U. S. NUCLEAR REGULATORY COMMISSION
REGION III

Report No. 50-263/91002(DRS)

Docket No. 50-263 License No. DPR-22

Licensee: Northern States Power Company
414 Nicollet Mall
Minneapolis, MN 55401

Facility Name: Monticello Nuclear Power Plant

Inspection At: Monticello Nuclear Power Plant, Monticello, MN

Inspection Conducted: February 25 - 28, March 1, and March 11 - 15, 1991.

Inspectors:
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Inspection Summary

Inspection on February 25 - 28, March 1, and March 11 - 15, 1991. (Report No. 50-263/91002(DRS)).

Areas Inspected: Special announced team inspection of maintenance, engineering support of maintenance, and related management activities. The inspection was conducted utilizing Temporary Instruction 2515/97, the attached Maintenance Inspection Tree, and selected portions of Inspection Modules

62700, 62702, 62704, 62705, and 73755 to ascertain whether maintenance was effectively accomplished and assessed by the licensee.

Results: Based on the items inspected, overall performance in maintenance was considered satisfactory. The most significant strengths were: (1) experienced and well trained maintenance personnel, (2) good plant materiel condition, (3) a system that allowed personnel to view plant areas by picture rather than going to actual plant areas, and (4) good communications between maintenance personnel and the systems engineers. The most significant weaknesses noted were: (1) lack of or inadequate procedures or work instructions; (2) inadequate planning of maintenance work, (3) failure to follow procedures in performing maintenance or related work, (4) failure to define and develop a program for component and equipment trending, (5) limited scope of the preventive maintenance program, and (6) weak control of calibrated equipment. Three minor violations were identified: four examples of inadequate procedures or failure to follow procedures (Paragraphs 2.3.2.1, 2.3.2.2, and 2.4.2.3), inadequate calibration control (Paragraph 2.3.4.3) and the failure to perform an adequate 10 CFR 50.59 safety evaluation (Paragraph 2.7.2).

DETAILS

1.0 Principal Persons Contacted

Northern States Power Company

* L. Waldinger, Acting Vice President Nuclear Generation
* K. Albrecht, Director of Power Supply QA
* D. Antony, General Manager Monticello Site
* B. Day, General Superintendent of Engineering
* M. Hammer, General Superintendent of Maintenance
* W. Hill, Plant Manager
* D. Nevinski, General Superintendent of Operations
* L. Noland, General Superintendent Training
* A. Ward, Superintendent Reactor Systems Engineering
* J. Windschill, Superintendent of Radiation Protection

U. S. Nuclear Regulatory Commission (NRC)

* R. DeFayette, Section Chief - Project Section 2B
* P. Hartmann, Senior Resident Inspector - Prairie Island
* W. Long, Nuclear Reactor Regulation Project Manager
* P. Moore, Resident Inspector
* S. Ray, Senior Resident Inspector
* M. Ring, Chief, Engineering Branch

* Denotes those present at the exit meeting on March 22, 1991.

Other persons were contacted as a matter of course during the inspection.

2.0 Introduction to the Evaluation and Assessment of Maintenance

An announced NRC team inspection of maintenance and supporting activities was conducted at the Monticello Nuclear Power Plant during the period of February 25 - 28, March 1, and March 11 - 15, 1991. The inspection was conducted during plant operations to assess maintenance activities including engineering and technical support. The team goal was to determine if maintenance had been effectively implemented to assure the safe operation and reliability of plant structures, systems, and components to operate on demand. This inspection was based on the guidance provided in NRC Temporary Instruction 2515/97, "Maintenance Inspection," and Drawing 425767-C, "Maintenance Inspection Tree." The drawing, which is attached to this report, was used as a visual aid during the exit meeting to depict the results of the inspection. Acronyms used in this report are defined in Appendix A.

Results of this inspection were derived from data obtained by observation of current plant conditions and work in progress, by review of completed work, and by evaluation of the licensee's self assessment of maintenance and correction of weaknesses. Major areas of interest included electrical, mechanical, instrument and control (I&C) and the support areas of radiological control, engineering, quality control (QC), training, procurement, and operations. Problems identified by the inspectors were evaluated for effect on technical specification requirements, plant and systems operability and technical or managerial weaknesses.

2.1 Performance Data and System Selection

2.1.1 Historic Data

The inspectors considered the latest Systematic Assessment of Licensee Performance (SALP) report and completed NRC inspection reports. Primarily, the inspectors were sensitive to technical and managerial problems that appeared to be maintenance related. The inspectors also reviewed plant operations data since January 1989, including events reportable to the NRC. Of 40 Licensee Event Reports (LERs) issued in 1989, 5 were maintenance related; of 19 LERs issued in 1990, 1 was maintenance related, with the goal being less than 14 for both years. The industry average for Boiling Water Reactors in 1989 was 33. Results of this review were used in the selection of the systems for emphasis as noted in Section 2.1.2 of this report.

The average plant availability for 1989 was 75.2%, which was slightly better than the goal of greater than 75%. The average plant availability for 1990 was 96.1%, which was better than the goal of greater than 95% established for 1990. There were two reactor trips in 1989, which exceeded the established goal of less than two trips per year. One trip appeared to be attributed to a lack of maintenance that was caused by inadequate acceptance criteria for a valve inspection. The goal was met in 1990 with one reactor trip, which was not attributed to maintenance. Radiation exposure for 1989 was 506 rem, which exceeded the established goal of less than 460 rem; personnel radiation exposure for 1990 was 94 rem, which was better than the established goal of less than 100 rem. Although some of the performance measurement goals were not met, the plant appeared to perform well with long runs in both 1989 and 1990. Overall the measurements appeared to indicate good performance.

2.1.2 System Selection

The systems were selected based on the review stated in 2.1.1, the Probabilistic Risk Assessment (PRA) study furnished to the team by the Reliability Applications Section of the Office of Nuclear Reactor Regulation, and discussions with cognizant personnel. The systems included specific electrical, mechanical, and instrumentation components of the control room emergency filtration train (EFT), emergency ac power system including the emergency diesel generators (EDG), reactor core isolation cooling (RCIC) system and the containment isolation valves. In addition, activities and documentation involving other systems and components were reviewed during the inspection, with consideration given to the systems most important to reactor safety.

2.2 Description of Maintenance Philosophy

The inspectors reviewed site policy statements, administrative procedures, organization charts, established goals, and documents that described improvement programs for the maintenance process. The licensee had a documented maintenance plan that included milestones and completion dates for improvement programs and goals. Discussions with selected managers indicated that personnel were knowledgeable and aware of established performance goals and that the goals, in most cases, were being met.

Plans had been developed for incorporating reliability centered maintenance (RCM) into the maintenance program: however, details of the RCM methods and criteria were not described in procedures or other documents. A PRA group had been established and preliminary plant PRA information had been developed for use in the RCM program. The RCM program had not been completed for any plant systems at the time of the inspection.

2.3 Observations of Current Plant Conditions & Ongoing Work

2.3.1 Current Material Condition

The inspectors performed general plant as well as selected system and component walkdowns to assess housekeeping, the general and specific material condition of the plant, and to verify that work request authorizations (WRA) had been initiated for identified equipment problems.

Walkdowns also included an assessment of the buildings, components, and systems for proper identification and tagging, accessibility, fire and security door integrity, scaffolding, radiological controls, and any unusual conditions. Unusual conditions included but were not limited to: water, oil or other liquids on the floor or equipment; indications of leakage through ceiling, walls or floors; loose insulation; corrosion; excessive noise; unusual temperatures; and abnormal ventilation and lighting. Since the plant was operating at the time of the inspection, the inspectors assessed the material operating condition and non-outage condition of systems and components. The inspection results were as follows:

- The plant was well maintained and neat. The licensee had implemented an on-going program to paint facility areas that improved the appearance of the plant. No significant liquid or steam leaks were noted.

- The inspectors observed a small number of minor defective plant equipment problems that had not been previously identified and tagged including deteriorated insulation in the EFT system and a flickering power light on a fire detection alarm panel.

- A few instances of poor housekeeping were noted including small amounts of combustible waste and debris, several spray cans in the traveling screens area and excessive grease in the EFT blower motor bearing areas of both filter trains.

- Poor equipment identification was noted in some areas. Examples were:

  Breaker 52-108 was labeled as "spare" yet was closed. The breaker was later identified as the supply breaker for the fabrication shop in the north east corner of the turbine building.

Several manual dampers on the EFT system had component identification and position indication written in black magic marker on paper, which was not mounted to the damper. The ventilation manual shutoff damper (VDMS-9242) had arrows pointing in both directions to indicate the open direction.

There were no identification tags on valves downstream of service water (SW) valve 148-1 including a valve identical to SW valve 148-1 and a sample valve. In a subsequent review the licensee determined the valves were not shown on the SW Piping and Instrumentation Diagram (P&ID). The valves were in the reactor building closed cooling water heat exchanger vent line and the deficiency had no safety significance. A drawing change was submitted and the valves were tagged.

A number of valve labels were noted that only contained the component number and did not have name descriptions. Examples of these tags were SV-4110 and SV-4017B.

The EDG fuel oil day tank level indicators had labels indicating the overflow levels for fuel oil day tanks #11 and #12 were 1400 and 1410 gallons, respectively, yet the licensee performed calculations that showed the tanks will hold greater than 1500 gallons. The level instruments were indicating 1580 gallons in the tank.

- Several control room instruments had incomplete "WRA Issued" stickers on them. Although WRAs had been initiated there was no method for identifying the associated WRA number nor the quantity of affected instruments covered by the WRA. Collectively, this represented poor traceability of equipment problems. Licensee personnel stated that both the "WRA Issued" identification mechanism and the procedure for completing these stickers would be revised.

Overall plant housekeeping and material condition were considered good. The material condition appeared to maintain operability of components at a level commensurate with the components' function and few components were noted to be in need of repair. Housekeeping was very good in most areas with an occasional exception. Many areas appeared to have been recently painted.

2.3.2 Ongoing Work

The inspectors observed activities to determine if maintenance was adequately performed and in accordance with required administrative and technical requirements. Work activities were assessed in the following areas: work control and planning; management presence, involvement, and knowledge; QC presence and involvement; health physics support and hazards; procedure availability, adequacy, use and general conformance to NUREG/CR-1369; personnel training and qualification; material availability, adequacy, and use; measuring & test equipment (M&TE) application and calibration; post maintenance testing adequacy including proper acceptance criteria. The inspectors observed ongoing work in electrical, mechanical, and I&C maintenance areas. The inspectors selected maintenance activities from the plan of the day listings, work assignments in individual maintenance shops and through discussions with individual foreman. Where possible, safety significant activities were chosen for direct observation.

2.3.2.1 Ongoing Electrical Maintenance

The inspectors observed portions of eight electrical maintenance activities as discussed below:

PM 4118	Perform main generator electrical checks.
PM 4561-1	Perform preventive maintenance (PM) of invertor Y71.
WRA 91-00366	Perform PM on motor operator for valve MO 4043A.
WRA 91-00367	Perform PM on motor operator for valve MO 4044A.
WRA 91-00368	Perform PM on motor operator for valve MO 4047A.
WRA 91-00971	Troubleshoot #11 standby diesel generator controls.
WRA 91-00999	Replace time delay relay in #11 standby diesel generator control circuit.
WRA 91-01031	Disassemble and inspect governor motor of #11 standby diesel generator.

During the review of electrical work activities, the following concerns were noted with working without procedures or instructions, inadequate procedures, and failure to follow procedures.

- The inspectors observed electrical work being performed on plant security equipment for which the electricians did not have a WRA, procedure, or any other written instructions or authorization. The workers stated that the work was very simple and was normally performed, when requested by security, without written authorization or instructions. The inspectors observed that the workers coordinated the work with several security officers involved with the work. Post maintenance testing appeared to be adequate. Security personnel told the inspector that there were no written inspections for the work although procedures were being written for maintenance of security equipment. The inspectors discussed this weakness with a Region III security inspector. The regional security inspector was aware of this practice and had monitored some of the licensee's activities in this area.

- WRA 91-00366 and WRA 91-00367 - PM task 4926PM was being performed on MOVs, MO 4043A and MO 4044A, utilizing procedure 4926PM, "Signature Tested Limitorque Motor Operated Valves," Revision 5, dated March 8, 1991. The craftsmen had to overcome procedural inadequacies by "working around" the procedure weaknesses. Step 31 of the procedure required the workers to check and adjust the limit switch contact tension for each motor operator using Figure 1 of the procedure. Figure 1 included a drawing and two steps, step 1 for contacts that were made (closed) and step 2 for contacts that were not made (open). The procedure did not indicate that each contact needed to be checked only in the "as-found" position. The workers stopped work and verified that the valves did not have to be cycled to check all contacts in both open and closed positions.

Many of the limit switch contacts were not used and had no wires connected to the contacts. The procedure did not address action to be taken for unwired contacts. The workers (with the concurrence of the QC inspector) decided not to check and adjust the unwired contacts; this was noted in the comments section of the procedure. There was no discussion as to whether contact adjustment would be required if the spare contacts were used.

In addition, the procedure contained no directions or instructions to adjust contacts not made that were found unacceptable. The workers did not notice this omission and adjusted contacts that were not made even though no gap setting, tolerances or acceptance criteria were specified.

These items did not appear to be individually safety significant. However, inadequate procedures that force individuals to address procedure deficiencies or work around requirements does have significance. The failure to provide adequate written instructions for performing safety related work is considered to be an example of a violation of Criterion V of 10 CFR 50, Appendix B (263/91002-01A(DRS)).

o WRA 91-0097I - While reviewing work on the #11 standby diesel generator, the inspectors noted that procedure 4 AWI-15.02.02, "Temporary Change Process," Revision 0, was not being followed in making temporary changes. Step 4.2.1 required that, when making temporary changes to procedures, the reasons for the changes shall be entered in the comments section of the procedure. Test Procedure 0187-1, "#11 Standby Diesel Generator/EDG Emergency Service Water Monthly Tests," Revision 11, dated October 21, 1990, had temporary changes on pages 10, 16, and 17 with no reasons for the changes entered in the comment section. The inspectors looked at other procedures and found many with temporary changes and no reasons entered in the comment section. Two other examples with no reasons entered in the comment section were Test Procedures 0187-2, "#12 Standby Diesel Generator/EDG Emergency Service Water Monthly Tests," Revision 9, and PM Procedure 4100-1PM, "Air Starting System #1 - Diesel Generator #11, "Revision 1. This failure to follow procedure 4 AWI-15.02.02 in controlling temporary changes is a violation of Criterion V of 10 CFR Part 50, Appendix B (263/91002-01B(DRS)).

o The inspector reviewed control of lifted leads, jumpers, mechanical bypasses and key lock electrical bypasses and identified a problem with an undocumented bypass authorization. Procedure 4 AWI-04.05.03, "Bypass Control," Revision 1 was used for this control. The overall control appeared to be good, with 27 bypasses in effect. On March 14, 1991, the inspector observed two jumper bypass forms in the active section of the bypass control form book for bypasses that had been cleared on March 11, 1991. Jumper bypass form 91-130 had been prepared March 11, 1991, for permanent key controlled manual/automatic switches used to perform Test 0253, "Standby Gas Treatment System Operability Test." The inspector verified that the test, completed March 11, 1991, had independent verification steps initialed for clearing the bypasses. The licensee documents bypass authorization by completing step 4.6.1.4 of the bypass control procedure. This step required a shift supervisor (SS) to initial, date and record the time of authorization in the "INSTAL AUTH (SS)" block of the jumper bypass form. On March 14, 1991, the inspector observed that the "INSTAL AUTH (SS)" block on jumper bypass form 91-130 was blank. This failure to follow the bypass procedure is a violation of Criterion V of 10 CFR Part 50, Appendix B (263/91002-01C(DRS)).

The inspectors concluded that except as noted above electrical maintenance activities were adequate. The electrical maintenance supervisor and other electrical maintenance personnel appeared to be knowledgeable, well trained and had extensive experience. In most cases, work was completed per procedural requirements and QC coverage was generally good. Test equipment used was within current calibration periods.

2.3.2.2 Ongoing Mechanical Maintenance

The inspectors observed portions of 11 mechanical maintenance activities listed below:

WRA 91-00002	Rebuild discharge canal sample pump P-112A.
WRA 91-00135	Replace fitting in SW line between valves SW214-2 and SW213-2.
WRA 91-00438	Machine a stem for valve RHR-9.
WRA 91-00704	Repair/Replace 12 service water pump seal regulators.
WRA 91-00712	Investigate and repair noisy battery room exhaust fan.
WRA 91-00973	Align body feed pump for the condensate demineralizer.
WRA 91-0098I	Install a new governor top on #11 EDG.
WRA 91-00985	Install a new motor for the governor on #11 EDG.
WRA 91-50010	Torque friction clutch on #11 EDG.
4200-1PM	Perform PM on #11 control rod drive (CRD) pump.
4580-PM	Rebuild snubbers.

Concerns with inadequate work instructions and failure to follow procedures were identified during the review of mechanical maintenance activities as follows:

- WRA 91-00002 - The inspector was concerned that the technical manual included a diagram of the pump but there were no written instructions. The craftsman assembling the pump was very knowledgeable and appeared to perform the necessary steps required for proper pump assembly including non-routine steps such as cleaning surfaces, gluing gaskets and diffuser pieces. The inspectors discussed with maintenance supervisors the lack of instructions to assemble the pump by less experienced personnel. The supervisors stated that they had previously identified that pump rebuild procedures should be prepared.

- WRA 91-00712 - The inspector was concerned by the apparent lack of procedures and failure to follow a procedure. The inspector observed that fan parts removed for maintenance were scattered on the floor near the fan and no one was working in the area. Licensee personnel stated that there were no procedures that required parts to be placed in containers or in an orderly fashion and since the work area was not in a high traffic area the practice was considered acceptable as long as the condition did not remain unattended overnight or longer. Several days later the inspector noted that the fan had been reassembled and was operating, and the job site was clean. However, the WRA sticker was still attached to the fan shaft personnel guard. Section 4.1.3 E. of procedure 4 AWI-05.02.04, "WRA Closeout and Disposition," Revision 2, requires that the WRA sticker be removed after equipment is returned to normal. Although this was an isolated incident and minor, it is another example of the failure to follow procedures.

- 4200-1PM - The inspector was concerned that work instructions were inadequate. PM procedure, 4200-1PM, "11 CRD Pump," Revision 3, was being used to verify the alignment of the No. 11 CRD pump. Step 2.b of the procedure required that a section of the technical manual be used for the alignment verification. Instead, craft personnel had an unapproved copy of hand-written instructions. After questioning by the inspector, craft personnel reviewed the technical manual and stated that the manual did not contain the proper instructions. Following additional discussions with licensee personnel and review of the procedure steps, the inspectors agreed that the procedure did not contain appropriate acceptance criteria since the referenced vendor manual did not consider the thermal growth of the CRD pump flexible couplings. Subsequently, the licensee confirmed that the handwritten information was the correct acceptance criteria and made a temporary change to the procedure to incorporate this data. The failure to have appropriate instructions for performing safety related activities is considered a violation of Criterion V of 10 CFR 50, Appendix B (263/91002-01D(DRS)).

  Additionally, licensee personnel identified that the PM procedure required an oil filter on the speed increaser be changed; however, there was no oil filter on the speed changer. The inspectors also identified that one of the technical manual identification numbers was incorrect for one of the referenced technical manuals. The crafts and supervision, in coordination with the system engineer, also initiated temporary procedure changes to correct these mistakes. Based on the noted procedural deficiencies, it appeared that the procedure preparation and verification, prior to issue of the procedure, was inadequate.

The inspectors concluded that mechanical maintenance activities in the pertinent areas described in 2.3.2 were adequate and accomplished by skilled maintenance personnel. Maintenance personnel appeared to be very knowledgeable and well trained in the work performed and there was QC involvement in most of the work. Maintenance supervisors were in constant touch with the technicians and aware of the progress of each maintenance job.

2.3.2.3 Ongoing Instrument and Control Maintenance

The inspectors observed portions of 10 I&C maintenance activities as discussed below. Revision numbers are followed by temporary change notices in parenthesis when applicable.

ICI-A2-19, Rev. 0	Calibrate Fluke 8810 digital multimeter.
ICI-A8-1, Rev. 3(5)	Calibrate Model 1040 digital calibrator.
ICI-A25-7, Rev. 1(1)	Calibrate dial calipers.
ICI-C-R43-3, Rev. 0	Perform functional check of DG pneumatic logic board.
Procedure 0058	Calibrate and test the HPCl steam line high area temperature.
Procedure 7300	Perform PM on the EFT chlorine monitor.
SVI-C71-T0256, Rev. 0(8)	Check and adjust the turbine control valve fast closure response time.
WRA 91-00318	Perform resistance checks on Barton differential pressure unit (DPU) combustible gas control system (CGCS).
WRA 91-00943	Perform PM on the circulating water system instruments.
WRA 91-00987	Repair the circulating water screen wash proportional controller (PC-1971).

During the review of I&C maintenance activities concerns were identified with not having WRA reference documents at the work location as follows:

- WRA 91-00318 - A wiring diagram for the junction box, where leads would actually be lifted, was not available during the lifting of the leads. The WRA specified that a referenced technical manual wiring diagram be used in determining leads to be lifted for the resistance checks, but this wiring diagram was for the actual DPU, not the junction box. The

I&C technicians and QC inspector present felt that a wiring diagram for this evolution was not necessary because "they had done it before." Lifting of leads without specific instructions or a wiring diagram is not commensurate with sound maintenance practice.

- WRAs 91-00943/91-00987 - During the conduct of both activities, the inspector observed technicians calibrating instruments without the governing WRA at the work location. In the case of WRA 91-00987, the technician had only the calibration page of the instrument technical manual at the work location. As adjustments were made to the instruments, documentation of calibration steps, repairs or adjustments was not done. Throughout these activities, it was not apparent that the technicians had reviewed the WRA for any relevant guidance. Although the instruments affected by these WRAs appeared to have little safety significance, the inspectors concluded that conducting PM and/or repairs to instruments without documenting steps taken or having appropriate instructions and documentation at the work location was an example of poor maintenance practice.

- Section 4.6.1 of procedure 4 AWI-05.02.01, "Requesting Work and WRA Preparation," Revision 3, states, in part, "the WRA preparer SHALL provide maintenance instructions in the form of written procedures, documented instructions, or drawings." As described above WRAs were not present when the maintenance tasks were being performed or all documentation required was not present. Although no errors occurred, this is considered a weakness since industry experience has shown that errors can and do occur when procedures are not used.

Based on review of I&C maintenance in progress, the inspectors concluded that, except as noted above, the activities were adequate, and the I&C staff was knowledgeable, well trained, and skilled in the work performed. Most of the concerns were maintenance program and procedure related. Such as, the lack of a program for issuance of portable M&TE. The program shortcomings were substantially reduced by conscientious, experienced and well trained technicians. No problems were identified with the performance of the work. The inspectors determined that the above instances of working without appropriate reference documents were the result of a management philosophy regarding maintenance practices, which placed extraordinary confidence in "skill of craft" capabilities.

2.3.3 Radiological Controls

The inspectors reviewed the support provided to maintenance for radiation protection (RP). This support included radiation work permit (RWP) preparation, as low as reasonably achievable (ALARA) reviews and maintenance job planning, and training. The inspectors also reviewed records related to these and other support activities, made independent dose rate measurements, and discussed radiological controls with plant personnel. The results of this review are discussed below. The inspectors also reviewed the support provided by I&C maintenance for the repair of portable RP equipment. The support was adequate with a recent trend toward more timely repair of the equipment and more detailed descriptions of the repairs in the equipment history files.

The support provided to maintenance in radiological controls was good. Health physics technicians were available near the maintenance jobs in radiologically controlled areas and a high level of cooperation was evident between maintenance and health physics personnel. The RP group, included a cadre of individuals with many years of experience at Monticello. The group prepared the RWPs and ALARA reviews, cleaned contaminated areas, and participated in maintenance planning. The knowledge and experience of these individuals was augmented with some state-of-the-art equipment. A plant tour video disc system (see view), which included several thousand digitized photographs of plant areas and components, was used by the RP, engineering, and maintenance groups for job planning. Plant areas can be viewed on a video monitor and copies of the photographs can be made if needed. Alpha numeric information, such as equipment identification numbers and dose rate information, can be added to the photographs. The licensee recently purchased a camera that will allow the addition of job-specific maintenance and surveillance activities. Other equipment used to support maintenance included electronic dosimeters that were used in place of self-reading dosimeters and dose cards, and a computer-aided design system that was used to generate survey maps used in the RWPs and plant layout maps posted throughout the controlled area.

The inspectors also noted several other practices/initiatives that indicated the licensee's commitment to minimize the radiological impact on maintenance. These included: the use of a zinc oxide injection was used to reduce Cobalt-60 plateout; accelerated replacement of high-cobalt control blades; a program where contamination surveys of "problem" valves are done quarterly to detect and initiate repair of leaky valves before the leaks become radiologically significant or the operability of the valves is jeopardized; a chemical decontamination during the upcoming outage of the recirculation, reactor water cleanup, and residual heat removal (train "A") systems; and participation of the maintenance supervisors and workers in a three-day advanced radiation worker training course. In addition, training was provided to maintenance workers on mockups of a recirculation pump seal, a Target Rock safety relief valve (SRV), a main steam isolation valve seat, a hydraulic control unit, snubbers, a control rod drive, and several valves for Motor Operated Valve Analysis and Test System (MOVATS) testing.

The overall contamination control program was generally good. The amount of the controlled area that was contaminated was low. Most of the torus room and corner rooms were not contaminated. The lower limit for posting an area as a contamination area was half the industry standard. The licensee has implemented the "ALNOR" automatic radiation exposure recording system that provided for faster and more accurate reading of personnel radiation exposure.

In contrast to these positive findings, the inspectors noted several examples where licensee performance could have been better or needed improvement.

- In the planning for repair work on the top work of the "D" SRV, during a maintenance outage in October 1990, maintenance personnel indicated that lock washers, which in previous outages hampered bolt removal, were no longer installed on the SRV. However, when the job began, lock washers were found on 6 of 12 bolts and additional exposure was accrued removing the bolts.

- Dose rates during the repair job mentioned above were higher than indicated on the pre-job survey and the initial exposure estimate for the job did not include RP, QA, and operations personnel who worked on the job. Because of these problems, the person-rem accumulated on the job was approximately 4 person-rem, compared to an initial estimate of 1.6 person-rem.

- Records of ALARA reviews conducted during the 1989 refueling outage were not available, at the time of the inspection, for use in planning similar jobs for the upcoming refuel outage scheduled to begin in April 1991.

Overall, RP support of maintenance was good, with strong upper management support and an experienced, aggressive RP group.

2.3.4 Maintenance Facilities, Material Control, and Control of Tools and Measuring Equipment

2.3.4.1 Maintenance Facilities

The mechanical crafts had a workshop located in a separate building near the administrative building where the offices for the maintenance supervisors were located. The shop contained a machine shop, a welding area, a training room and other mechanical work areas. The licensee had several types of mockup and other equipment for training mechanical maintenance personnel located in the workshop. The workshop appeared to provide adequate space for mechanical crafts. A hot machine shop for use by mechanical, electrical and I&C personnel was located in the turbine building. A snubber rebuild area was located on the fourth floor of reactor building. A training facility was located about a mile from the plant. The facility contained a classroom for maintenance training and included mockups and actual equipment used for training.

The electrical shop was located in the basement of the administration building. The workshop area included the supervisor's office. The allotted space appeared to be adequate and the shop area appeared to be adequately equipped; ample work stations were provided and adequate tools and test equipment appeared to be available.

The I&C maintenance workshop was located in the administration building near the control room and appeared to be adequate for the ten specialists and one supervisor who comprised the I&C organization. The supervisor's office was located in the workshop area. Most portable M&TE was located within the workshop and was available for use as needed. M&TE was maintained under the I&C M&TE program as discussed in section 2.3.4.3 of this report.

2.3.4.2 Material Control

The inspectors reviewed the methods used by maintenance and support organizations to control replacement parts and materials. This review included replacement parts and materials used during observed maintenance activities as well as a review of the parts storage methods and areas. In addition, the inspectors made observations in the warehouse and material storage areas.

The licensee had four warehouse buildings located onsite, three of which were located outside of the protected area. The fourth building, which contained commonly used items and materials, was located inside the protected area. Access to each warehouse was limited to authorized personnel.

Parts and materials were stored in a neat and orderly manner and the buildings were clean. Safety related and non-safety related materials in each warehouse building were stored in the areas; however, each item was required to be individually labeled to include the appropriate safety classification. Compressed gas cylinders were stored in a separate fenced area unchained or chained only around the cylinder heads. Licensee personnel took immediate action to properly secure the cylinders. All chemicals were received and reviewed by the plant chemist for proper labeling of possible hazardous properties.

Limited life materials were stored throughout the warehouses with appropriate identification and expiration dates identified. No limited life material was observed that had exceeded the specified expiration dates.

Welding rods that required environmental controls were maintained within a segregated oven.

The number of maintenance work items on hold for parts was within an acceptable range. Control of replacement parts and material appeared to be good. The inspectors selected additional replacement parts, which were properly labeled.

Parts inventory and location were computerized. Although stocked parts could be automatically reordered, a manual reordering check was used to ensure that the need for an item's reordering quantity was still necessary.

2.3.4.3 Control and Calibration of Measuring and Test Equipment

The inspectors conducted an inventory of the I&C equipment; none was missing. The M&TE reviewed was within current calibration intervals, and defective or "calibration due" equipment was segregated and tagged to prevent inadvertent use. A monthly schedule was generated to assign one technician the responsibility for equipment due for calibration that particular month. Technicians were trained in the use of shop primary standards to calibrate M&TE. The inspectors reviewed calibration records for selected M&TE and found no discrepancies. Calibration records appeared to be in order and the calibration standards were traceable to national standards.

- The inspectors reviewed the control and use of M&TE. There was no documented program for control of portable M&TE, which was stored on open shelving in the I&C maintenance shop. There was no M&TE check-out mechanism or use log in place and all I&C M&TE was "self-service." Therefore, traceability of equipment affected by M&TE found out of calibration, defective, or missing could only be traced by a manual search of thousands of calibration records, completed surveillance data, or completed work documents (WRAs).

- The inspectors reviewed a sample of installed process instrument calibration records to determine if the instruments were being calibrated in accordance with the I&C PM plan. Two flow indicators (FI-9080 and FI-9082) for the EFT system did not have calibration records, and were inadvertently omitted from the instrument calibration system and the master instrument index. These flow indicators were used for the surveillance tests of the control room EFT system (Test 0464), and were used to verify operation of the normal control room ventilation system. Failure to assure that measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods is a violation of Criterion XII of 10 CFR 50, Appendix B (263/91002-02(DRS)).

2.4 Review and Evaluation of Maintenance Accomplished

2.4.1 Backlog Assessment and Evaluation

The inspectors reviewed the amount of work accomplished compared to the amount of work scheduled. Emphasis was placed on work that could affect the operability of safety-related equipment or equipment important to safety, which included some balance of plant (BOP) components. Maintenance WRA backlogs were evaluated for cause and impact on safety.

Both the corrective maintenance (CM) and PM backlogs were reviewed. In reviewing a listing of PM items, the inspector noted a number of items that appeared to be CM work. The inspectors were told that the acronym PM, actually meant planned maintenance rather than preventive maintenance; however, the computer actually printed "preventive maintenance" for PM rather than "planned maintenance". Because of this problem, it was difficult to separate PM from CM items.

Maintenance management tracked several categories of CM and PM backlogs. This information provided management with indicators of performance in maintenance and allowed management to maintain oversight of backlogs and to detect trends in backlog levels. Overall, both CM and PM backlogs appeared to be well controlled and were well within the capabilities of the maintenance staff.

2.4.1.1 Corrective Maintenance Backlog

In evaluating the CM backlog, emphasis was placed on non-outage related work. The total backlog of non-outage CM WRAs at the end of February, 1991, was 211. The backlog had increased from 144 in February of 1990; however, none of the items appeared to affect the safe operation of the plant or have an adverse effect on plant availability. As noted in the previous section, this number might be somewhat larger based on the computer listing PM for "planned maintenance"; however, based on the current rate of completion, the non-outage CM backlog could be eliminated in approximately seven weeks. The number of WRAs on hold for parts was very low (approximately 30). None of the WRAs appeared to be safety significant or have any adverse effect on critical equipment. Although some CM was occasionally rescheduled, the inspectors noted no significant CM work that had been inappropriately delayed.

2.4.1.2 Preventive Maintenance Backlog

The inspectors reviewed the backlog of both outage and non-outage PM items. There were no overdue PM items listed, which indicated adequate attention to PM work. The scope of the PM program appeared to be low with less than 1,000 total items in the program. In some cases, vendor PM recommendations had not been incorporated into the program or otherwise addressed. Examples included the vendor recommendation to grease approximately 45 dampers in the EFT system, and the recommendation to periodically lubricate the governor linkage, had not been added to the PM procedures or tasks. Additional discussion of this subject is in Section 2.4.2.2 of the report. The PM backlog, however, appeared to be well managed and controlled.

2.4.2 Review and Evaluation of Completed Maintenance

The inspectors selected a sample of completed WRAs for review with emphasis on the components and systems identified in Section 2.1.2 of this report. The purpose of this review was to determine if specified electrical, mechanical, and I&C maintenance was accomplished as required. In each maintenance discipline, this review included one or more of the following:

Evaluation of work procedures for completeness, adequacy of work instructions, acceptance criteria, inclusion of vendor requirements/recommendations, QC hold points, ease of use, necessary approvals, and general conformance to NUREG/CR-1369.

Evaluation of completed CM and PM tasks, for use of qualified personnel, proper prioritization (based on risk), QC involvement, quality of documentation for machinery history, acceptance criteria, description of problems and resolutions, and post maintenance testing.

Evaluation of the extent that RCM was factored into the established maintenance process.

Evaluation of the extent that vendor manual recommendations, NRC Bulletins , NRC Notices, Service Information Letters, and other outside source information were utilized in the development, correction or upgrading of the maintenance process.

Evaluation of the extent that outside source information, maintenance histories, LERs, negative trends, rework, extended time for outage, frequency of maintenance, or results of diagnostic examinations were analyzed for trends and root causes for modification of the PM process to preclude recurrence of equipment or component failures.

2.4.2.1 Past Electrical Maintenance

The inspectors reviewed records for 11 completed electrical WRAs and PMs.

WRA 90-05183	Repair or replace chiller for recombiner.
WRA 90-05769	Replace relay for EFT.
WRA 90-06360	Repair or replace lead detection solenoid valve.
WRA 90-07212	Replace fused disconnect assembly for valve MO 2080.
WRA 90-07518	Inspect motor starter, overload relays and auxiliary contacts for core spray valve MO 1750.
4510-PM	Perform PM on battery 16.
4811-2 PM	Perform PM on starters for core spray motor operated valves.
4850-16 PM	Perform PM on 480 V breaker 152-602.
4851-04 PM	Perform PM on 480 V breaker 52-405.
4851-06 PM	Perform PM on 480 V breaker 52-401.
4858 PM	Perform PM on 4.16 Kv 152-6032.

The quality of the WRAs reviewed was mixed. In most cases, the WRAs were satisfactory in scope and content; however, work instructions were not always adequate. For example, WRA 90-07518 had detailed instructions attached while WRAs 90-05183 and 90-06360 were vague. WRAs 90-05183 and 90-05769 were for work to repair or replace malfunctioning equipment but were listed in the WRA computer data base as PM. The inspector observed that many other corrective WRAs were shown in the WRA data base as PM, which could complicate future component failure trend searches and reduce the value of PM to CM ratio trending. Corrections to data or work descriptions were poor and usually made by write overs or additions without dates or initials.

PM records included detailed instructions and forms. Prioritization appeared to be proper and QC involvement was adequate. Documentation of work performed, when combined with other historical plant data, was sufficiently detailed for trend identification and root cause analysis in most cases. Post maintenance testing was satisfactory and properly identified.

The inspectors reviewed seven electrical maintenance procedures.

4100-1 PM, "Air Starting System #1 - Diesel Generator #11," Revision I.

4563 PM, "GE HFA Relay Special Maintenance," Revision 0.

4844 PM, "Thermal Overload Relay Test Procedure," Revision 0.

4846 PM, "Molded Case Circuit Breaker Maintenance and Test Procedure," Revision 0.

4920 PM, "Change out Procedure for ASCO Solenoid Valves," Revision 5.

4 AWI-05.01.01, "Mechanical and Electrical Preventive Maintenance Plan," Revision 2.

4 AWI-05.02.03, "Conduct of Maintenance and Modifications," Revision 2.

Most of the electrical procedures reviewed were adequate and provided detailed instructions for maintenance work. The format and style of the newer procedures was quite clear. The administrative procedures included a listing of source documents so that reasons for requirements and documents impacted by proposed changes could be checked. Administrative procedures also included a summary of significant changes that made changes easier to identify and understand. Procedure 4100-1 PM had a temporary change that was not properly entered, which is discussed in Section 2.3.2.1.

The inspector reviewed the vendor documents included in the Limitorque Motor Operator Instruction Manual, NX-16932-1. Appropriate vendor recommendations had been incorporated into PM procedure 4926 PM, Revision 5.

2.4.2.2 Past Mechanical Maintenance

The inspectors reviewed 12 completed mechanical WRAs and 1 completed mechanical surveillance test for the attributes included in Section 2.4.2.

WRA 90-05382	Repair/replace stator cooling pump "B" mechanical seal.
WRA 90-06015	Adjust actuating bar of 12 compressor relief line isolation valve limit switch.
WRA 90-07047	Investigate and repair conditions causing EFT air conditioning compressor to trip.
WRA 90-07356	Investigate and repair conditions causing EFT air conditioning compressor to trip.
WRA 90-07361	Repair packing leak on screen wash/fire pump No. P-104.
WRA 90-50136	Repair EFT recirculation fan.
WRA 91-00687	Replace seals on No. 11 reactor building component cooling water pump.
WRA 91-00800	Repair RCIC valve No. 3.
WRA 91-00813	Furmanite reactor water cleanup manual valve No. 1 to stop steam leak.
WRA 91-00815	Remove covers on MO-1246, MO-2008 and MO-2009 for inspection, torquing and lubrication.

WRA 91-00819 Add packing rings and adjust packing of "A" inboard MSIV valve A02-80A.

WRA 91-50005 Tighten bonnet nuts or replace bonnet O-ring and fasteners on pilot stage.

The quality of the completed WRAs was mixed. Detailed instructions or procedures were not always included. Skill of the craft was heavily relied upon and technical manuals were usually used as work instructions. The description of work performed and conditions was good on most of the WRAs. Post maintenance testing was performed when required.

The inspectors reviewed the following six PM procedures for the attributes described in Section 2.4.2:

PM 4106-1, "Emergency Diesel 11 1 Cycle Maintenance," Revision 0.

PM 4107-1, "Emergency Diesel 11 2 Cycle Maintenance," Revision 0.

PM 4120, "RCIC System Inspection," Revision 13.

PM 4121, "RCIC Pump," Revision 5.

PM 4460, "Heating and Ventilation System Lubrication and Inspection Schedule," Revision 14.

PM 4926, "Signature Tested Limitorque Motor Operated Valves," Revision 4.

The procedures were satisfactory in scope and content.

The inspector reviewed five vendor technical manuals for selected mechanical components to determine if PM recommendations were incorporated in maintenance procedures.

MI 1741, "General Motors Corporation Maintenance Instruction for EDG"

NX 7222-15, "Bingham Pump Company Technical Manual for the RCIC Pump"

NM 16838, "Buffalo Forge Company Technical Manual for Tornado Dampers for the EFT"

NX 16839, "Buffalo Forge Company Technical Manual for Back Draft Damper for the EFT"

NX 16840, "Buffalo Forge Company Technical Manual for Balancing and Shutoff Damper for the EFT"

The vendor recommendations for PMs on the RCIC pump and most of the recommendations for the EDGs had been incorporated into PM procedures. The licensee had just completed a detailed review of the EDG technical manuals and had identified some items that were to be added to the PM program. One significant item, the recommendation to periodically lubricate the governor linkage, had not been added to the PM procedures or tasks. Also, the vendor recommendation to periodically check the exhaust manifold base flange bolts for proper tightness was in the process of being added to the PM procedures; however, licensee personnel stated this task was probably done a number of times with other maintenance work.

A recommendation in each of the Buffalo Forge Company technical manuals to lubricate the dampers annually had not been incorporated into PM procedures and there was no evidence that approximately 45 dampers had been lubricated since installation in 1983. After the inspectors identified that the dampers had not been lubricated, the licensee immediately issued a WRA to lubricate ten modulating dampers. Licensee personnel stated that the balance of the dampers were scheduled for lubrication during the 1991 refueling outage.

The inspectors evaluated the extent that the licensee's review of external operating experience reports was factored into the maintenance program. The inspectors concluded that the internal reviews and evaluations included applicable items in the maintenance program for the following items:

- Limitorque 10 CFR 21 report dated November 3, 1988, regarding melamine torque switches.
- Inspection and Enforcement Notice (IEN) 89-01, Valve body corrosion.
- IEN 89-30, High temperature environments at nuclear power reactors.
- IEN 90-21, Potential failure of motor-operated butterfly valves to operate because of valve seat functions.

Based on the review of the completed WRAs and PMs, maintenance backlogs, work history of selected components, and maintenance procedures, the inspectors concluded that past mechanical maintenance had been accomplished in a satisfactory manner. Some improvements were needed to improve work instructions, and the documenting of work and vendor PM recommendations.

2.4.2.3 Past I&C Maintenance

The inspectors reviewed 16 completed WRAs.

WRA 89-02336	Recalibrate RCIC steam line pressure switches.
WRA 89-02563	Repair analyzer fail annunciator.
WRA 89-02666	Repair analyzer fail annunciator.
WRA 89-02954	Repair trouble alarm for the control room monitor.
WRA 89-03216	Repair "B" C1 detector flow light and alarm.
WRA 89-03407	Reset or repair PS-3232 air compressor pressure trip.

WRA 89-03742	Replace RCIC steam line pressure switches.
WRA 90-05230	Correct wiring problems for control circuits.
WRA 90-06937	Replace cracked EDG tubing for the air start system.
WRA 90-07125	Check trip point and calibrate high condenser pressure trip switch.
WRA 90-07242	Replace instrument isolation valve for #12 EDG left bank starting air.
WRA 90-50159	Correct wiring problem with "B" chlorine detector.
WRA 91-00509	Repair/replace HCU-39 accumulator level switch.
WRA 91-00724	Replace failed CRD accumulator gauges.
WRA 91-01009	Investigate failure of EFT fire alarm system.
WRA 91-01047	Repair circulating water temperature transmitter.

The following documentation discrepancies were identified.

- WRA 89-03742 - Documentation of test equipment usage was inadequate. The affected pressure switches were replaced and calibrated per the work instructions. The test equipment used was "XDV-9027", but no calibration information was included. In addition, the accompanying QC inspection report for this WRA identified the test equipment used as "XPI-9027", which was in current calibration status during the performance of the work. The inspector confirmed that both instruments had been used in the calibration of the new pressure switches.

- WRA 90-07125 - Documentation on this WRA was poor. The only work instructions were to "calibrate if needed". The technician was unable to calibrate the pressure trip switch without bleeding freon from the compressor system. No documentation of actual calibration of the pressure switch was included and there was no indication that the initial problem was ever corrected, yet the WRA was closed out. This WRA was prioritized as "Urgent", and the inspector confirmed that the affected instrument had been re-calibrated and returned to service. The inspector determined no further corrective action for this WRA was required.

In many cases, preparation of these WRAs appeared to be weak with respect to work scope and content. Several WRA's contained instructions within the work scope to "investigate and repair as required," including WRAs 89-02563, 89-02666, 89-02954, 89-03216, and 89-03407. WRAs 90-5230 and 90-6937 had adequate work instructions to perform the task. The WRAs reviewed were properly prioritized and QC reports and criteria were included where appropriate.

- Some WRAs had changes that were not authorized by initialing and dating as required by procedure 4 AWI-15.02.02, "Temporary Change Process," Revision 0. WRA 90-00724 changed the M&TE identification number without properly documented authorization or explanation. WRA 89-03407 post maintenance testing activities control cover sheet had changes to the "Test Instructions and/or Procedures" section without properly documented authorization or explanation. WRA 90-5230 had changes made to pages 2 and 4 of the post maintenance test procedure without proper authorizations. These changes were to panel numbers, which identified the location of instrument caps that were to be removed and to a gauge number which was to be used for verifying flow. These examples were indicative of a licensee management oversight in not assuring that licensee personnel familiarity with the WRA content was adequate. The failure to provide documented authorizations to the above WRA packages is a violation of Criterion V of 10 CFR 50, Appendix B (263/91002-01E(DRS)).

- Several instruments in the EFT exceeded the calibration due date by greater than 25% as allowed by 4 AWI-06.01.01 "Instrument and Control Preventive Maintenance Plan." A deviation was approved to extend the calibration due date 60 days since the EFT system was being modified. These gauges were scheduled to be calibrated in October 1989 but were not completed until May 1990 under WRA 90-5491. The calibration could have been completed as early as April 1989 and still been within the 25% window; however, the I&C staff waited until the end of the period to perform the calibrations, and as a result, the deviation was needed. This indicated a lack of good planning and scheduling.

The I&C PM plan was reviewed. This administrative control document, 4 AWI-06.01.01, Revision 1, provided general acceptance criteria regarding instrument "as-found" and "as-left" calibration data. The inspectors examined the calibration records (calibration cards) for several instruments and determined that some instruments were left outside the ± 1% tolerance specified by the PM plan. No documentation was available as to why these instruments were left in an out of tolerance condition. Past I&C practices had not emphasized documenting corrective action for "out of tolerance" instruments even though the M&TE control procedure required this documentation. The inadequacies of this practice had been cited in Inspection Report No. 50-263/90018 issued in December 1990. The licensee was in the process of implementing corrective action to evaluate "as-found" and "as-left" data on all plant process instrumentation.

The inspectors reviewed 35 completed work packages to evaluate the effectiveness of the controls the licensee had in place for I&C work activities. The results showed that the licensee generally maintained good control of the work in progress.

The following I&C procedures were reviewed for completeness, adequacy, incorporation of vendor requirements and review/approval process.

4 ACD-06.04, "Calibration and Control of Inspection, Measuring and Testing Equipment," Revision 6.

Procedure 7140, "RCIC System Instrument Maintenance," Revision 7.

Procedure 0031, "ECCS High Drywell Pressure Sensor Calibration," Revision 6.

The procedures included vendor manual requirements and recommendations, the instructions were adequate, and acceptance criteria were included for equipment testing.

Based on the review of completed maintenance documents, procedures and programs, the inspectors concluded that the conduct of past I&C maintenance was adequate, but improvements were need in maintenance documentation.

2.5 Maintenance Work Control

The inspectors reviewed maintenance activities to evaluate the maintenance work control process to assure that plant safety, operability and reliability were maintained. Areas evaluated were control of WRAs and other maintenance records, planning and scheduling, backlog control, maintenance documentation and review of work in progress.

During observations of work in progress, the inspectors noted that the maintenance organization did not appear to have a formal planning function integrated into WRA processing. Most WRAs were initiated by system engineers. Throughout the WRA routing process, other plant organizations (engineering, operations and QC) reviewed the WRA for applicable requirements. When the WRA reached the appropriate shop to be worked, the craft personnel generally arranged and coordinated the efforts of needed maintenance support personnel. Most of the interface between plant organizations related to a typical WRA was on an informal "face to face" communication basis. As a result, WRA documentation in some cases was poor, as exemplified in section 2.4.2.3 of this report.

The inspectors concluded that deficiencies in the plant maintenance planning program were contributors to the instances of unsound maintenance practices noted during observations of maintenance in progress.

Additionally, the inspectors observed that several control room instruments had incomplete "WRA Issued" stickers. Although WRAs had been initiated, there was no method for identifying the associated WRA number nor the quantity of affected instruments covered by the WRA. Collectively, this represented poor traceability of equipment problems. The controlling procedure did not include an adequate description of what should be entered on the "WRA Issued" tag or what controls or cross references were to be used. Licensee personnel were going to revise both the procedure and the "WRA Issued" sticker to address these weaknesses. No scheduled completion date for this action was provided during the inspection.

2.6 Engineering and Technical Support

The inspectors reviewed the activities of the engineering organizations that pertained to modifications, installation, testing, maintenance support, and material qualification. Maintenance support was provided by engineering department personnel, which included systems engineers.

The engineering division was divided into six groups including auxiliary systems engineering, reactor systems engineering, turbine systems engineering, electrical and I&C engineering, nuclear engineering and technical services. There were approximately 35 system engineers with 11 that had been trained and certified as reactor operators. The system engineers had an average of three primary systems each. The maximum number of primary systems assigned to any one engineer was six. The organization did not appear to be overburdened and the system engineers adequately handled assigned workloads. The engineers demonstrated system ownership and were active participants during maintenance on the assigned systems. The engineering division was recently reorganized but a procedure that described the organization and responsibilities did not exist.

The inspectors determined that documentation for some safety related equipment was not easily retrievable. Information about the emergency diesel fuel oil day tanks, such as manufacturers tolerances and purchase specifications, was not obtainable. Shelf life and service life for the expansion joint material between the EFT filters and the exhaust fan were also not obtainable during the inspection. The lack of the above information caused analyses to be based more on engineering judgement than on engineering data.

o The inspectors questioned whether the EDG fuel oil day tanks contained enough fuel oil to provide eight hours of full power operation. This was of concern because the inspectors observed that the day tank level indicators had labels that indicated the overflow levels of the day tanks were less than the required number of gallons needed for eight hour operation. The licensee's Updated Safety Analysis Report (USAR) stated that each EDG had a completely separate eight hour fuel supply in a day tank. The licensee's calculation indicated that 1576 gallons of fuel oil was required for the 8 hours of full power operation and that 1587.5 gallons was available. However, the inspectors determined that this calculation did not consider other necessary factors. For example, loss of volume due to changes in temperature of the oil, the tank being tilted, the additional loss of liquid height caused by vortexing around the suction line when the fuel oil was being transferred, and the volume displaced by the level instrumentation. After considering the additional factors the EDG fuel oil day tanks would only contain 1500 gallons, which is 76 gallons less than the required 1576 gallons. Therefore, the USAR was incorrect. Although, the EDG's had integral tanks with a 550 gallon capacity. The use of these tanks would still provide sufficient fuel oil capacity (a minimum of 190 additional gallons) for use in the 8 hour full power operation time requirement. To resolve the USAR discrepancy, the licensee wrote an NCI to change the USAR to allow the extra oil capacity of the integral tank to be used.

o Four instruments, two of which were used to determine the operability of the EFT system in surveillance procedure 0464 "Control Room Emergency Filtration Treatment System" were inadvertently omitted from the system for calibration purposes. Differential pressure (DP) instruments DPI-

9319 for the control room to administration building and control room to turbine building DP's, DPI-9320 for the technical support center (TSC) to administration building DP, DPI-9321 TSC to administration building DP, and DPI-9322 EFT to stairwell DP were inadvertently left in the heating and ventilation train (HVT) system when the EFT system was installed. Instruments DPI-9319 and DPI-9322 are used to verify positive pressure exists in the control room and the EFT rooms as required by Section 4.17.B.2.b(3) of the TS and the USAR. The EFT system instruments were calibrated on a 24 month PM interval and the HVT system instruments were calibrated on a 48 month interval. The licensee was in the process of reviewing these instruments for placement in the correct system.

- o Two flow indicators, used in performing TS surveillance procedure 0464, "Control Room Emergency Filtration Treatment System", to verify proper operation of EFT ventilation units V-EAC-14B and V-EAC-14A were not placed in the master instrument index and were not in the plant calibration program. No documentation existed to show that these instruments were ever calibrated. This problem is discussed in more detail in Section 2.3.4.3 of this report.

- o An informal trending program existed. Trends for selected heat exchangers, condenser performance, and heat rate were available. Nuclear Plant Reliability Data System (NPRDS) trending was accomplished but this did not encompass all plant equipment such as non-safety related and balance of plant equipment. Although trending was being performed on a number of components, there was no program that provided formal instructions for system engineers to address what or how to trend. Engineers performed regular walkdowns of assigned systems to monitor degradation and component failures.

2.7 Review of Licensee's Assessment of Maintenance

The inspectors evaluated the licensee's quality verification process in the maintenance area by the review of QA audit and surveillance records, maintenance self assessments, non-conformance reporting, and trending of component and hardware failures. The inspectors reviewed documents to assess the coverage of maintenance, technical adequacy, timeliness and adequacy of corrective action and justification for closeout of corrective action documents.

2.7.1 Audit and Surveillance Reports

The inspectors reviewed records of 12 QA audits performed between January 1988 and January 1991 which, in most cases, covered portions of maintenance and maintenance support. Additionally, the inspectors reviewed records of approximately 24 surveillances conducted between January 1989 and January 1991.

- o The audit reports emphasized document and procedure review rather than a review of maintenance activities or performance related documents, and therefore did not appear to be performance oriented. The inspectors had discussions with QA personnel and reviewed audit checklists, which indicated that some evaluations were made of maintenance work activities as well as the documentation that quality program requirements were being implemented. However, emphasis by QA management was weak in the area of conducting performance based audits and surveillances. Documenting the results of performance oriented activities in audit reports was considered weak. For example, audit reports AG 90-26-10 and AG 89-7-3 did not clearly document the results of performance oriented reviews.

Audit and surveillance findings were promptly issued. Responses and corrective actions to the audit findings were completed in a timely manner. In most cases, the actions taken were adequate, and reasonable justification was given for closing out issues. In some isolated cases, the conditions noted in the closed audit findings still existed and were noted during the inspection. For example, the lack of control in making controlled documents.

2.7.2 Maintenance Self-Assessment

The inspectors reviewed the licensee's nonconforming item (NCI) process. The licensee had initiated a formal NCI process in April 1989, in response to a Corporate QA finding. The controlling procedure was 4 AWI-02-06-02, "Nonconforming Item Process," Revision 2. NCIs were written for conditions caused by personnel errors and equipment failures. The inspectors reviewed several completed and open NCIs. Responses and corrective actions were generally timely; however, one concern was identified.

- The requirement for a change to the Monticello Technical Specifications (TS), due to modification 88Z042, was identified in May of 1990 and, at the time of the inspection, no action had been taken to initiate or submit the required change. The initial 10 CFR 50.59 safety evaluation by the licensee did not identify the need for a change to the TS and the modification was installed during the 1989 refueling outage without prior approval of the NRC as required by 10 CFR 50.59. During the review of NCI 90-014 and the response, the inspectors noted that the response identified that the modification required a change to Section 3.7.A.4.d of the plant TS. The modification changed the control switch for testing the drywell vacuum breakers from a push button switch to a valve selector switch and a single on-off test switch. The TS stated that "Drywell suppression chamber vacuum breakers may be cycled, one at a time, using the exercise test push button during containment inerting and de-inerting." Since the push button no longer existed a TS change was required. Criterion XVI of 10 CFR 50, Appendix B, requires that measures be established to assure that conditions adverse to quality be promptly identified and corrected. Although the need for the change to the Monticello TS was identified in May of 1990, the change was not initiated or requested until the problem was noted by the NRC during the inspection (263/91002-03(DRS)).

2.7.3 Quality Control Support

The plant QC organization included a general superintendent of quality and administration, a superintendent of quality services, a QC supervisor, four QC specialists, one senior quality engineer, and three quality engineers. The quality engineers performed inspections as required and participated in QA audits. The current staff was adequate.

The inspectors interviewed members of the QC staff. The staff was knowledgeable of QC responsibilities and had the necessary acceptance criteria for inspecting. Several procedures had QC witness points prominently pre-printed in the body of the procedure. This was a strength.

During the day shift and on back shifts, call-in work QC coverage was provided. However, when maintenance began working a regular evening shift the inspector observed on two occasions that QC coverage was provided for only about the first half of the shift. QC witness points that workers expected to work during the second half of the shift were waived at that time, which appeared to be a practice that was being done frequently. This was considered a weakness.

2.7.4 Trend Analysis

The inspectors reviewed the methods used by the licensee to evaluate maintenance records and other documents to detect repetitive component failures in order to provide action to prevent recurrence. Procedures 4 ACD-02.05, "Trending," and 4 AWI-02.05.01, "Trending Program," provided for trending of many overall maintenance information items such as backlogs, LERs, NRC violations and extended outage times. In addition, management had established a goal for component trending by system engineers.

System engineers trended hardware problems on selected systems and components, in many cases to track known problems. On selected components, component failure analysis reports were obtained from NPRDS to provide selected component trending on an industry wide basis. However, there was no program or procedure that required routine review and analysis of component failures to determine if a negative trend existed on a day by day basis. In addition, there were no instructions as to the methods to be used in the trending of the selected components which were currently trended by the systems engineers and there were no acceptance criteria that defined what a trend was.

Equipment failure analysis was primarily initiated by a NCI report in accordance with 4 AWI-02.06.02. The requirement to evaluate unexpected failures of Q-listed systems, structures or components was also included in procedure 4 ACD-05.02, "Nuclear Plant Maintenance," Revision 6.

The licensee has also considered the effects of plant aging and has identified several components and systems to replace in the future.

3.0 Synopsis

This synopsis highlights the inspection findings in terms that were meant to be representative of the presentation tree that is attached to this report. A (+) means that the item is considered good or a strength or has the potential to be so; a (-) means that the item is considered a weakness or is not fully developed.

3.1 Overall Plant Performance

3.1.1 Historic Data

(+) Plant performance was good and most operational performance type goals were met. The operating record since January 1989 indicated that the majority of the problems encountered were not directly attributed to maintenance related activities or maintenance personnel.

3.1.2 Plant Walkdowns

(+) The material condition of the plant was very good and almost all equipment was ready for service. Good housekeeping was evident and no significant liquid leaks were observed. Many areas had been recently painted.

(-) Identification of plant equipment needed to be improved in some areas. Additionally, there were a number of minor housekeeping and equipment problems noted.

3.2 Management Support of Maintenance

3.2.1 Management Commitment and Involvement

(+) Management emphasized the need for adequately trained and experienced personnel and the maintenance staff was adequate for performing required maintenance work as evidenced by a low backlog of CM work.

(-) Plant management exhibited a high threshold for when work packages or procedures needed to be at the work location.

3.2.2 Management Organization and Administration

(+) Maintenance management used tracking of maintenance performance indicators to determine status and maintain control of maintenance work. Rework was tracked and reports were prepared to determine if maintenance activities were effective.

(-) In defining maintenance work, vendor PM recommendations were not always addressed. There was also difficulty in readily retrieving some technical information on plant hardware.

(-) A somewhat casual attitude toward compliance with maintenance procedures existed, which resulted in a failure to follow procedures in a number of areas.

3.2.3 Technical Support

(+) ALARA was enhanced by the use of a surrogate tour system which allowed personnel to view pictures of equipment locations in limited access areas of the plant; extensive efforts were made to reduce radiation exposure by a number of different approaches.

(+) HP personnel were very knowledgeable of maintenance work being performed. Radiation smear tests are taken around valve stems to detect leakage before visible leaks occurred.

(+) Maintenance personnel, both craft and supervision, had completed an advanced radiation worker training course.

(+) The "ALNOR" automatic radiation exposure recording system provided for faster and more accurate reading of personnel radiation exposure.

(-) HP personnel have not maintained job history files to be used for ALARA purposes.

(-) Engineering did not address vendor recommendations for PMs and a program for vendor manual review for PM application had just been initiated. Additionally, engineering calculations, performed some time ago yet still being utilized, for capacity of the EDG oil storage day tanks were inaccurate and not conservative. However, the EDGs were still operable based on additional fuel available in the EDG integral tanks.

(-) A modification to the plant, which required amending the TS, was completed prior to obtaining NRC approval.

3.3.1 Work Control

(+) The work priority system appeared to be working well; none of the open work orders appeared to be safety significant. The WRA computer tracking program was versatile and would allow retrieval of information by many different categories or titles.

(+) Electrical and mechanical craftsmen and I&C technicians were knowledgeable and well qualified.

(-) There was inadequate advance planning of some work. In many cases the WRA was sent directly to the craft which required the craftsman to perform any planning considered necessary.

(-) In certain cases maintenance work was performed without procedures or instructions. A number of WRAs contained the instructions "trouble shoot and repair as necessary". In a number of cases existing procedures were not followed in performing maintenance work and in some cases, maintenance personnel were not knowledgeable of procedures. A number of maintenance procedures were noted to be inadequate or poorly written. Skill of the craft was relied on heavily to accomplish maintenance activities.

(-) There was no procedure addressing changes to records. Description of work performed on WRAs was being changed in many cases by write overs, which made it difficult to read and determine what was intended.

3.3.2 Plant Maintenance Organization

(+) Maintenance personnel in all three disciplines were highly experienced and knowledgeable of the work being performed and a number of craftsmen and/or technicians had operations experience. Good communication existed between maintenance personnel and the systems engineers.

(+) Management utilized some aspects of predictive maintenance such as vibration analysis and thermography to monitor equipment deterioration.

(+) NPRDS information was used to trend repetitive equipment failures for selected components.

(-) Inadequate procedures were used in some areas without providing feedback for corrections.

(-) There was no formal program that described what items were to be trended or how trending was to be performed, nor were records maintained for action taken to evaluate equipment or tests when M&TE was found out of calibration.

(-) Personnel were doing work in some areas without a WRA being initiated, without the WRA or other work instructions at the work location. Maintenance personnel performed work with an unapproved hand written document.

3.3.3 Maintenance Facilities, Equipment, and Material Control

(+) An exceptionally large amount of warehousing space was available for stocked parts and equipment. The maintenance work areas were considered adequately supplied.

(-) There was no formal system for usage control of M&TE.

3.3.4 Personnel Control

Although personnel control was not reviewed in enough depth for an assessment, some items were noted in this area.

(+) Staffing levels in maintenance and maintenance support appeared to be adequate as was evidenced by a low backlog of non-outage CM. The maintenance personnel were experienced and appeared to be well qualified, and trained for the work performed. This included craftsmen and supervisors.

(+) Mockups of plant equipment were used to train plant maintenance personnel in many areas.

(-) QC witness points that workers expected to work during the second half of the shift were waived.

4.0 Exit Meeting

The inspectors met at the Monticello Nuclear Power Plant with licensee representatives (denoted in Paragraph 1) on March 22, 1991, to summarize the purpose, scope, and findings of the inspection. The inspectors 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 such documents or processes as proprietary.

APPENDIX A

ACRONYMS

ALARA	As Low As Reasonably Achievable
CM	Corrective Maintenance
DPU	Differential Pressure Unit
EDG	Emergency Diesel Generator (System)
EFT	Emergency Filtration Train
I&C	Instrument & Control
IEN	NRC Inspection and Enforcement Notice
LER	Licensee Event Report
M&TE	Measuring and Test Equipment
MOV	Motor Operated Valve
NCI	Nonconforming Item
NPRDS	Nuclear Plant Reliability Data System
NRC	Nuclear Regulatory Commission
PM	Preventive Maintenance
PRA	Probabilistic Risk Assessment
QA	Quality Assurance
QC	Quality Control
RCM	Reliability Centered Maintenance
RP	Radiation Protection
RWP	Radiation Work Permit
SALP	Systematic Assessment of Licensee Performance
USAR	Updated Safety Analysis Report
WRA	Work Request Authorization

MONTICELLO MTI

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