U. S. NUCLEAR REGULATORY COMMISSION
REGION III

Report Nos. 50-315/90007(DRP); 50-316/90007(DRP)

Docket Nos. 50-315; 50-316 License Nos. DPR-58; DPR-74

Licensee: American Electric Power Service Corporation
Indiana Michigan Power Company
1 Riverside Plaza
Columbus, OH 43216

Facility Name: Donald C. Cook Nuclear Power Plant, Units 1 and 2

Inspection At: Donald C. Cook Site, Bridgman, MI

Inspection Conducted: March 13 through August 22, 1990

Inspectors: E. R. Schweibinz

Z. Falevits (August 6 through 8, 1990)

W. G. Rogers (August 6 through 8, 1990)

Approved By: B. L. Burgess, Chief
Projects Section 2A

9/14/90
DATE

Inspection Summary

Inspection on March 13 through August 22, 1990,
(Report Nos. 50-315/90007(DRP); 50-316/90007(DRP)
Areas Inspected: Special announced inspection by Regional and resident inspectors of maintenance activities:
Results: Of the areas inspected, no violations or deviations were identified.

Strengths:

Many improvements in maintenance support systems were observed. Some of these are: the uniform setting of priorities; increased planning; improved scheduling, centralizing PM activities; reassessment of licensee performance indicators; rework monitoring program; more worker invovlement in procedure revision; pre and post job reviews; and improved housekeeping and material condition of the plant. The skill and experience of maintenance craftsmen continues to be excellent. The very positive and dedicated attitude displayed by all plant personnel continues as a strength.

Weaknesses:

Although the inspection at D. C. Cook was limited in scope, three instances of less than adequate maintenance procedures and one case of lack of procedures were identified of the 43 jobs reviewed. Several instances of inadequate coordination of maintenance activities were also observed. A number of recently implemented and planned changes should result in an overall improvement in plant maintenance; however, significant change is not yet evident.

The following additional summary information is provided by SALP functional areas:

Operations:

Both units operated at or near full power for the majority of the period with Unit 2 shutting down for a refueling outage at the end of June. All interfaces between Operations and Maintenance observed during this inspection were appropriate and timely.

Maintenance/Surveillance:

This inspection concentrated on maintenance activities and many ongoing improvements in maintenance support systems were observed, some of which are summarized here: The Common Job Order Priority System which provides a uniform method for establishing the priority of non-outage corrective maintenance (CM); a centralized single point of contact for all preventive maintenance (PM) activities was established in the PM Group; a Reliability Centered Maintenance (RCM) program; expansion of corrective maintenance trends from the I&C group to the whole Maintenance Department with the first trend products expected in November; reassessment of performance indicators; expansion of a Rework Monitoring program to the whole Maintenance Department; implemented or improve system and schedule to accurately control revisions maintenance procedures; revision of the maintenance procedure review process to enhance the role and authority of the workers in the process; the reinstatement of the quality team concept in the Maintenance Department; use of maintenance pre-job review training sessions; enhancements to the post job review procedure; more detailed planning than done in the past; the development of an Integrated Scheduling Program; major improvements in the housekeeping and material condition of the plant and specifically the Auxiliary Building; and increased management and senior management attention.

Some problems with maintenance procedures were still observed. The projected changes that should result from the ongoing improvements to maintenance support systems are not yet discernible in the maintenance process.

Engineering/Technical Support:

The interface between the site and corporate was observed. While the support was always adequate, timeliness left room for improvement.

Safety Assessment/Quality Verification:

QA involvement was observed during repairs to the Unit 1 West Essential Service Water Pump. This involvement was not very active until the inspector

pointed out needed changes to the procedure. After that point, QA involvement improved considerably. Inspection Report No. 50-315/90010; 50-316/90010 addresses activities inspected during this ESW pump repair. A lack of QA involvement was apparent in the electrical replacement of the 125 ampere breakers in each of the four Control Room Instrumentation Distribution (CRID) Inverters.

Radiological Controls:

Adequate radiological controls and practices were exhibited during the maintenance activities observed during this inspection period. The contaminated square feet in the Auxiliary Building was reduced from approximately 33,000 in the beginning of January, 1990, to below 20,000 (10,000 per unit) in April, 1990.

Security:

Proper security controls and practices were exhibited during this inspection period that spanned five months, and no cases of security infractions were observed.

DETAILS

1. Persons Contacted

A. Blind, Plant Manager
*J. Rutkowski, Assistant Plant Manager - Technical Support
L. Gibson, Assistant Plant Manager - Projects
K. Baker, Assistant Plant Manager - Production
*B. Svensson, Executive Staff Assistant
J. Sampson, Operations Superintendent
*T. Beilman, Maintenance Superientendent
J. Droste, Technical Superintendent - Engineering
M. Barfelz, Senior Performance Engineer
*L. Ingros, Preventive Maintenance Group Supervisor
*T. Walsh, Procedures Group Supervisor
*C. Miles, Instrumentation and Electrical Group Supervisor
*T. Bestrom, Planning Group Supervisor
*J. Hylok, Scheduling Group Supervisor
*F. Pisarsky, Mechanical Welding and HVAC Group Supervisor
*B. Jones, Building and Grounds Group Supervisor
T. Wagoner, Staff Support Services Group Supervisor
*P. Carteaux, Safety and Assessment Superintendent
*A. Gort, Preventive Maintenance
*R. Allen, Regulatory Services Supervisor
*M. Evarts, Manager Nuclear Maintenance Support, NOD, AEPSC
*J. Kurgan, Manager Nuclear Operations Support, NOD, AEPSC
*K. Worthington, Site QA, AEPSC

NRC

*B. Burgess, Chief, Projects Section 2A
*J. Isom, Senior Resident Inspector
*D. Passehl, Resident Inspector
*E. Schweibinz, Senior Project Engineer

2. Licensee Actions on Previous Inspection Findings

(Closed) Violation (315/90010-02; 315/90010-01): failure to correct the deficiencies and sequencing errors in a maintenance procedure that were identified in 1988. The inspector reviewed the licensee response dated July 18, 1990, and the corrective actions taken to avoid further violations and found them to be adequate. In addition, the inspector reviewed the process of maintenance procedure upgrades which the licensee has undertaken and found it to be acceptable. For more details, see paragraph 3.1.2. This item is closed.

3.0 Maintenance Program Implementation (62700)

The purpose of this inspection effort was to evaluate the licensee's corrective actions for weaknesses identified by the December, 1989, Maintenance Team Inspection, (MTI) and to assess their current performance prior to the end of the SALP period, August, 1990. Throughout this inspection period, the Senior Resident Inspector and Resident Inspector have increased their effort in the observation of maintenance activities and this has been documented in their routine inspection reports.

This evaluation spanned the entire Maintenance Department with few exceptions, and this report is being divided into two major parts. The first part addresses the organization, groups, and systems that support Maintenance, and the second part addresses direct observation of the performance of maintenance activities.

3.1 The Maintenance Department is lead by the Maintenance Superintendent and is subdivided into eight groups: Preventive Maintenance; Procedures; Instrumentation and Electrical; Planning; Scheduling; Mechanical, Welding, and HVAC; Building and Grounds; and Staff Support Services. The group leaders and/or the first line supervisors for each of these groups were interviewed by the inspector and activities performed by these groups were observed with the exception of the Building and Grounds group and the Staff Support Services group. The following paragraphs (3.1.1 through 3.1.6) address these groups and how they support maintenance activities.

The licensee has made a conscious decision to delay parts of their maintenance improvement program until after the back-to-back refueling outages that are expected to span approximately six months, until the end of 1990. This appears to be appropriate considering the amount of changes that will ultimately take place and the high work load on the maintenance staff during any refueling outage.

One generic activity that was developed and implemented prior to the outage is the Common Job Order Priority System. It is not being used for outage work scheduling, but it has allowed the licensee to establish a uniform priority on all non-outage corrective maintenance, toward implementation in January, 1991. The recording of all open non-outage job orders is complete, and the licensee is working on age retirement requirements, how they will status the job orders, and monitor their performance.

3.1.1 Preventive Maintenance Group

The Preventive Maintenance (PM) Group was established to be the single point of contact for all plant PM activities. This "centralizing" all PM activities into one location is new for D. C. Cook as historically they have been very compartmentalized. PM is defined by the licensee as "Predictive, Periodic, or Planned maintenance actions taken to maintain a piece of equipment within designed operating conditions and to preclude equipment failure." The distinctions between Predictive, Periodic, and Planned maintenance as used by the licensee were reviewed and found to be consistent. Some of the methods used by the license to analyze and predict equipment performance are: vibration analysis, acoustic analysis, lube oil analysis, ferrography (the analysis of metals in oil), monitoring and trending bearing temperatures, and thermography infrared surveys.

The PM Program upgrade has continued to make progress during the outage while the licensee schedules and performs PM tasks under its existing program. The Reliability Centered Maintenance

(RCM) program which analyzes systems vertically for critical components and recommends logical PM tasks has provided some recommendations which are being used to upgrade the PM program. These include: pre-planning of tasks, spare parts analysis of the tasks, as-found condition analysis, corrective maintenance trending, and component "type" failure analysis across system boundaries.

The PM group has expanded from a supervisor and three personnel in January, 1990, to fifteen personnel in August. They currently have two engineers and three more being hired or contracted.

While the licensee has only recently tracked the ratio of preventive to corrective maintenance (CM) activities, they are currently, July, 1990, performing about 45 percent PM and 55 percent CM. The licensee's goal is to achieve 70 percent PM and 30 percent CM.

In the area of Corrective Maintenance Trends, the licensee had been using a process that was developed in 1989 for I&C items. After the Maintenance Department was reorganized in late 1989, the process was placed on hold until the PM staff and program upgrades could both perform the trends and evaluate the results. The group is now staffed and the first trend products are expected in November, 1990. They are also reviewing the old process for possible improvements.

The Maintenance Department is reassessing the Performance Indicators they currently monitor for possible improvements. Some of the items they currently monitor are: personnel errors; corrective/preventive maintenance job order ratio; problem reports, open and past due; control room open job orders; Turbine Building and Auxiliary Building leaks, job order status (where in planning or scheduling, if on hold, why, etc.); and job orders on hold for engineering support or for lack of parts.

A program for Rework Monitoring being used by the I&C group since 1989 is being expanded in scope and will be used by the rest of the Maintenance Department in January, 1991. The program required any newly received job order to be reviewed to see if it is potentially linked to any corrective or preventive job order performed in the past 30 days. If so, it is marked REWORK. The first line supervisor/crew that performed the previous job order receives the rework order to resolve the identified problem and to research whether or not the rework correlation is valid. When the job is concluded, the first line supervisor documents any conclusions and provides them to the planner and Section Supervisor for any followup actions such as training enhancements. The trending of how much rework is occurring should give the licensee data on the quality of maintenance performed and the quality of the maintenance support systems.

3.1.2 Procedures Group

During the beginning of this inspection period, the licensee was just implementing its new system to revise maintenance procedures. Since then, the software, staff, and internal process

have been established. The group has been divided into three sub-groups: one that addresses day-to-day problems that arise while a procedure is being performed; one that addresses near term commitments resulting from design changes, problem report investigations, and Technical Specifications Amendments; and one that handles the overall upgrade effort.

The increased attention the licensee has placed in following procedures has resulted in the generation of approximately 210 change sheets by the Maintenance Staff. These change sheets were initiated to correct maintenance procedures that could not be performed as written or to provide enhancements to them. This year, 89 minor revisions to maintenance procedures have been written due to near term commitments and 25 revisions or new procedures have been written.

As a result of worker feedback, the licensee is changing their internal maintenance department procedure review process to enhance the role and authority of the workers in the process. This is an improvement as interviews with maintenance staff indicated that in the past they were not kept informed as to why suggested changes to procedures were not incorporated.

3.1.3 Instrumentation and Electrical Groups

The quality team concept is being reinstated in the Maintenance Department and the I&E Group in particular. An example of one product of such a team follows: An Electrical Quality Team, which consisted of three senior electricians and two supervisors, revised the Electrical Pre-Job Brief Standard and it was put into use on August 13, 1990. The I&E Group Supervisor is monitoring the use and effectiveness of this change on a daily basis. The licensee plans a follow-up session to assess the effectiveness of the Electrical Pre-Job Brief Standard subsequent to its first month's use.

The inspector attended portions of a maintenance pre-job review training session given by a consultant to the electrical maintenance craft and supervisors. The training addressed better ways and more effective methods of coordinating and implementing work activities by performing pre-job reviews and research. The craft and supervisors participating in the training session by expressed professional opinions relative to job performance and suggested improvements. This was considered to be a good management initiative in improving the maintenance process.

In the area of Post Job Review, the licensee is trying a new approach of using a form to assist this review. This form is provided to encourage comments, to ensure that feedback is provided to the workers to obtain any comments they have, and to inform them of the resolution of the comments. The form will also provide feedback to planning and scheduling for the length of time it takes to complete a job. This appears to be a positive step toward improving the involvement of the workers in changing the process.

The majority of inspection activity for this group was in the observation of electrical maintenance activities (paragraph 3.2.1) and in the observation of the interfaces between the electrical maintenance group and the other maintenance groups.

3.1.4 Planning Group

The Planning Group is responsible for non-outage planning, outage planning, and corrective/preventive procurement. Observation of the above activities included scheduled planning meetings in preparation for the outage, weekly planning meetings during the outage, and the results of these efforts. The licensee attempted to plan and schedule all outage work prior to the outage. This was not always the case. In previous outages, the major activities were planned, but the support activities and some of the minor activities did not receive the same degree or any prior planning. During this Unit 2 outage, the licensee prepared a list of all activities that would be ongoing, it comprised 3,000 activities. This was helpful to the licensee in the planning stages. In previous outages this detailed listing was not attempted. Some of the problems observed involved the licensee not having all the necessary parts on hand to make repairs to equipment that was being inspected.

As of the end of this inspection, the emergent work scope additions accounted for 16 percent of the outage activities, and the licensee felt this was an improvement over prior outages. While this may be the case, the licensee has room for improvement.

3.1.5 Scheduling Group

Scheduling activities were observed prior to and during the outage. This area was reviewed for both their current methods and their proposed methods. The majority of scheduling activities were well controlled. Several scheduling changes by the scheduling group occurred during this outage when work on Reactor Coolant Pump seals had to be shuffled due to other work in the area surrounding the reactor coolant pumps. The rescheduling of the reactor coolant pump seal activity was not the result of a lack of parts or personnel for the job. One example of lack of coordination of activities is described in paragraph 3.2.1. and involved one group of electricians attempting to perform maintenance on a 4KV breaker that was already removed form its cubicle for maintenance by the vendor. The inspector's evaluation was that scheduling of work activities has improved from previous outages, but still has room for improvement.

The inspector also reviewed the progress the licensee is making toward an Integrated Scheduling Program. Two individuals, a Maintenance I&C Supervisor and an Operations Unit Coordinator started on this project in April, 1990. On August 8, 1990, these individuals made a presentation to the inspectors and a summary follows. This project was a joint venture between Maintenance and Operations to provide a balanced perspective and improve its credibility. Their goal is to have a site-wide work control system in place by June, 1991. They have made visits to Diablo Canyon, Salem, and Callaway to evaluate the scheduling systems used by those utilities. They also

participated with 14 other utilities in an On-line Scheduling Seminar sponsored by Arizona Public Service and are scheduled to visit South Texas at the end of August, 1990.

The mechanics of how the schedule will be created were discussed including the schedule's "units" which are Functional Equipment Groups (FEGs). These FEGs are grouping of equipment that are within the same isolation boundaries or are functionally related such that the equipment should be removed from service together. The licensee intends to use a 12 week long schedule, which is 3 iterations of the 28 day surveillance cycle. This will allow approximately 1/12 of the equipment in the plant that can be worked, while at power, to be assigned to a given week. The schedule is driven by Technical Specification requirements and the post-maintenance testing (PMT) that often follows or is part of the Surveillance Test Procedures. These activities are also segregated into train-weeks to minimize the potential for cross-train events. Several of the advantages to this scheduling scheme were discussed including: work within common isolation boundaries resulting in a minimum of down time and more efficient use of resources; RCM given the structured environment within which it should function to be successful; fixed windows of opportunity for maintenance activities in a given week with more selective planning; more productive at-power maintenance should reduce the length of refueling outages and also reduce radiation exposure. All of the above should represent improvements from past practice.

Activities that will be subject to Integrated Scheduling (IS) include: Surveillance (T.S., I.S.I., I.S.T.); Preventative Maintenance; Corrective Maintenance requiring clearances; RWPs; scaffold erection; insulation removal/reinstallation; activities requiring significant inter-departmental involvement; activities that significantly curtail access to equipment; activities that curtail services to the office buildings RPAC, Training Center, or Visitor's Center; activities requiring load curtailment; and activities effecting blowdown or make-up plant abilities. In summary, only simple troubleshooting, shop work, or emergent work will not be subject to IS. How the schedule will be implemented and the preparations for any given "target" week were also discussed and appear proper.

The scheduling of Post Maintenance Testing (PMT) has been improved through the use of a new computer network and FOXPRO software (that the licensee purchased primarily for the PM program). As a job order is received, the planner is required to assess and document the PMT required as part of the planning process. This provides a tracking system to insure that the PMT is performed even when the maintenance work and the PMT occur at different times such as during an outage. This is also an improvement over the previous system.

The licensee is progressing in the implementation of a well thought out integrated scheduling program, and these activities will be subject to future inspections.

3.1.6 Mechanical, Welding, and HVAC Group

The majority of inspection activity for this group was in the observation of mechanical maintenance (paragraph 3.2.2) and in the interfaces between groups. One violation, failure to correct deficiencies and sequencing errors in a maintenance procedure that were identified in 1988, was observed. This item was documented in Inspection Report No. 50-315/90010; 50-316/90010, but was the result of the inspector's review of the system the licensee previously used to update and modify procedures.

3.2 Observation of Maintenance

Observation of maintenance, both preventive and corrective, has been ongoing throughout the inspection period. The following paragraphs describe electrical and mechanical activities inspected.

3.2.1 Electrical Maintenance Activities

The inspectors observed ongoing electrical maintenance activities performed by the licensee and by contractors. The activities were selected from the plan of the day listings and work assignments in the electrical maintenance shop. Where possible, safety significant activities were chosen for follow up.

Maintenance activities were witnessed to determine if those activities were performed in accordance with applicable requirements and procedures. Work activities were assessed in the following areas: work control, planning and coordinating; management involvement and knowledge; quality control (QC) presence and involvement; procedure adequacy and use; personnel trained and qualified; material use and application; and post maintenance testing (PMT). The inspector concluded that the electrical maintenance activities observed were adequate and accomplished by skilled maintenance personnel and dedicated supervisors. However, the following concerns were identified:

JO B008031 - This WR required the replacement of the General Electric 125 Ampere breakers in each of the four Control Room Instrumentation Distribution (CRID) Inverters. The licensee determined during the investigation done per NRC Bulletin 88-10 that the four breakers were not traceable to qualification documents. The licensee attempted to replace the existing CRID I Inverter Output Breaker; however, a terminal block containing breaker wiring was attached (glued) to the back of the breaker. This appeared to be a unique installation; not shown on electrical wiring diagrams. The job was stopped for further review by engineering. The inspector determined that the wiring diagrams did not reflect the installed terminal block wiring. During visual inspection of CRID I cabinet the inspector noted that the Alternate Source AC input to the static breaker, mounted next to the inverter output breaker, also contained the same unique terminal block which became unglued from the back of the breaker and was hanging behind the breaker. The inspector determined that this

maintenance activity was not adequately planned and lacked engineering involvement and QC review. The licensee is reviewing this activity to resolve any discrepancies.

JO B001108 - This JO was issued requesting that ABB contractor personnel use Procedure **12 MHP SP.134 Rev. 0, to refurbish 4KV circuit breaker T21A7 (W-CCW pump). The inspector observed ABB field service personnel disassembling breaker T21A7 mechanism. The inspector noted that ABB personnel used Anderol 732 spray on some breaker components. Recommendation to use Anderol 732 spray was not found in licensee procedure **12 MHP SP.134, Rev. 0. In addition, the inspector noted that the ABB personnel had not been using the procedure provided by the licensee specifically for this activity; nor were they using the vendor instruction manual. The ABB personnel stated that the procedure provided by the licensee contained steps that could not be used to perform the activity and that at the conclusion of the work on 18 designated SR breakers the procedure would be marked up to include the correct steps as determined by ABB field personnel. At the time, four SR breaker mechanisms had been refurbished by ABB without the use of the procedure or the vendors instructions. The licensee promptly revised the procedure, removing sections that did not apply and adding Anderol 732 spray. The ABB personnel were instructed to use the procedures.

It was apparent to the inspector that the ABB personnel have not been trained in the use of procedures. Also, the licensee was not involved in this activity until prompted by the NRC.

JO B007683 - During observation of a PM performed at MCC 2-TPP-A, per Procedure 12 MHP 5021.082.017, Revision 6, the following was noted: Step 7.11 of the procedure stated, "Measure the circuit resistance of each phase from the bus bar to the load side of the breaker. Readings of less than 100 milliohms are acceptable. For reading of 100 milliohms or greater, record required information on Attachment No. 3 and notify your supervisor." During measurement of phase B of the molded case breaker in compartment 2-TPP-A-1C (used for South NESW Pump Discharge Strainer 2-OME-35S) the inspector noted the meter reading full scale of 600 milliohms. The electrician opened and closed the breaker five times which resulted in a reduced reading of approximately 50 milliohms. This activity was not denoted in the procedure and the as-found data was not documented by the craftsman for follow up and trending. Earlier in the day, another similar breaker was replaced because the reading remained at full scale even though the craftsman opened and closed the breaker a dozen times. The licensee is examining this issue.

Except for the above concern, licensee electricians appeared to be knowledgeable in the tasks performed. The job was performed by a contractor and a licensee electrician.

JO B000569 - Issued to perform PM, clean and inspect 4.16KV breaker T21A11, "Emergency Incoming Feed from Diesel Generator 2AB." When the licensee attempted to perform the PM task the inspector

accompanied the licensee to the switchgear room and noted that the breaker was not in the cubicle because it was removed earlier from the switchgear cubicle by another group (vendor) to perform another PM task. This was indicative of a lack of planning and coordination in performing electrical maintenance activities.

Another example of lack of coordination was noted when plant electricians spent half a day disconnecting the main conductors from the switchgear to the outside transformers in an attempt to hi pot the cables. The activities had to be stopped when I&M Electrical Distribution personnel grounded the bus to perform some testing on the outside transformer without informing the electrical department of this activity.

JO B000585 - The inspector observed licensee and contractor personnel performing a PM activity on 600v bus 21A breaker which was moved to the electrical maintenance shop. Personnel performing this activity appeared to be trained and knowledgeable in performing this activity. Applicable documents and appropriate tools were used, a clearance permit was obtained and the instruments used contained calibration stickers. However, sections of the procedures used were not applicable to the task performed and several needed changes were not marked up by the craft to assure that the next time the procedure is used it would be accurate.

JO B000544 - The inspector observed licensee electricians performing a PM activity on 4KV circuit breaker 2A2 (spare). Procedure **12 MHP 5021.082.001, Revision No. 7, Inspection and Repair of 4KV Circuit Breakers. The personnel appeared to be knowledgeable and trained in the use of the procedure and were following it step by step. The inspector observed that at one point in the procedure a safety note, from a previous page, was almost not performed. The procedure stated "For Safety: Prior to any disassembly or inspection of the circuit breaker, the closing springs shall be discharged and the breaker shall be open." After a check that the racking crank would not turn with the breaker closed in step 7.1.2, an electrician started to remove one of the sheet metal screws in preparation for removing the arc chute. The other electrician stopped him and suggested that they check that the closing springs were discharged first; they were not. The inspector suggested that step 7.1.3 be added to open the circuit breaker and discharge the closing springs. The licensee stated they would consider such a change. The electricians proceeded with removal of the arc chute. Upon removal and during the process of turning the arc chute upside down to do a visual inspection, a piece of arc chute plate fell out. The piece measured 1.5 x 0.375 x 0.625 inches and came from an area of the arc chute plate that was hard to view without the use of a mirror. The electricians stopped work and contacted the electrical maintenance supervisor as required by the procedure. The supervisor determined that the arc chute should be replaced. A spare arc chute was obtained from the warehouse and work continued. When the breaker was laid on its side to access the lower trip linkage, the anti-shock spring was found to be loose, one end was

completely disconnected from the breaker. The purpose of the anti-shock spring is to prevent the close latch from slipping when struck by the close latch roller, making the breaker close inadvertently.

The licensee wrote two problem reports to address first, the piece of broken arc chute (Problem Report No. 90-0406); and second, the loose anti-shock spring (Problem Report No. 90-0415). The licensee could not find a replacement anti-shock spring in their warehouse although their part system indicated they they were in stock. The inspector periodically checked to see if the spring for the spare breaker had been replaced for approximately two months before finding the work completed. The inspector reviewed problem reports to see if the loose anti-shock spring was a repeat problem and identified at least one previous occurrence, Problem Report No. 89-250, 03/01/89. The inspector will review the root cause analysis for its potential to be a generic problem during a future inspection, and this will remain an open item (315/90007-01; 316/90007-01).

Overall, the inspector could not detect measurable improvements in the maintenance process in the electrical area. Some programs appeared to be in place to improve related maintenance areas; however, it appears that results would not be seen for some time.

3.2.2 Mechanical Maintenance Observation

The inspector observed several maintenance activities associated with the Unit 2 refueling outage on August 6 - 8, 1990. The maintenance activities witnessed/reviewed were: replacement of the rotating pump assembly for the east centrifugal charging pump; disassembly and inspection of the discharge check valves associated with the EDG fuel oil transfer pumps; disassembly and inspection of the west residual heat removal suction shutoff valve; partial reassembly of the east residual heat removal suction shutoff valve; disassembly/inspection/assembly of EDG AB lube oil cooler check valve; review of completed maintenance history of the installation of EDG AB air start check valves.

The following general observations were made. The strength of the maintenance program rests in the high percentage of experienced maintenance craftsmen. Appropriate craft skills were observed in the handling of equipment, and proper cleanliness control was always exhibited. Some of the work procedures observed were cumbersome in that it was hard for the craft to follow the steps as written. However, craft personnel were making a concerted effort to follow the procedures. Housekeeping practices were good, but appeared overly aggressive in one case when the Auxiliary Building Reclamation crew took tools/parts that were left behind from a job that was not completed. Proper radiological practices were exhibited during the maintenance activities. The removal of anti-c hoods during unsuiting was a problem in that the inspector observed a few cases where

individuals flipped their anti-C hoods off rather than doing this removal in a controlled manner such that any contamination would be directed into an appropriate container. Proper tagouts were established and implemented for all the work reviewed.

3.2.2.1 Charging Pump - A periodic pump cladding inspection was scheduled for this refuel outage. A work request was initiated to disassemble the pump, inspect the cladding and reassemble the pump. Prior to entering the outage three additional corrective maintenance activities were added to the cladding inspection work order so they could all be performed during the same time frame. These were to repair a tubing leak on the pump's cooler and to repair/replace the inboard and outboard mechanical seals that had been leaking. During the reassembly of the pump, a mechanical seal was not installed properly causing the seal to seize on the pump shaft. In this case, it appeared a more detailed installation procedure for the alignment of the keyway on the seal with the key on the shaft could have prevented the misalignment that subsequently caused the seal to bind or seize on the pump shaft. The seal had to be ground free of the shaft and this activity caused damage to the shaft. After review, management decided to replace the rotating assembly which included the shaft. The inspector's review of this event determined that this was not a frequent occurrence and may have occurred only once before.

Very little documentation of the seal installation problem was present in the work order package during the inspector's original review on the day after the problem occurred. By the end of the inspection a post-work evaluation sheet had been written and maintenance management considered a human performance evaluation system (HPES) type review appropriate.

During the removal of the damaged shaft proper procedure adherence was noted with two work stoppages to revise the maintenance procedure. A vendor representative was present in preparation of the new rotating assembly and the interface with the representative was appropriate.

3.2.2.2 Limitorque Valves 2-IMO 310 & 320 - The valve actuators were being periodically torn down and inspected. The first valve Actuation, 320, had a part of the manual handwheel mechanism bent, apparently due to excessive force being applied to the handwheel. The inspector determined from discussion with the craft that other manual handwheel mechanisms exhibited damage also. Generally, the root cause of such damage is the lack of appreciation of operating authority personnel in how to use the manual handwheel attachment. Discussion with the licensee indicated that formal valve actuator training was instituted for the non-licensed operators in 1988. Given that it had been approximately 10 years since last actuator disassembly on this valve, it is possible that damage occurred prior to the training. The appropriate grease and oil were being used on the actuator assemblies. Personnel exhibited an appropriate level of expertise in handling the actuator components. The same level of expertise was

apparent in the installation of the Actuator valve 310. It did appear that the job order/procedures were being used more as a reference in performing the maintenance activities than as a step-by-step process.

3.2.2.3 EDG Transfer Pump Check Valves 2 -DF-108A & 109A - The valves had been disassembled under routine inspection. One valve, 2-DF-108A, exhibited excessive slop between the disk and retaining nut due to the wearing down of the back of the disk. The condition was properly noted and a replacement valve acquired. In looking at both the old and new check valve the inspector noted that the anti-rotation lugs had been ground down. The vender manuals referenced with the work order were checked and found not to be applicable for this type of check valve. Corporate engineering was contacted and two days later information was received from Velan, the valve manufacturer, that this was done at the factory and had no impact on check valve operation. The licensee determined that this condition was acceptable.

3.2.2.4 Lube Oil Cooler Check Valve 2-DL-158A - The valve was properly disassembled and inspected. However, the licensee identified that restoration of the valve could could not be completed until torque values were received from engineers for the retaining block and the flange cover. Work was properly stopped until the values were received a day later. Restoration was proper with use of calibrated tools.

3.2.2.5 EDG AB Air Start Check Valves - These valves were inspected during the 18 month EDG inspection. In one of the valves it was observed that two copper seats were present instead of one. This information was annotated in the procedure but not brought to the supervisor's attention until noted in a documentation review by the inspector. Subsequently, a condition report was initiated on the matter.

4. Plant Housekeeping

The inspectors performed general plant walkdowns to assess housekeeping and material condition of the plant. On August 7, 1990, an additional walkdown was performed; Unit 1 was operating at the time and Unit 2 was in an outage. The housekeeping and material condition of the plant, particularly in the auxiliary building, have undergone major improvements since December 1989 as evidenced by the absence of steam or liquid leaks and the reduced number of funnels noted in the auxiliary building to contain and direct leaks. Areas were painted, lighting has improved in certain locations and scaffolding and other temporary installations were secured and anchored to the floor. The contaminated square feet in the Auxiliary Building was reduced from approximately 33,000 in the beginning of January, 1990, to below 20,000 in April. It is expected that this number will increase during the two refueling outages. Their next milestone is to be below 10,000 (5,000 square feet per unit) by June, 1991.

Management command and control in this area have greatly improved D. C. Cook's housekeeping an material condition during this inspection period.

5. Management Involvement

Through attendance at various licensee planning and corrective action meetings, observation of work activities, and interviewing maintenance staff from workers through the plant manager, the inspector observed a very positive and dedicated attitude as well as financial support toward maintenance and improvements to the system.

Senior licensee management have been observed to be actively involved in site activities including monitoring of the material condition improvements through weekly visits by the VP Nuclear, monthly visits by the Sr. Executive VP, and bimonthly visits by AEP Section Heads.

6. Exit Meeting (30703)

The inspectors met with the licensee representatives denoted in paragraph 1 at the conclusion of the report period on August 22, 1990. The inspectors discussed the purpose and scope of the inspection and the findings. The inspectors also discussed the likely information content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. The licensee did not identify any documents or processes as proprietary.