshooting, inspection, and repair efforts after Control Rod 14 failed to fall into the core following the reactor trip signal. Control Rod 14 failed to fall into core because of a failed bearing in the control rod drive mechanism. The planned scope of inspections and repairs was thorough. However, root cause analysis for the failed bearing were ongoing at the end of the inspection period and this issue will be tracked as Inspection Follow-up Item 50-255/99011-02.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 General Comments (71750)

The inspectors observed radiation work practices during routine plant tours. Also, the inspectors observed the morning refueling outage status meetings. The inspectors noted that radiation protection technicians were pro-active in that they questioned plant workers regarding radiological conditions at work locations before allowing entry into the radiation controlled area. Also, the inspectors noted that accumulated dose, as

compared to the projected for the outage, was a daily discussion topic. This demonstrated a heightened awareness among the individual work groups regarding accumulated dose and resulted in more interaction with radiological protection personnel to strive to maintain dose as low as reasonably achievable.

R5 Staff Training and Qualification in Radiological Protection and Chemistry Controls (71750)

The inspectors observed "Back-To-Basics" training that was provided to all radiological workers prior to the outage. The training was conducted to emphasize the fundamentals of radiological work practices. Site management communicated plant expectations regarding radiological practices and dose control. Also, radiation technicians utilized mock-ups to demonstrate effective contamination control, effective radiation dose control principles, high and locked high radiation area controls, and dressing requirements. The inspectors concluded that the training was effective in that the use of mock-ups reinforced effective radiological work practices. Also, site management actively supported the training.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on November 3, 1999. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

G. R. Boss, Operations Manager
E. Bogue, Director, Chemistry and Radiological Services
S. C. Cedarquist, System Engineer
D. E. Cooper, General Manager, Plant Operations
P. D. Fitton, System Engineering Manager
N. L. Haskell, Director, Licensing
D. G. Malone, Licensing
R. L. Massa, Shift Operations Supervisor
T. J. Palmisano, Site Vice President
D. W. Rogers, Director, Training
B. M. Sova, System Engineer

NRC

R. G. Schaaf, Project Manager, NRR

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observations
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 92700:	LER Follow-Up

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-255/99011-01	NCV	Technical Specification surveillance not completed within specified frequency.
50-255/99011-02	IFI	Root cause evaluation associated with the failure of Control Rod Drive Mechanism 14

Closed

50-255/99-002	LER	Technical Specification surveillance not completed within specified frequency.
50-255/99011-01	NCV	Technical Specification surveillance not completed within specified frequency.

Discussed

None