APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-382/89-01 Operating License: NPF-38

Docket: 50-382

Licensee: Louisiana Power & Light Company

Facility Name: Waterford Steam Electric Station, Unit No. 3

Inspection At: Waterford 3, Taft, Louisiana

Inspection Conducted: January 17 through February 10, 1989

Inspectors: W. D. Johnson, Team Leader, Senior Resident Inspector, Project Section A, Division of Reactor Projects

R. B. Vickrey, Reactor Inspector, Operational Programs Section, Division of Reactor Safety

J. P. Stewart, Reactor Inspector, Operational Programs Section, Division of Reactor Safety

R. E. Baer, Chief, Facilities Radiological Protection Section, Division of Radiation Safety and Safeguards

A. T. Howell, Project Engineer, Project Section A, Division of Reactor Projects

W. B. Jones, Resident Inspector, Project Section C, Division of Reactor Projects

E. B. Tomlinson, Senior Project Engineer Projects Division IV

J. L. Hansen, INEL/EG&G Idaho

Approved: W. C. Seidle 3/14/89

W. C. Seidle, Chief, Test Programs Section
Division of Reactor Safety

Date

Inspection Summary

Inspection Conducted January 17 through February 10, 1989 (Report 50-382/89-01)

Areas Inspected: Special, announced inspection by a team of NRC inspectors of the maintenance performance (both safety-related and balance of plant) of overall plant performance related to maintenance, management support of maintenance, and maintenance implementation.

Results: Four apparent violations have been identified in this report:

- Three instances of failure to follow equipment control procedures (unauthorized operation of a valve by a mechanical maintenance worker, failure to perform required independent verification of a valve's position, and operation of a valve hand wheel, which had a danger tag attached), were observed. (Section 4.1.3)

- One case of failure to follow the requirements of a maintenance procedure was identified. (Section 4.1.3)

- Three environmentally qualified safety-related motor operated valves were found by the licensee to have been lubricated with an admixture of two different types of grease. (Section 4.3.3)

- Technical documents used in the field, maintenance data forms, and instrument information sheets, were not controlled as required by licensee procedures. (Section 3.2.3)

The following unresolved items have been discussed in this report:

- The licensee's lack of corrective action to resolve the low "B" HPSI pump recirculation flow. (Section 3.3.3)

- The surveillance test procedure for the "B" HPSI pump may not meet the requirements of IWP-3100, possibly leading to extended periods of undetected pump degradation. (Section 3.3.3)

- The seismic qualification of air operated valves, with copper tubing installed on the topworks of the operator, needs further review. (Section 3.3.3)

- Instrument loop calibration procedures have been performed in two parts with, perhaps, 2 months between the calibration of the instruments outside containment and calibration of the primary elements inside containment. The procedures did not require rechecking of prerequisites or obtaining operations approval to do the second part of the calibration. There was some question as to the quality of a loop calibration conducted over such an extended interval. (Section 4.1.3)

The following inspector followup item has been discussed in this report:

- A licensee representative agreed to develop a maintenance procedure to be performed periodically to confirm the operability of the nitrogen accumulators. (Section 4.1.3)

The team's overall assessment was that the licensee's performance of maintenance activities was satisfactory, with most programs being appropriately documented and functioning well. However, a significant number of areas were noted in which implementation should be strengthened. During the inspection, several strengths and weaknesses were identified by the inspection team. These are highlighted below:

Strengths

- The work order control system was functioning effectively.
- Equipment history was complete and retrievable.
- The maintenance backlog was small and under control.
- Maintenance personnel were competent, had a good attitude, and were motivated.
- Communications and planning within the maintenance and QC departments were excellent.
- Communications between the maintenance department and other organizations were excellent.
- The trending and predictive maintenance program was well developed and comprehensive.
- Good training facilities were available, and good use was made of mock-ups.
- The scope of the preventive maintenance program was complete for selected systems.
- First and second line maintenance supervisors were involved in, and knowledgeable of, activities under their cognizance.
- The general appearance of the plant was very good.
- Health physics and maintenance had a good working relationship at the field working level.
- Health physics coverage provided for maintenance activities was very good.
- Containment devices were effectively used to limit the spread of contamination.

- The general appearance within the radiological controlled area was excellent.
- Only a small portion of the plant was contaminated.
- The program for evaluation of industry experience was functioning well.
- Operations had good control of equipment out of service.
- The area walkdown program was considered to be a very good practice.
- Radiation work permits were complete and were followed.

Weaknesses

- Personnel safety awareness appeared to be lacking.
- System engineers lacked experience and knowledge of their assigned systems.
- System descriptions were incomplete and outdated.
- Secondary plant steam leaks were not always identified and corrected promptly.
- I&C procedures need improvement.
- Job planning did not always include personnel safety, proper tools, or movement of materials.
- There was no consistent criteria for determining which valves should be locked in position.
- There was no independent check that when a mechanic drew a grease gun from the tool room, the grease gun contained the proper grease for the component to be lubricated.
- Measuring and test equipment were noted to be logged as being used in excess of 16 times without supervisory approval as required by procedures.
- There were few component-specific corrective maintenance procedures for mechanical components.
- Until recently, no capacity test was performed on air compressors after being overhauled.
- LP&L routine review of completed work packages had failed to identify some of the discrepancies noted by the team.
- The scope of the valves tested under the MOVATS program has been limited.

- Components of the operators for air operated valves were not in a preventive maintenance program.
- Operations QA should have identified some of the discrepancies noted by the team.
- Nuclear plant island structure watertight doors were not included in a preventive maintenance program.
- Poor practices were observed in the selection and use of hand tools.

The NRC inspectors reviewed the documents listed in Attachment 1 to this report.

DETAILS

1.0 Persons Contacted

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*J. Dewease, Senior Vice President - Nuclear
#*R. Barkhurst, Vice President - Nuclear
#*N. Carns, Plant Manager
#*S. Alleman, Quality Assurance Manager
H. Aubert, Mechanical Maintenance Supervisor
#*P. Backes, Assistant to Plant Manager - Special Projects
#*D. Baker, Nuclear Operations Support & Assessment Manager
R. Bailey, Mechanical Maintenance Planner
R. Bennett, Quality Assurance Inspection Supervisor
*C. Booth, Mechanical Maintenance Assistant Superintendent
*R. Burski, Nuclear Safety & Regulatory Affairs Manager
A. Cilluffa, Maintenance Engineer
V. Collins, Operations Administrative Supervisor
R. Crawley, Safety Engineer
G. Davie, Operations Assessment Supervisor
#*G. Davis, Manager, Event Analysis Reporting and Response
R. DeLagrange, Mechanical Engineer
S. de St. Germain, Quality Assurance Analyst
E. Fields, Electrical Engineer
C. Gamache, Engineer
*T. Gerrets, Nuclear Services Manager
D. Gilley, Maintenance Engineer
B. Goldman, ALARA Coordinator
T. Gray, Quality Assurance Support Supervisor
M. Green, Quality Assurance
S. Griffin, Maintenance Engineer
D. Guidry, Instrumentation & Control (I&C) Engineer
M. Hamilton, Environmental Qualification Coordinator
R. Hereford, System Engineer
D. Hoel, Health Physics Supervisor
J. Hoffpauir, Assistant Operations Superintendent
A. Holder, Fire Protection and Safety
A. Jacobs, I&C Supervisor
R. Jenquine, I&C Supervisor
P. Kelly, Health Physics Supervisor
B. Kennedy, System Engineer
R. Kenning, Engineer, Nuclear Operations and Support Assessment
#*S. Khan, Lead Maintenance Coordinator
R. Kilinksiek, Mechanical Engineering Supervisor
G. Koheler, Quality Assurance Audits Supervisor
W. LaBonte, Radiation Protection Superintendent
*A. Larsen, Electrical Maintenance Assistant Superintendent

L. Laughlin, Site Licensing Superintendent
H. LeBlanc, Maintenance Engineer
*K. LeBlanc, Maintenance Engineer
P. Lumpkin, Mechanical Maintenance Supervisor
#*T. Leonard, Planning and Scheduling Supervisor
#*J. McGaha, Nuclear Operations Engineering and Construction Manager
*D. Marpe, Lead Maintenance Engineer
*D. Matheny, I&C Maintenance Assistant Superintendent
*J. Millwater, Lead Maintenance Planner
M. Moe, Radwaste Supervisor
#*R. Murillo, Licensing Engineer
#*D. Packer, Assistant Plant Manager - Operations and Maintenance
W. Pendegrass, Shift Supervisor
O. Pipkins, SRC Support Senior Engineer
J. Poff, Electrical Supervisor
#*P. Prasankumar, Assistant Plant Manager - Technical Services
S. Ramzy, Health Physics Engineer
J. Ridgel, Health Physics Engineer
E. Rogers, System Engineer
E. Sarran, I&C Supervisor
S. Shete, Mechanical Engineer
D. Shultz, STA Supervisor
*L. Simon, Radwaste Supervisor
*T. Smith, Plant Engineering Superintendent
R. Starkey, Operations Superintendent
D. Stevens, Radwaste Supervisor
K. Van Le, Maintenance Engineer
#*D. Vinci, Maintenance Superintendent
D. Walls, Mechanical Maintenance Supervisor
T. Watkins, System Engineer
D. Williams, Planning/ALARA Technician
B. Wilson, System Engineer
J. Zabritski, Operations Quality Assurance Manager

NRC Personnel

T. Foley, NRR, Performance Evaluation Branch
*J. Milhoan, Director, Division of Reactor Safety, RIV
J. Monninger, Engineer, NRR, PDIV
*W. Seidle, Chief, Test Programs Section, RIV
#*W. Smith, Senior Resident Inspector
#*T. Staker, Resident Inspector
D. Wigginton, Project Manager, NRR, PDIV

# Denotes those personnel attending the exit interview on February 3, 1989.
*Denotes those personnel attending the exit interview on February 10, 1989.

2.0 Overall Plant Performance Related to Maintenance

2.0.1 Scope

The effective implementation of maintenance can be directly related to overall plant performance with respect to plant operability, equipment availability, and general reliability. The assessment of the material condition of the plant during walkdown inspections provides an indication of the effective performance of maintenance activities.

2.0.2 Conclusions

Plant walkdown inspections provided an indication that the licensee has implemented an effective maintenance program. Plant general appearance, equipment conditions, and housekeeping conditions were very good. Most minor deficiencies identified during walkdown inspections had been previously identified by the licensee.

2.1 Direct Measures

2.1.1 Scope

This portion of the NRC inspection dealt with reviewing the direct measures for determining overall plant performance, plant operability, and the general reliability of plant systems and components. The inspection and assessment of direct measures were conducted by performing plant walkdown inspections. The findings, which resulted from the plant walkdowns, were considered as indicators of the effective implementation of the licensee's performance of maintenance activities.

The NRC inspectors conducted extensive tours of the plant throughout the inspection to observe and assess the material condition of the plant; to monitor ongoing maintenance activities; and to note the status and use of clearance tags, deficiency tags, and any other forms of tags or stickers used to identify material deficiencies and ongoing or future maintenance activities.

2.1.2 Conclusions

The licensee has implemented an effective maintenance program as reflected through the plant walkdown inspections. Maintenance workers and management personnel demonstrated that they were active in maintaining the plant through good housekeeping practices.

The licensee was identifying and tracking material deficiencies utilizing the condition identification (CI) program. This program should become even more effective when the system engineers become more knowledgeable and involved with their respective systems.

Installed plant equipment appeared to be well maintained. Operations department personnel demonstrated that they had control over and were maintaining an accurate status of equipment out of service. Additional management attention in the area of support activities for maintenance was needed. This area included establishing locked valve criteria, ensuring procedures are complied with or changed, and ensuring that established clearance boundaries are observed.

2.1.3 Findings

The NRC inspectors performed several plant walkdowns of the auxiliary, fuel handling, and turbine buildings during the inspection period. The licensee has established an effective housekeeping program which was observed being implemented by buildings and ground, maintenance, and management personnel. Several buildings and ground personnel were observed performing housekeeping activities. The individuals were thorough in that loose debris was picked up and oil and grease located around equipment were removed. General areas and piping were wiped down periodically to remove accumulated dust. Good control over consumable cleaning fluids was noted. The significance of this type of housekeeping practice is that contamination of all types is greatly reduced and changes in equipment status such as oil leaks from pump and motor seals is more easily recognized.

The NRC inspectors also observed good housekeeping practices by maintenance personnel. In particular, mechanical maintenance personnel who had performed a realignment and lubrication of a motor to pump coupling were observed cleaning their work area at the completion of their maintenance activity. The area was left in a condition better than it had been when the maintenance activity was initiated.

The licensee's management also participates in assuring that good housekeeping is maintained. Each week the Assistant Plant Manager for Operations and Maintenance, accompanied by approximately 12 other managers and supervisors, conducts a tour of a selected area of the plant to identify housekeeping items and any equipment deficiencies. An NRC inspector observed such a tour on January 31, 1989. The tour was found to be thorough and resulted in the identification of several housekeeping deficiency items as expected. The tours usually last between 2 and 3 hours, and the individual responsible for that area of the plant inspected participates in the tour. Identified discrepancies are tracked on the plant improvement list until corrected or otherwise dispositioned.

As part of the licensee's housekeeping efforts, the licensee has reduced the area which is radioactively contaminated. Most areas within the radiologically controlled area (RCA) could be toured without requiring the use of protective clothing. Two exceptions to this were the reactor building and one of the two safety injection pump rooms. The licensee planned to begin decontaminating this safety injection pump room within the next month. The licensee had

established the use of containment devices to minimize the spread of potentially contaminated water. Examples noted included valve packing leaks on potentially radioactively contaminated systems. A collection device was installed below the source of the leakage and routed to a radioactive drain header. During the first week of the NRC inspection, it was noted that the long pieces of tubing used to route the collected water to the drains were not marked as "possibly internally contaminated." This condition was corrected prior to the NRC inspectors' return for the second week of onsite inspection.

The physical condition of plant equipment was observed during the plant walkdowns. In particular, conditions which could lead to the degradation of installed equipment were noted and checked against the licensee's deficiency reporting system to determine whether the condition had been identified. Several CI tags, which were used to identify equipment deficiencies, were noted on plant equipment. The CI tags located on emergency feedwater (EFW) and station instrument air system equipment were verified to be included in the licensee's deficiency tracking system. During the plant walkdowns, the NRC inspectors noted several steam leaks on balance of plant equipment which were not identified in the deficiency tagging program. A valve packing leak on a main steam supply valve to the EFW turbine driven pump had also not been identified. The NRC inspectors noted that several of the system engineers interviewed were not very familiar with their assigned systems. This appeared to be mostly because of a lack of experience and training. One aspect of the system engineer training program is to walkdown and to stay familiar with the condition of their assigned systems. As each system engineer becomes more involved with assigned systems, the effectiveness of the CI program should improve as potentially degrading conditions are more quickly identified.

During the plant walkdowns, the NRC inspectors noted that manual valves located within safety system flow paths were not consistently locked to prevent unauthorized or inadvertent positioning of the valves. Procedure OP-100-009, "Locked Valve List," did not provide consistent criteria for locking manual valves. Examples of manual valves in important flow paths, which were not locked, included stop check valves located in the high pressure safety injection (HPSI) system (SI-205 A, A/B, B) and the containment spray system (CS-111 A, B).

The NRC inspectors observed that numerous installed plant instruments were not tagged with current calibration stickers although similar instruments were affixed with calibration stickers. The I&C departmental procedures specified requirements to affix current calibration stickers when performing instrument calibrations. Following discussions with an NRC inspector, the licensee issued a memorandum on January 23, 1989, redefining the use of calibration stickers. The licensee's policy was revised to only use calibration stickers on instruments designated as measuring and test equipment,

and to remove calibration stickers from installed instruments during their next calibration. The licensee established plans to revise the departmental procedures to reflect these changes during the next procedure review.

The physical appearance of installed plant equipment was very good. It was apparent that plant equipment was being returned to its original configuration following maintenance and surveillance activities. However, additional attention should be provided to reinstalling caps and plugs on air lines and pipe when an activity is completed. An example where plugs were not reinstalled was noted on air operated Valves CS-125A and B. A plug should have been installed downstream of the air operated valve diaphragm test port isolation valve.

The licensee demonstrated good controls over identifying equipment out of service and identifying maintenance activity boundaries through the use of clearance tags. Equipment that was taken out of service for maintenance activities was controlled by the shift supervisor (SS)/control room supervisor (CRS). The status of equipment out of service (EOS) was maintained in the EOS log by the SS/CRS. The NRC inspector reviewed clearances identified in the plant and verified that they were controlled in the clearance log book. Specific maintenance activities were selected and the appropriate clearances verified in place prior to the maintenance activity beginning. Although operations had established good control over the issuance of clearances, maintenance personnel did not appear to understand adequately the importance of not operating a valve tagged under a clearance that was accepted for the maintenance activity. An example where a valve, controlled under a clearance, was manipulated by a maintenance individual after work had been initiated is identified in section 4.1.3 of this report.

3.0 Management Support of Maintenance

3.0.1 Scope

Good maintenance is influenced by the management philosophy toward maintenance activities. The inspection of this area was conducted to assess the degree to which management is committed to and involved in the maintenance process. Management's commitment was assessed in terms of their support of industry initiatives in the area of maintenance and providing and effectively utilizing technical and other resources in the support of maintenance activities.

3.0.2 Conclusions

The NRC inspection team concluded that Waterford 3 has good programs in place to enable management to provide proper support to maintenance. Some cases were identified in which these programs had not been properly implemented. Some strong points included application of industry

initiatives, management involvement in maintenance, allocation of resources, staffing level of engineers to support maintenance, communications between maintenance and support organizations, definition of maintenance requirements, and radiological controls. Weak areas included a lack of aggressive expansion of the testing program for motor operated valves, inadequate corrective action related to a high pressure safety injection pump deficiency, improper testing of a high pressure safety injection pump, system engineers' lack of experience and system knowledge, a violation involving document control, observed poor industrial safety practices, and failure of the quality organization to identify existing problem areas.

3.1 Management Commitment and Involvement

3.1.1 Scope

This portion of the inspection dealt with determining the emphasis that management had placed on the support of maintenance and management's degree of involvement with the maintenance process. The NRC inspection and assessment of management commitment and involvement included the review of the following:

- Application of industry initiatives
- Management vigor and example

The NRC inspectors also interviewed selected managers and employees to determine their assigned responsibilities in the maintenance area and to ascertain whether these individuals understood their assigned responsibilities.

The NRC inspectors performed a limited review of the licensee's application of industry initiatives. Primarily, this review consisted of an evaluation of the licensee's program for reviewing, implementing, and tracking industry operating experience as well as the licensee's program for maintaining and testing motor operated valves (MOVs).

3.1.2 Conclusions

The NRC inspectors considered that the licensee's application of industry initiatives was functioning well. The NRC inspectors also assessed licensee management vigor and example and found these characteristics to be comparable with other licensees. However, the licensee's lack of aggressive expansion of the scope of MOVs included in the diagnostic signature analysis testing program was considered to be indicative of a lack of management vigor. However, throughout the NRC inspection it was evident that Waterford 3 management was involved in the many facets of the maintenance program.

3.1.3 Findings

The NRC inspectors reviewed the licensee's use and analysis of industry technical information received from external sources. The NRC inspectors' review was primarily centered on industry technical information received since 1985. However, a more extensive review of industry technical information pertaining to MOVs was performed by the NRC inspectors. Overall, the NRC inspectors found the licensee's analysis, implementation, and tracking of such information to be above the industry norm in terms of the completeness and timeliness of the reviews. The NRC inspectors did note, however, that there was no programmatic mechanism to ensure that system engineers were made aware of pertinent industry operating experience. Discussions with licensee system engineers confirmed that in general they were unaware of past or current industry experience that may be pertinent to their systems. The NRC inspectors considered this to be a weakness.

The NRC inspectors performed an extensive review of the licensee's program for maintaining and testing MOVs. This review included an examination of the following:

- MOV preventive maintenance requirements
- Lubrication program for MOVs
- Response to IE Bulletin 85-03, "Motor Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings"
- MOV diagnostic signature analyses
- Postmaintenance testing
- MOV maintenance procedures
- Control of MOV switch settings
- Utilization of MOV industry operating experience

Overall, the NRC inspectors noted that the scope of the preventive maintenance program for MOVs was significantly above the industry norm. The licensee had established similar preventive maintenance requirements and frequencies for both safety-related and balance of plant (BOP) MOVs. These requirements were in conformance with the vendor technical manual maintenance recommendations and other identified industry good practices for maintaining MOVs. The NRC inspector considered the maintenance of BOP as well as safety-related MOVs to be a significant strength. Notwithstanding this programmatic strength, the NRC inspectors observed several specific items of weakness in the licensee's MOV program. The following examples are provided:

- The NRC inspector considered the licensee's program for lubricating MOVs inadequate for preventing the mixing of greases of different soap bases in MOV main gear boxes. Mixing of incompatible greases may result in MOV actuator failure. This finding is discussed in detail in Section 4.3.3 of this report.

- Several safety-related MOVs were not equipped with torque switch limiter plates. The purpose of the limiter plate is to prevent torque switch adjustment above the maximum specified setting. Adjusting the torque switch beyond this point could damage the MOV actuator, the valve, or both.

- The NRC inspectors reviewed the licensee's December 21, 1987, response to IE Bulletin 85-03, "Motor Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings." Of the 20 MOVs tested by use of diagnostic signature analyses equipment under the scope of this bulletin, the NRC inspectors noted that the licensee had found that for several MOVs, the torque switches had been improperly set. Improper torque switch settings had resulted in overthrusting conditions for some MOV actuators and valve stems. The licensee also documented several defective torque switches. On the basis of the relatively high number of problems that were revealed during the testing of only a fraction (about 25 percent) of the safety-related MOVs in the plant, the NRC inspectors believed that it would have been prudent to expand the scope of the test program. Discussions with licensee personnel revealed that only eight additional MOVs had been tested using motor operated valve analyses and test system (MOVATS) equipment during the next refueling outage, thus leaving approximately 65 percent of the safety-related MOVs untested. The NRC inspectors pointed out that several other licensees had undergone extensive MOV refurbishment and test programs, the scope of which covered virtually all the safety-related MOVs. Further discussions with licensee personnel revealed that they intended to increase the scope of coverage for MOV diagnostic signature analyses testing significantly, but were awaiting further guidance from the NRC. Given the efficacy of diagnostic signature analyses testing in resolving MOV switch setting problems, the NRC inspectors viewed the licensee's lack of aggressiveness in expanding the scope of coverage for IE Bulletin 85-03 to be indicative of insufficient management vigor in this area.

- The licensee had established different types of postmaintenance test requirements for MOV actuators. The postmaintenance test requirements for those MOVs, which had not been previously tested using MOVATS equipment, were considerably less comprehensive than for those MOVs which had been tested with the MOVATS

equipment. The NRC inspectors considered the application of different postmaintenance test requirements for similar types of equipment to be a poor maintenance practice.

The NRC inspectors observed that the plant management strongly emphasized maintaining good material condition of the plant and surrounding areas. The licensee had formally assigned an area manager to each area of the plant. These managers were responsible for maintaining good material condition of plant equipment as well as general housekeeping.

The NRC inspectors noted that the licensee had not initiated any formal program to address plant aging awareness. However, the NRC inspectors observed that the currently implemented maintenance trending program would provide an adequate data base in conjunction with the plant's current participation in the NPRDS.

3.2 Management Organization and Administration

3.2.1 Scope

This portion of the inspection dealt with determining the overall extent to which management supports the maintenance activities. The inspection and assessment of management organization and administration included a limited review of the following:

- Allocation of resources
- Definition of maintenance requirements
- Document control system for maintenance
- Maintenance decision process

The NRC inspectors also interviewed selected managers and other employees to determine their assigned responsibilities in the maintenance area and to ascertain whether these individuals understood their assigned responsibilities. Many of the programmatic functions that govern maintenance activities were not directly evaluated by the NRC inspectors. For this area, most of the NRC inspectors' efforts were focused on management's definition of maintenance requirements and the usefulness of the document control system for maintenance. To a lesser degree, the NRC inspectors also evaluated the licensee's allocation of resources.

3.2.2 Conclusions

Although a violation involving field control of technical documents was identified, the NRC inspectors found that maintenance activities were well supported by Waterford 3 management. The NRC inspectors found the licensee's allocation of resources to be excellent.

3.2.3 Findings

The NRC inspectors performed an extensive review of the maintenance requirements for the HPSI system and the emergency feedwater (EFW) system and found them to be comprehensive. As stated in Section 3.1.3 of this report, the maintenance requirements for MOVs were also complete. The NRC inspectors considered this indicative of widespread management involvement in the maintenance process. One exception, however, was noted by the NRC inspectors. The Waterford 3 Final Safety Analysis Report (FSAR), Section 2.4.10, provides flooding protection requirements and states that the nuclear plant island structure (NPIS) is flood protected up to elevation 30 feet MSL. Accordingly, the NPIS is equipped with water tight doors. There was no program in place for routine preventive maintenance or inspections of water tight doors. The NRC inspectors observed that some door seals and seating surfaces had been painted. The NRC inspectors were concerned that such doors might not provide a watertight seal. During this inspection, the licensee developed plans for periodic inspection and testing of water tight doors.

The NRC inspectors reviewed the document control system for maintenance in order to assess the flow of maintenance work authorizations (WA) from WA generation to closeout. Overall, the NRC inspectors determined that the document control system for maintenance was working adequately; however, two weaknesses were observed by the NRC inspectors.

- Procedure UNT-4-002, Revision 2, requires technical documents used in the field to be "field controlled." This procedure specifies the administrative procedures to be used to provide field control of technical documents. Maintenance data forms have been used to provide calibration data used in performance of instrument calibrations. The maintenance data forms, which were included in instrument surveillance procedure packages in 1988 and 1989, were not found to be field controlled as required by Procedure UNT-4-002, Revision 2. During this NRC inspection, the licensee revised Procedure MD-1-002, Revision 00, "Control, Review and Revision of Maintenance Data Forms," to require that maintenance data forms be field controlled as required by Procedure UNT-4-002, Revision 2.

- Instrument information sheets were also included in instrument surveillance procedure packages. These sheets were printed from the Station Information Management System (SIMS) data base and contained setpoint information. These information sheets were found to be referenced on the work authorizations and they were found to be stamped, "FIELD CONTROLLED." However, they were not field controlled as required by Procedure UNT-4-002, Revision 2. They were discarded during the work closure process and were not retained as a plant record. The NRC inspectors found that these

documents, which were used as references during performance of safety-related work, were not controlled and traceable.

The licensee's failure to control maintenance data forms and instrument information sheets, as required by Procedure UNT-4-002, Revision 2, is an apparent violation. (382/8901-01)

The NRC inspectors found Waterford 3 allocation of manpower resources to be excellent. The backlog of maintenance requirements was small and under control. Additionally, the NRC inspectors noted that even though a small group of I&C technicians were contractors who did not receive formal training on Waterford 3 systems, they appeared to be technically competent and were closely supervised.

3.3 Technical Support

3.3.1 Scope

The NRC inspection and assessment of the technical support area included a review of the following:

- Internal Communications
- Engineering Support
- Role of quality control (QC) in the maintenance process
- Integration of radiological controls into the maintenance process
- Safety review of maintenance activities

The NRC inspectors reviewed documentation; held discussions with plant engineering and management personnel; and examined in-process, completed, or scheduled maintenance activities to ascertain the adequacy of communications channels. The NRC inspectors also interviewed selected managers and employees to determine their assigned responsibilities in the maintenance area and to ascertain whether these individuals fully understood their assigned responsibilities.

3.3.2 Conclusions

The licensee's lack of corrective action to resolve the low "B" HPSI pump recirculation flow was a significant concern and remains an unresolved item.

The licensee's apparent failure to implement all of the requirements of IWP 3100, "Inservice Test Procedure," was also a significant concern and remains unresolved.

Though weaknesses in the experience and training of the systems engineers were identified, the NRC inspection team concluded that staffing of the system engineers had only recently been implemented and that, in itself, was a major accomplishment by LP&L. However, the experience level and training provided to the system engineers were insufficient to meet the requirements described in their position descriptions.

Excellent communications and working relationships were observed between maintenance and the onsite technical support and quality assurance organizations. The plant staffing level of the number of engineers in the maintenance and technical support organizations was good, but there was lack of a detailed description of system and component design basis.

3.3.3 Findings

The NRC inspectors attended daily plant meetings at the plant management and technical staff level, maintenance scheduling meetings, and maintenance department meetings at the first line supervisor level. The NRC inspectors noted that the meetings were well planned and that excellent internal communications existed at all levels in the maintenance department. The maintenance department's communications with the technical support organizations were also excellent.

The onsite plant engineering staff reporting to the plant manager, consisted of approximately 50 engineers distributed in the following organizations: 10 engineers assigned to the maintenance department in staff and discipline (e.g., I&C) technical support positions; 16 system engineers assigned to plant engineering; 15 staff and reactor engineering and performance engineers assigned to plant engineering; and about 10 engineers assigned to health physics, chemistry, and other technical disciplines. In addition, the NRC inspectors noted that the nuclear operations engineering and construction organization was located onsite and was available to the maintenance department for technical support of maintenance activities.

Overall, the staffing of the onsite plant engineering organization was determined to be good and above average for a single unit site. However, weaknesses were identified in the implementation and utilization of the system engineering staff in the plant engineering organization in the technical services department. In one case, this weakness may have contributed to an identified degradation of a high pressure safety injection pump going uncorrected until identified by the NRC inspection team.

The NRC inspection team examined selected maintenance and surveillance activities performed during the last two years on the

following systems: high pressure safety injection, emergency feedwater, instrument air, station air, and the nitrogen gas system.

The NRC inspectors identified during the review of the HPSI pump operability checks (required by Technical Specification 4.5.2.f.1, and performed in accordance with Surveillance Procedure OP-903-030, Revision 6, "Safety Injection Pump") that on November 22, 1988, the "B" HPSI pump (SIMPMP0002B) recorded value of recirculation flow was 19.0 GPM (in accordance with Flow Instrument SI-IFI-7121). The NRC inspectors identified that the minimum pump recirculation flow required per the vendor technical manual for the HPSI pump (Ingersoll-Rand HPSI Instruction Manual, 457000272) was 25 GPM. The technical manual, specifically stated, "line [recirculation piping flow path] is to be kept open when starting or stopping and at capacities [flow] less than 25 GPM. It is highly important that this line be open during periods of light load. Failure to provide the necessary minimum flow can cause the rotor to seize and the result would be damaging to the internal parts." The NRC had recently addressed this concern on a generic basis to the industry in NRC Bulletin 88-04, "Potential Safety-Related Pump Loss." A review of Waterford 3 FSAR, Section 6.3, identified that the design flow of the HPSI pump was 380 GPM plus 25 GPM recirculation flow. This is consistent with the pump technical manual.

Upon review of the low recirculation flow data, the NRC inspectors noted that the data sheet, on which pump recirculation flow was recorded, did not contain or identify any value associated with an "Acceptable," "Alert," or "Required Action Range" for recirculation flow, as required by table IWP 3100-2 of Section XI of the ASME Boiler and Pressure Vessel Code Standard, even though the measured value of recirculation flow was recorded. A review of the licensee's Pump and Valve Inservice Test Plan, Revision 5, revealed that the licensee had requested relief (Section 2.1.3) from the IWP-3100 standard because recirculation flow paths contained a restricting orifice, which limited flow through the recirculation line to a specific amount. The licensee argued that the flow rate was a fixed amount and could not be adjusted. On this basis, the licensee stated that the flow rates would be approximately the same each time the tests are conducted, and therefore proposed that an alternate measurement of differential pressure would be compared to the allowable ranges in lieu of a flow rate comparison. The NRC denied this request for relief in a May 20, 1988, letter to LP&L, and required that LP&L measure and record all the parameters in Table IWP 3100-2 in order to determine pump operability. The NRC inspectors also identified that, even though the licensee had been recording recirculation flow during the quarterly surveillances, the flow was not constant from test-to-test. The following table is a summary of the recirculation pump flow data:

Date	Flow (GPM)
01-27-87	31.5
04-15-87	29.5
07-07-87	30
10-01-87	28.5
12-10-87	20
03-15-88	25
06-07-88	26
08-30-88	25.5
11-22-88	19.0

Additionally, Table IWP-3100-2 requires, in part, that flow be measured and that the acceptable range for flow should be 0.94 to 1.02 times the reference flow value (Qr). The table established a low alert range of 0.90 to 0.94 times Qr, a high alert range of 1.02 to 1.03 times Qr, and required action ranges of below 0.90 times Qr and above 1.03 times Qr.

A review of this data revealed that flow varied as much as approximately 25 percent from a nominal flow value of 25 GPM. The surveillance flow data for the "B" HPSI pump varied so much over the past 2 years, the NRC inspector concluded that either flow lower than the low required action range limit or higher than the high required action range limit would have been exceeded some time during the 2-year period regardless of whatever reasonable value of reference flow may have been established. Having not established a reference flow or alert and required action ranges from May 20, 1988, onward, the licensee failed to implement the corrective action requirement of IWP-3230 which would have otherwise been necessary. IWP-3230(b) requires that if deviations fall within the required action range of Table IWP-3100-2, the pump shall be declared inoperative and not returned to service until the cause of the deviation has been determined and the condition corrected.

Failure to test the "B" HPSI pump in accordance with the requirements of IWP-3000 is contrary to Technical Specifications 4.0.3 and 4.0.5 These Technical Specifications require, in part, that inservice testing of ASME Class 1, 2, and 3 pumps shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code except where specific written relief has been granted by the Commission. The licensee's relief request to not require the resistance of the HPSI system to be varied until the reference flow or pump differential pressure are at the reference value was denied by the staff on May 20, 1988, in a letter from the Office of Nuclear Reactor Regulation. It was again denied in the January 19, 1989, transmittal of the staff's Safety Evaluation of the licensee's Pump and Valve Inservice Test Plan, Revision 5. Since the licensee may have failed

to test the "B" HPSI pump in accordance with TS 4.0.5.a from May 20, 1988, onward, it may have failed to meet operability requirements for the pump within the specified time required by TS 4.0.3. This is an unresolved item. (382/8901-02)

The NRC inspector questioned the licensee's representative as to corrective action taken in response to the low recirculation flow for the "B" HPSI pump. The licensee's maintenance representative stated that a CI was written shortly after the test on November 22, 1988, to check the calibration of SI-IFI-7121, since it was suspected as being the cause of the low flow reading. The CI was dispositioned and the instrument was determined to be within calibration. The licensee then wrote CI 259394 to further investigate the low flow condition. However, the CI was not dispositioned because the licensee was awaiting information from Ingersoll-Rand in response to NRC Bulletin No. 88-04 on revised safety-related pump recirculation flow requirements. The NRC inspector noted that the "B" HPSI pump had never been declared inoperable as a result of the low recirculation flow.

In an apparent response to the questioning from the NRC inspector, the licensee performed an engineering evaluation of the low flow condition on January 18, 1989. This evaluation documented that SI-IFI-7121B was probably not the cause of the low flow, but that a possibly clogged orifice (2SI-IFI7127B), or a possible drifting setpoint for the HPSI header "B" relief valve (SI MVAAA220B) could be the cause. A work authorization was generated on January 20, 1989, (WA 01028201) to check SI MVAAA220B for seat leakage and setpoint drift. However, the NRC inspector noted that the work authorization was not scheduled to be performed until the next "B" HPSI train outage, scheduled for March 14, 1989.

The NRC inspector returned to the site on January 30, 1989, and determined that no corrective action had taken place on the "B" HPSI pump. At this time, the NRC informed the licensee that the NRC questioned the operability of the "B" HPSI pump. On January 31, 1989, the licensee informed the NRC that they considered the pump to be operable on the basis that the pump had met the acceptance criteria for OP-903-030. The licensee's determination of pump operability based on meeting its surveillance test procedure acceptance criteria, without fully considering the possible impact of reduced recirculation flow, was a concern to the NRC inspection team. The licensee agreed to run the pump later that day to determine actual recirculation flow.

On January 31, 1989, the "B" HPSI pump recirculation flow was 20.5 GPM as measured during the surveillance. During the pump test, the I&C technician observed that the flow orifice associated with flow instrument SI-IFI-7121 in the return line to the refueling water storage pool (RWSP) was installed backwards. During this test, the licensee also identified that a high pitch whining noise was coming from the pump and that the horizontal outboard pump bearing vibration was higher than normal.

On February 1, 1989, the licensee informed the NRC that an improperly installed flow orifice could result in a reduction in indicated flow. The licensee also noted that maintenance had been performed on the flow orifice associated with SI-IFI-7121 in December 1987, and that the orifice could have been reversed at that time. The NRC inspector noted that reversing the orifice could explain the documented low flow noted on the December 10, 1987, surveillance test. The NRC inspector noted, however, that the licensee did not resolve the low recirculation flow of 20 GPM identified in December 1987. Additionally, a reduction in indicated flow due to a reversed flow orifice does not appear to account for the increase in recirculation flow from 20 GPM in December 1987, to the 25 to 26 GPM range of flows observed during the following three surveillances performed on the "B" HPSI pump.

The licensee initiated WA 01031720 on February 1, 1989, to place the flow orifice in the proper direction. After the maintenance was performed, the pump was run and recirculation flow was recorded as 24.5 GPM. The NRC inspector noted that indicated flow did increase following the reinstallation of the flow orifice in the proper direction. However, flow was still less than 25 GPM, and significantly less than the recorded recirculation flow values that were recorded prior to December 1987, the period during which it had been postulated that the orifice might have been reversed.

Additionally, during the postmaintenance test of the "B" HPSI pump following reinstalling the flow orifice on February 1, 1989, an unusual pump noise was noted. The pump was secured and velocity vibration test equipment was obtained. The pump was restarted and horizontal and vertical vibrations were slightly higher than normal, and the axial vibration was noted to have been extremely high. The pump was secured and declared inoperable by the licensee.

On February 2, 1989, the licensee initiated WA 01031752 to replace the pump inboard and outboard thrust bearings. The bearings were rough and had excessive play. As of February 14, 1989, the licensee had not conclusively established the cause of the excessive thrust bearing wear. It may have been caused, in part, by improper balance drum clearances specified in the technical manual. This will remain unresolved pending followup during a future inspection, which will be documented in NRC Inspection Report 50-382/89-09. (382-8901-03)

On the basis of NRC inspector interviews, observations and questioning of five system engineers on technical issues during the inspection, the following observations were made by the NRC inspection team:

- Some of the system engineers only had 1 to 2 years experience in the nuclear industry.

- A majority of the system engineers had been assigned their systems for only a 1-year period.

- A majority of the system engineers did not maintain a day-to-day knowledge of the systems they were assigned, nor were they expected to by management.

- The system engineers were not required to review CIs or WAs on their assigned systems, nor to witness postmaintenance testing or surveillances performed on their assigned systems.

- The system engineers had not received any detailed formal training on the systems they were assigned.

- The system engineers were not aware of LP&L responses to Institute for Nuclear Power Operations (INPO) Significant Event Reports (SERs) and did not have industry experience files on components in their assigned systems, nor were they on routing for current industry operating experience.

- Training and technical documents available to the system engineers in order for them to perform their assigned tasks were poor. A contributing cause for the inadequate corrective action taken on the "B" HPSI pump was inadequate training of the system engineer. The system engineer, though he was aware of the low flow condition in the recirculation line, was unaware of the corrective action required for this condition. The system engineer was unaware that the main purpose of the pump recirculation line was pump protection while the pump was operating at low or no flow conditions.

Available training material (including systems descriptions (SD-XX Series), FSAR, surveillance procedures, and operating procedures), which the system engineers could use in teaching themselves the design basis of their assigned systems and the operability requirements of the components contained within the assigned systems, was poor. In several instances during the inspection, the system engineers were found to be unaware of operating characteristics of components included in systems they were assigned. In some cases, the operating characteristics of plant safety-related components and equipment were not to be found anywhere in controlled documents, except for the purchase requisition documents (1982-83 or earlier). Since purchase requisitions are not normally a part of a training program, the training provided to the system engineers needs improvements if the Waterford 3 plant management's expectations are that system engineers are to be the individuals who make operability evaluations for degradations identified in safety-related components.

During the walkdown and inspection of air operator topworks for air operated valves, the NRC inspectors noted that copper tubing was installed on the valve topworks for all safety-related valves. The

licensee was questioned as to the acceptability of using copper tubing on safety-related valves. The licensee's representative indicated that the valve topworks were qualified by the vendor with copper tubing installed and provided the NRC inspectors with a letter dated January 28, 1989, stating Ebasco's position on qualification of valve topworks. The NRC inspectors reviewed the seismic report for Valves SI-602A and SI-602B, valves which are required to open on a recirculation actuation signal (RAS) to recirculate water which has accumulated in the containment sump area following a loss of coolant accident (LOCA). The NRC inspectors determined that since the valves are required to operate on an RAS, and are required to remain operable for approximately 1 hour after initiation of a LOCA, the valves must be designed to be able to withstand the design seismic event. The NRC inspectors and licensee also noted that since the valves fail "as is," the topworks of the valve must be designed to remain operable following the design seismic event. The NRC inspector noted that the seismic report, SQ-MM-4, did not identify the use of copper tubing. This is an unresolved item. (382/8901-04)

Quality Control (QC) inspector involvement in several work activities was observed during the inspection and was noted to have been good with excellent communications and planning by both the maintenance and QC departments. However, the NRC inspection team identified a number of concerns (including the HPSI recirculation flow concerns, improper lubrication of valve operators, improper valve manipulations, and cases of poor work practices by maintenance craft personnel), which indicate that the QC function was not fully effective.

The NRC inspectors reviewed the licensee's program to determine the extent to which radiological controls are integrated into the maintenance process. Areas reviewed included: health physics involvement in the planning and preparation to support maintenance work, training and qualifications of maintenance and support personnel, external and internal exposure control of maintenance workers, control of radioactive material, contamination surveys and monitoring, and maintaining maintenance personnel radiological exposures ALARA.

The health physics coverage provided for maintenance activities was observed by the NRC inspectors to be very good. The maintenance and health physics interface for the various work packages observed were performed in a professional manner with a good working relationship between the two groups. Maintenance personnel accepted the guidance provided in both ALARA and crew briefings and contacted health physics personnel prior to breaching systems, which had the potential for containing either liquid or gaseous radioactivity. In general, the maintenance personnel appeared to understand and follow the requirements of the radiation work permits for the specific tasks they were performing.

The general appearance within the radiologically controlled area was excellent. The health physics radwaste group with cooperation from the maintenance cleaning crew have done a very effective job in controlling contamination in this area. The licensee was maintaining over 94.5 percent of the approximate 110,000 square feet floor area as clean. This allowed personnel to access the the area and perform certain maintenance activities without the need for protective clothing or respiratory protective equipment.

When leakage was observed, it was quickly reported to health physics who checked for contamination. Containment devices were used to control both radioactive and nonradioactive leakage to floor drains. These containments were controlled by the health physics radwaste group, which would install them, initiate a CI for repair, and after the leakage was terminated, remove them and decontaminate the area. The good cooperation between all groups to identify, repair, and cleanup the area was noted by the NRC inspectors.

The NRC inspectors noted improvement in the area of ALARA radiation exposure goal setting. The licensee was making the individual work groups more responsive to the amount of radiation exposure each work group received. This will increase the worker and foreman awareness of ALARA goals and the person-rem exposure being received, and will be instrumental in reducing the total person-rem exposure.

The NRC inspectors reviewed the licensee's program to determine the extent to which safety is integrated into the maintenance process. This included an evaluation of work packages and procedures, as well as observing maintenance activities. These observations included the use and storage of hazardous materials, electrical safety, fire protection, and entries into confined spaces and/or inerted atmospheres.

The NRC inspectors reviewed the work package and observed work performed under RWP-89000058, Task 2, for a fuel pool filter replacement. An ALARA briefing was conducted for the work party by a health physics technician and the ALARA coordinator. This briefing was comprehensive and all personnel involved appeared to know their work assignments. The filter would normally be replaced by personnel standing on top of the fuel pool filter vault, but the cable attached to the filter housing lid was broken making it necessary for personnel to descend into the cubicle. Maintenance personnel were scheduled to perform repairs to the filter housing lid cables following the filter replacement.

Entry into the fuel pool filter cubicle required a confined space atmospheric evaluation. When first tested, the cubicle was found to contain an elevated concentration of carbon monoxide and leakage of nitrogen gas into the area was noted. The source of nitrogen gas was determined and secured and the area was purged to reduce the carbon monoxide concentration to an acceptable level.

The NRC inspectors made several observations of maintenance work groups performing various tasks during the inspection period. There appeared to be an overall lack of commitment to personnel safety. This was demonstrated by several examples such as:

- When personnel were spin balancing a rotor in the mechanical shop there was no shield between the balancing machine and personnel in the area. After this was brought to management's attention, a temporary shield was installed.

- The fire pump diesel batteries were protected by a large metal cover. During routine scheduled maintenance activities on the batteries, the cover (which required two men to move) must be removed. There existed the potential for dropping the cover and possibly damaging or shorting the batteries during this process.

- There were filters which must be routinely replaced on the minus 34-foot elevation. The spent filters are radioactive and must be placed in a transfer cask that weighs several thousand pounds. This transfer cask must be manually pushed up a ramp to gain access to the elevator, which is about 2 feet higher than floor level.

- An individual was observed standing under a heavy load suspended from a crane.

- A crane resting on outriggers, with its wheels off the ground, extended its boom with a heavy load to the point where the crane tilted forward, lifting the rear outriggers from the ground.

- Handrails were installed with only two of the four vertical supports in their retention pockets.

- Personnel entered and worked in a confined space without any rescue equipment available in the area.

- Personnel used an instrument line support channel to tie off a rope which was used to support personnel entering and exiting a filter cubicle. A granny knot was used to secure the rope.

The licensee has a good safety record based on hours worked without a lost time accident. These records are often misleading as to the actual safety program. The level of awareness to safety in the maintenance process has been determined by the NRC inspectors to be a weakness in the program.

The NRC inspection team did not review the licensee's program to integrate regulatory documents into the maintenance process. However, as a result of the inspection activities, the NRC inspectors did note that of several licensee responses reviewed, the responses appeared to be technically adequate.

The NRC inspectors performed followup on Generic Letter 83-28, Item 4.1, in accordance with Temporary Instruction 2515/91. This item dealt with verification that the licensee had implemented any vendor-recommended modifications to reactor trip breakers. The NRC inspectors found that Waterford 3 uses General Electric AK-2-25 type reactor trip breakers and that the General Electric Company (GE) has not issued any modification recommendations. However, GE has noted that the bearing grease may start to solidify after about 7 years, possibly affecting breaker response time. The licensee returns the reactor trip breakers to GE for refurbishment on a 5-year interval. The preventive maintenance program checks breaker response times and these times are in the trending program.

4.0 Maintenance Implementation

4.0.1 Scope

Good maintenance performance is influenced by the quality of the established controls. The controls need to be both consistent with management policies, goals, and objectives and detailed to the extent that confusion is minimized. The inspection of this area divides maintenance into work control, plant maintenance organization, maintenance facilities, equipment, and materials control, and personnel control. The NRC inspectors also interviewed selected managers and employees to determine their assigned responsibilities in the maintenance area and to ascertain whether these individuals fully understood their assigned responsibilities.

4.0.2 Conclusions

The NRC inspection team found that Waterford 3 had good programs in place for most of the elements considered in this area. Program areas, which could be improved, were job planning and upgrading of maintenance procedures. Implementation of equipment control procedures was found to be weak, with the three cases of failure to follow procedures identified.

These cases, together with an identified case of failure to follow a preventive maintenance procedure, indicate a need for LP&L management to increase its efforts to ensure procedure compliance.

The lubrication program was found to be inadequate to prevent the mixing of different types of grease in safety-related MOVs outside containment, even after LP&L had found cases of grease being mixed in safety-related MOVs inside containment.

Personnel training was not reviewed extensively, but it appeared to be very good, except for system engineers.

4.1 Work Control

4.1.1 Scope

The inspection and assessment of the work control process included review of the following:

- Maintenance in progress
- Work order control
- Equipment records and history
- Job planning
- Work prioritization
- Work scheduling
- Backlog controls
- Maintenance procedures
- Post maintenance testing
- Completed work control documents

4.1.2 Conclusions

While the programs in this area were generally very good, weaknesses in implementation were noted. Review of maintenance in progress resulted in conclusions that the maintenance workers were well qualified and motivated, but three instances of failure to follow procedures were noted, and improper use of hand tools was observed. In addition, review of completed work records identified an apparent violation in which a preventive maintenance procedure was not followed. The work order control system appeared to be functioning well. Equipment history was, in general, well maintained and retrievable. Job planning was good overall, but did not include all aspects of the job, such as movement of material and supplying the proper hand tools. No problems were noted in work prioritization, work scheduling, or backlog controls, so the programs for these activities were not reviewed extensively. Maintenance procedures were in need of improvement and the licensee had a procedure upgrade program underway. The postmaintenance testing program was good, but air compressor capacity tests after overhaul were not performed until recently. A good program was in place for review of completed work control documents, but some discrepancies identified by the NRC inspection team had been overlooked during the licensee's completed work review.

4.1.3 Findings

On January 31, 1989, the NRC inspectors observed that a mechanical maintenance worker operated Water Chiller Outlet Isolation Valve CHWMVAAA121B, during the performance of maintenance WA 01021204, without the cognizance of the SS/CRS or authorization in the work instructions. The WA was initiated to replace the manual valve operator drive sleeve gear and to lubricate the valve operator.

This activity was conducted on January 31, 1989, and the job was added to Clearance 89-104, which deenergized the chiller pump motor and isolated the chilled water chiller pump inlet and outlet valves. Valve CHWMVAAA121B is the manual chiller outlet isolation valve and was not specifically tagged by this clearance. Maintenance personnel replaced the drive sleeve gear in accordance with the WA; however, the valve was opened and closed several times while lubricating the valve operator. This action was not authorized by the WA and the SS/CRS had not been notified that the valve would be operated. This is an apparent violation of Procedure MD-1-014, Revision 2, "Conduct of Maintenance." (First example - 382/8901-05)

This WA required operations to stroke the valve following maintenance. This was accomplished, but no independent verification of proper valve positioning was accomplished, as required by Procedure UNT-5-010, Revision 0, "Independent Verification program." The licensee's failure to follow the requirements of Procedure UNT-5-010, Revision 0, is an apparent violation. (Second example - 382/8901-05)

Following completion of the fuel pool filter replacement and maintenance to the filter housing lid cable on January 31, 1989, the NRC inspectors observed a maintenance worker standing on the minus 4-foot elevation rotate Valve FS-325 hand wheel several turns. This valve was associated with the fuel pool purification filter drain to the recycle drain header and its hand wheel had a danger tag, No. 89-103-5, attached. This was done under the direction of a second maintenance worker standing on top of the fuel pool filter vault. Administrative Procedure UNT-5-003, Revision 7, "Clearance Requests, Approval and Release," Section 3.4, states that a danger tag, when in place, prohibits the operation of equipment or systems. Operation of a component which has a danger tag attached is an apparent violation. (Third example - 382/8901-05)

The NRC inspectors reviewed the completed work package for WA 01006815. The WA was for 4160 Volt Switchgear 3B-3S to clean and inspect in accordance with Procedure ME-4-121, Revision 3, "4.16-kv Switchgear." The NRC inspectors noted that paragraphs 8.1.24 and 8.1.31, which required torquing of switches and exposed connections, were marked "N/A." Notes in the remarks section of the WA stated "8.1.24 No loose bolts found. Torque not required," and "8.1.31 No loose connections found. Torque not required." There was no approved authorization for the above deviation from the procedure. Step 8.1.24 stated, "Torque all limit switches, auxiliary switches, and switch tie-bolts and record on Attachment 10.1. The torque should be between 23 and 27 inch-pounds." Step 8.1.31 stated, "Verify torque of all exposed electrical connections including the switchgear grounding connections, per Attachment 10.4." Attachments 10.1 and 10.4 were the applicable torque charts for the various sized bolts. The procedure addressed the need for two different torque wrenches in Section 6.2, "Test Equipment." No

torque wrenches were listed on the data sheet for recording M&TE equipment used. The licensee's failure to comply with the requirements of Procedure ME-4-121, Revision 3 is an apparent violation. (382/8901-06) The NRC inspectors brought to the attention of the licensee the need to evaluate the safety significance and operability of this safety-related switchgear and the need to determine if torque requirements had been deleted in other safety-related switchgear.

During review of completed I&C loop calibration procedures, the NRC inspector identified lengthy delays between completion of the outside containment loop instrumentation sections and the sections which include the primary element calibration. Steps in the early sections of these procedures, as well as signoffs on controlling work authorizations, ensured operations shift supervisor authorization and cognizance. Upon completion of the outside containment instrumentation, the procedures did not include steps to notify operations that work was temporarily stopped. When work was restarted at a later date (sometimes 2 months later), to complete the primary element portion, the procedures did not include steps to ensure operation's concurrence and verification of prerequisites. This lack of procedure and equipment control was determined by the NRC inspectors to be a poor practice.

In response to the NRC inspector's concern, the licensee planned procedure changes to add steps in procedures to notify operations of work stopping and restarting in these situations. The NRC inspectors were concerned about the length of time between calibration checks of loop instrumentation and the primary element and whether this process constituted a proper loop calibration verification.

This concern is designated as an unresolved item. (382/8901-07)

The NRC inspectors observed many maintenance activities in progress, including the following:

- Reversal of a HPSI pump recirculation line flow orifice
- Charging pump cylinder block removable/replacement
- Pulsation damper repair
- Charging pump breaker maintenance
- Fire pump diesel starting battery (monthly and weekly)
- Dry cooling tower (DCT) fan motor repair
- Relay maintenance
- Replacement of O-Rings on a Rosemont transmitter
- Review of several completed work packages

The NRC inspectors found that the WA packages included complete details of work to be performed, including step-by-step instructions for removal and replacement of parts. References to the technical manuals were included along with copies of the appropriate technical manual sections. The maintenance personnel were thoroughly familiar

with both the work package and the actual equipment. QA hold points were clearly identified and adhered to. In some instances, the maintenance personnel identified specific steps in the procedure which were out of date or incorrect because of a change of material or actual conditions. The maintenance personnel took appropriate action to have the procedures modified before proceeding with the work. In one case, the maintenance supervisor recognized that some required repair parts taken from storage had exceeded the stated shelf life. Appropriate action was taken to obtain engineering evaluation and approval of these repair parts before use. The conduct of the maintenance organization reflected an understanding of the need for and commitment to quality work.

The licensee has been making a good effort in application of lessons learned to equipment preventive maintenance activities. Knowledge gained, as a consequence of prior equipment problems and repairs, has been factored into the preventive maintenance program in order to enhance reliability and availability. The preventive maintenance programs have been modified to include checks for items that have caused various problems in the past. These vary from minor damage to loss of a component.

Based on the review of completed work order packages and work in progress, the NRC inspectors observed that the task elements in the area of work order control were performed and supervised in an effective manner by the organization.

All maintenance activities on both safety-related and BOP equipment were stored in the SIMS computer data base and in the NPRDS. Except for retrievability of the maintenance history on the core protection calculators (CPCs), the computer data base appeared to be an excellent basis for maintenance trending. The licensee's representative indicated that the redesignation of the CPC subcomponents in the data base would improve this weakness on retrieving CPC maintenance data.

During the inspection, I&C equipment records and history for instrumentation known to have a history of failure were obtained through archive inquiry from the SIMS database. The records and history stored in the SIMS data base were determined to be exemplary. Complete records of corrective maintenance and testing were available for review and evaluation by the NRC inspectors. The information stored in the SIMS included valuable data for input into maintenance trending and root cause analysis. It also provided sufficient cross-reference information for retrieval of documentation and reference material used during performance of specific tasks for more extensive review.

In addition to maintaining a history file for all components, the licensee conducts a root cause evaluation of all failures. This was done with a view toward extending the operating life of a component

or, as required, toward quantifying failure information in order to better predict when a component will fail again. Good examples included:

- Failure of the thrust bearings on the "B" HPSI pump
- Air compressor low flow and premature compressor degradation
- Charging pumps
- Main turbine governor valves

Job planning was performed in an organized manner and was considered quite complete for most aspects of the WAs reviewed. However, the following cases indicate that some aspects of job planning need to be upgraded.

- The NRC inspectors noted some instances where maintenance activities were conducted in a manner that could have resulted in serious personnel injury. One instance involved replacing the cylinder block on a charging pump. The charging pump work being performed under WAs 01023360 and 01027694, involved removing the heavy pump cylinder block, replacing it with a new cylinder block and repairing the pulsation damper. The work package did not include provisions for taking the old cylinder block out of the charging pump room and moving the new one into the room. The actual method of moving the cylinder blocks involved manual actions by four men inside the charging pump room and five to six men outside. All actions appeared to be developed as necessary with no apparent preplanning. The methods, which were finally used, could have easily resulted in personnel injury (i.e., four men lifting a heavy block of metal without mechanical aides, sliding the cylinder block down a ramp on a hand truck which was being restrained by two men holding a rope from behind and two men in front of the hand truck manually restraining it). Handling of the cylinder block within the charging pump room was further complicated by scaffolding which was in place for another purpose. An overhead hoist rail was available in the charging pump room but was not used. The pump block was removed initially using a chain fall suspended from structural members in the room, but there was no evidence of an analysis to demonstrate that the structural members could support the load. Removal of the old cylinder block from the pump room, wrapping the contaminated block for transport to the decontamination area, and actual transport of the old cylinder block were left up to the maintenance and health physics technicians. Lacking any specific instructions, the personnel involved had to improvise.

- The work authorizations reviewed included reference to all special tools that were required for a given maintenance task. However, none of the WAs covered basic hand tools. In several instances, the NRC inspection team noted several instances of misuse of hand tools, including:

- Using a torque wrench in the wrong direction

- Using a torque wrench to hold back on one nut while another nut was being jammed against it using a striking wrench and sledge hammer

- Hammering on the handle of an adjustable wrench

In the NRC inspectors' view, the observed misuse and inefficiency were a direct result of not determining what tools would be appropriate to the task prior to implementing the task.

° The NRC inspectors noted that WA 01021204 listed MM-06-002, Revision 2, "Valve Operator Maintenance," as a reference for work on a manual valve. This procedure included only instructions for work on pneumatic and hydraulic valve operators, and it was of no use during the performance of this WA.

The maintenance backlog on both safety-related and BOP I&C equipment was very small at the time of the inspection. The I&C department was using 14 contract technicians to supplement its staff while upgrading procedures with experienced technicians. The maintenance backlog for electrical and mechanical maintenance was small and under control.

The NRC inspectors identified a weakness in the lack of a preventive maintenance procedure for the nitrogen accumulator subsystems. The licensee's safety-related systems depend solely on the nitrogen stored in the nitrogen accumulators to operate critical valves during accident conditions. Procedure OP-903-032, "Quarterly ISI Valve Tests," was used to test individual check valves associated with the safety-related boundary of the nitrogen accumulator subsystems in Section 8.18, "Nitrogen Gas." Section 8.18 was intended to meet ASME Section XI quarterly check valve test requirements for the 16 identified check valves. However, based on the review of PRE-88-133, it appeared that the licensee was attempting to take credit for the performance of OP-903-032 Section 8.18 for determining the operability and capacity of the atmospheric dump valves' nitrogen accumulators. The NRC inspectors determined that the test methodology of OP-903-032, Section 8.18, was inadequate for determining nitrogen accumulator system operability for the following reasons:

° The nitrogen pressure decay time of 5 minutes was not long enough for a valid system test.

° The acceptance criteria of 10 psig, for determining whether a check valve changes position, is inappropriate for a system operability test because of the allowable error in the test instrument, and the human error in reading a test gauge with a range of 1000-2000 psi.

- Note 1 following Section 8.18 requires that any excessive air leakage, which may cause a check valve to fail the test, be isolated prior to performing the test (specific instructions to isolate any excessively leaking pneumatic valves were included in each accumulator test subsection).

- Verification of proper nitrogen regulator operation is not identified by any stated acceptance criteria in the procedure.

Based on a review of past maintenance records on the nitrogen accumulator subsystems, the NRC inspectors noted that the operability of the nitrogen accumulator subsystems have never been verified as being in an operable condition since the performance of startup testing in 1983. A licensee representative committed to providing a maintenance procedure, which would be performed on an 18-month/refueling cycle basis and which would confirm the operability of the nitrogen accumulators. This is an NRC inspectors followup item. (382/8901-08)

The licensee performed corrective maintenance on SI MPMP0002B on February 2-3, 1988, without a component-specific, corrective maintenance procedure. Vendor technical manuals and work instructions may not provide the requisite guidelines in the best manner to accomplish the task. Also, they were not given the same level of review as safety-related procedures. The licensee only has a generic procedure (MM-6-003, Revision 4 "Rotating Equipment Maintenance") for performing corrective maintenance on safety and nonsafety-related pumps, compressors, fans, blowers, and other rotating equipment. This was considered to be a weakness.

The licensee's process for development of new maintenance procedures included use of appropriate references, use of a writer's guide, procedure validation, and maintenance technician feedback. There was a generic program in effect for upgrading all maintenance procedures. There were approximately 1300 procedures involved, with program completion scheduled for April 1990. Revision 4 of Procedure MM-8-003, "Pressurizer Heater Removal and Replacement," was provided as an example of an upgraded procedure. Revision 4 of MM-8-003 was compared to Revision 3 of the same procedure. Revision 4 included significantly more detail, more notes and cautions, identification of required inputs to the record of performance, and greatly improved graphics. Revision 4 was a substantial improvement over Revision 3, and reflects favorably on the quality of the licensee's maintenance procedure upgrade program.

While the review of the postmaintenance testing program and its implementation were generally favorable, the NRC inspectors determined that no technical acceptance criteria was identified in the postmaintenance testing for the instrument and station air compressors for minimum capacity. The NRC inspectors determined, based on reviewing the maintenance history and completed work

packages from January 1987 to January 1989, that a capacity check on the air compressors was not required after compressor overhaul and repair. An example of the lack of postmaintenance testing acceptance criteria was identified during the review of WA 01028053 for an instrument air compressor, in which the air compressor was replaced with a reworked compressor from the warehouse. The postmaintenance test performed on November 30, 1988, did not require determination of the capacity of the air compressor. Based on discussions with the instrument air system engineer, the NRC inspectors determined that a capacity check had not been performed on any of the station air and instrument air compressors from startup testing (1982-83) until the response to Generic Letter 88-14 required it to be performed in December 1988. Based on the review of the flow capacity tests performed on December 27, 1988, of Instrument Air (IA) Compressors A and B, the NRC inspectors noted that the capacity of the A IA compressor was approximately 50 percent and the B IA compressor was approximately 65 percent (WA 01029635). The NRC inspectors concluded that the licensee had failed to maintain a full capacity instrument air system because of the lack of postmaintenance testing acceptance criteria.

The licensee had a good program for review of completed work packages, but its implementation needed to be strengthened. The licensee's completed work review failed to identify the problems discussed above concerning failure to torque fasteners in switchgear and failure to perform independent verification of the proper position of a chilled water valve.

4.2 Plant Maintenance Organization

4.2.1 Scope

The inspection and assessment of the plant maintenance organization included the review of the following:

- Control of mechanical maintenance activities
- Control of electrical maintenance activities
- Control of instrumentation and control maintenance activities
- Deficiency identification and control methods
- Maintenance trending
- Support interfaces

4.2.2 Conclusions

Waterford 3 had good programs in place and was achieving good implementation in the areas of control of plant maintenance activities, maintenance trending, and maintaining support interfaces. The program for deficiency identification and control was well documented, but a weakness was identified in its implementation. Section 3.3.3 includes a discussion of inadequate corrective action in response to low HPSI pump recirculation flow.

4.2.3 Findings

Based upon interviews with the maintenance superintendents, first line supervisors and craft personnel, and observations of maintenance activities, the NRC inspection team noted that the maintenance organization had been properly staffed and that adequate training had been provided to the craft personnel.

The NRC inspectors, through observation of maintenance activities, interviews with technicians, first line supervisors and technical staff and management personnel, and review of completed work packages and department records, noted a strength in the technical ability, excellent attitude, and professional commitment in the maintenance organization. The following strengths and improvement programs were identified:

- Procedure upgrade effort
- Plans to crosstrain I&C technicians in additional specialized systems
- Provision for technical training of technicians
- Resolution of long-term problems with the process radiation monitoring system
- Root cause analysis of component failures
- Trending and predictive maintenance program
- Good communications between maintenance and technical support organizations
- Good communications within the maintenance organization
- Good involvement in and knowledge of activities under their cognizance by first and second line maintenance supervisors

The licensee has developed an impressive trending and predictive maintenance program. All safety-related and most BOP mechanical components were included in the vibration monitoring program. Other items trended included flow rates, pressures, temperatures, and instrument setpoint drift. Specialized trending software was used to allow meaningful use of trending data. Licensee representatives mentioned plans to further improve this program by consolidating the various trending systems into one program and use of enhanced trending software.

The licensee's deficiency identification program was discussed in Section 2.1.3 of this report. The program appeared to be functioning well, but one case of a CI not receiving appropriate review and corrective action was discussed in Section 3.3.3.

The NRC inspectors verified that the licensee had a program for controlling and updating vendor technical manuals. The NRC inspectors noted that vendor information is formally controlled in accordance with UNT-4-035, Revision 1, "Control of Vendor Information," and NOEP-3-16, "Technical Review of Vendor Information." The only weakness noted in the review of the program was that there was no established method for ensuring that information obtained from a vendor in an informal manner, i.e., from vendor representatives via telephone or FAX, are appropriately incorporated into the vendor manual.

4.3 Maintenance Facilities, Equipment, and Materials Control

4.3.1 Scope

The inspection and assessment of maintenance facilities, equipment and materials control included the review of the following:

- Maintenance facilities and equipment
- Materials control
- Maintenance tool and equipment control
- Control and calibration of measuring and test equipment

The NRC inspectors conducted an inspection of the maintenance facilities, equipment and accessibility in regard to the plant layout and personnel placement.

4.3.2 Conclusions

Three environmentally qualified (EQ) motor operated valve main gear boxes were lubricated with two different lubricants. The licensee's lubrication program was inadequate to preclude the mixing of greases of different soap bases for the main gear boxes of safety-related and BOP MOVs outside the containment. This is an apparent violation of Procedure UNT-5-007, Revision 1, "Plant Lubrication Program."

Control and calibration of M&TE was well maintained. However, several pieces of permanently issued M&TE were found to have had extended uses without having received proper authorization. This was considered a weakness in the implementation of a recent revision to the controlling procedure.

Maintenance facilities and equipment were an enhancement to the maintenance process.

4.3.3 Findings

The NRC inspectors found that the facility arrangement and accessibility were an enhancement to the maintenance process. Plant layout and personnel placement were supportive of the maintenance process. Training and mock-up facilities were available and adequate for the maintenance goals and objectives. Staging areas, laydown areas, and scaffolding were available in sufficient quantities and space.

PRE-88-048 documented that the grease type in the gear boxes of MOVs SI-MVAAA331B, 332A, 332B, 401A, and 401B were found to be indeterminate during preventive maintenance that was performed in May 1988. Subsequent laboratory analysis revealed that high levels of lithium were found in the grease for SI-MVAAA331B, 332A, and 332B. Lithium is a constituent of the lubricant, Mobil Mobilux EP-0. These MOVs are located inside the reactor building. For MOVs located inside the reactor building (containment), the Limitorque technical manual states that Exxon Nebula EP-0 and -1 are the only approved lubricants for Limitorque MOVs, types SMB-000 to -5. The subject MOVs are type SMB-2. Limitorque requires the use of only these lubricants for environmentally qualified MOVs in a harsh environment because they are the only remaining approved lubricants that are qualified by MOV environmental testing. The NRC inspectors reviewed EQMI 3.1, Revision 5, and found that the above listed MOVs were to be lubricated in accordance with the Plant Lubrication Manual (PLM). A review of the PLM 457001150, Copy 029, revealed that the required lubricant for MOVs inside containment was Exxon Nebula EP-0.

The NRC inspectors reviewed the maintenance work orders that accomplished the lubrication of the subject MOVs during the first refueling outage in December 1986. Pertinent information is listed in the table below:

MWO No.	MOV ACTUATOR	DATE LUBRICATED	TYPE LUBRICANT	COLOR OF LUBRICANT
SIXB13	MVAAA331B	12-15-86	Nebula EP-0	Tan
SIXA23	MVAAA332A	12-22-86	Nebula EP-0	Med. Brown
SIXB23	MVAAA332B	12-15-86	Nebula EP-0	Tan

A review of licensee records and discussions with licensee personnel revealed that the next accomplishment of the preventive maintenance activity to check and/or relubricate the MOVs in question was in May 1988 during the second refueling outage. During the second refueling outage, the licensee concluded that some mixing of MOV main gear box lubricant had occurred.

On the basis of this information, the NRC inspectors made the following observations and conclusions.

- The mixing of greases probably occurred prior to December 1986. Discussions with licensee personnel revealed that it was their intent to use the lithium-based Mobil Mobilux EP-0 in all MOVs. Environmental qualification requirements, however, made it necessary to use Exxon Nebula EP-0 for all MOVs inside containment. MWO SIXA23 documented a grease color of "medium brown" for the grease in MVAAA332A. A grease color of medium brown may occur as a result of mixing tan Exxon Nebula EP-0 and black Mobil Mobilux EP-0. No other apparent lubrication of the subject MOVs occurred between December 1986, and the discovery of the mixed greases in May 1988.

- No concurrence of acceptability from the Limitorque Corporation was obtained for the admixture of grease when the licensee initially intended to demonstrate that the admixture was acceptable.

- A review of previous NRC Region IV Inspection Reports revealed similar past problems in this area. For example, NRC Inspection Report 50-382/88-10 documented a case in which the licensee was using a nonenvironmentally qualified Mobil grease product (Mobil-Temp SHC-32 grease) in lieu of the environmentally qualified Chevron SRI-2 for the containment cooling fan motors.

Because of the mixing of greases in certain MOVs located in the reactor building, the NRC inspectors reviewed the licensee's lubrication program for all MOVs to ascertain if a program weakness contributed to the mixing of greases, and if so, to ascertain whether such a program weakness had been corrected to preclude future occurrences. The NRC inspectors made the following observations and conclusions:

- The mixed lubricant in SI-MVAAA 331B, 332A, and 332B was flushed and was replaced with Exxon Nebula EP-0.

- The Plant Lubrication Manual had already been revised to require the use of Exxon Nebula EP-0 for these MOVs.

On the basis of these observations, the NRC inspectors concluded that the licensee's program for lubricating MOVs inside containment was adequate to prevent the recurrence of mixing greases of different soap bases.

The NRC inspectors reviewed the remainder of the MOV lubrication program and noted examples of program weaknesses.

The PLM lubricant data schedule specified Mobilux EP-0 for use in the below listed MOVs:

SI-MVAAA 225A, HPSI HDR A to RC LOOP-1A
SI-MVAAA 225B, HPSI HDR B to RC LOOP-1A

SI-MVAAA 226B, HPSI HDR B to RC LOOP-1B
SI-MVAAA 227B, HPSI HDR B to RC LOOP-2A
SI-MVAAA 228A, HPSI HDR A to RC LOOP-2B
SI-MVAAA 228B, HPSI HDR B to RC LOOP-2B

CIWA 028549, which accomplished the replacement of gasket and seals as well as the relubrication of these and other MOVs, specified the use of Exxon Nebula EP-0. The use of Exxon Nebula EP-0 per CIWA 028549 appears to be acceptable per Maintenance Procedure UNT-5-007, Revision 1, "Plant Lubrication Program," Step 5.4.2 which requires, in part, that "Lubrication activities for plant equipment shall utilize only the lubricants listed in the PLM for that equipment unless otherwise specified on a CIWA . . ." The NRC inspectors reviewed other documents, however, that revealed that subsequent relubrication of the subject MOVs would have resulted in adding Mobilux EP-0, per the PLM1, to these MOVs (which actually were lubricated with Exxon Nebula EP-0). For example, for SI-MVAAA225B, WA 01016791 was performed on August 13, 1988, to lubricate the MOV in the accordance with the PLM, if required. This MOV required no lubrication. Had lubrication been required, however, it appears this WA would have resulted in the addition of Mobilux EP-0 to the MOV main gear box which contained Exxon Nebula EP-0.

PLM 457001150, Copy 029, specified no "Lubricant Data" for MOV main gear boxes for those MOVs located outside containment.

WA 01001929 documented the discovery of the "wrong" grease in MOV EFW-MVAAA 220B, an EFW header blowdown isolation valve. The basis for this determination appeared to be the lubricant color. It was noted as "black" which is characteristic of Mobilux EP-0. A review of the PLM for this MOV revealed that the MOV grease specified was Mobilux EP-0. This conflicts with the guidance in the Lubrication Checklist, Step 3.9.3.4 (attached to 01012369) which stated, in part, that "if the sample is other than TAN in color . . . collect and package an extra sample . . ." TAN colored grease is a characteristic of Exxon Nebula EP-0. It is apparent that the licensee intended for the MOV to be lubricated with Exxon Nebula EP-0, but it was found to contain Mobil Mobilux EP-0 and therefore was classified as lubricated with the "wrong" lubricant. WA 01012370 for BAM-MVAAA 133, an emergency boration bypass header isolation valve, documented another example of this.

WA 01008035 was performed on December 28, 1987, to check the lubricant and relubricate, as necessary, MS MVAAA 416 (BOP), an EFW pump turbine steam supply throttle valve, per the PLM. The lubricant was noted as TAN in color (Exxon Nebula EP-0), but was specified as Mobil Mobilux EP-0 (black) in the PLM. The TAN lubricant was not noted to be wrong because it was consistent with the guidance of Step 3.9.3.4 of the checklist attached to WA 01008035. In this particular case, no lubricant was added because it was not required.

On the basis of these weaknesses, the team made the following observations and conclusions:

- The use of two different types of lubricants for the same component may lead to future occurrences of mixed greases for MOVs.

- The licensee's current program for lubrication provides conflicting guidance and does not assure that future occurrences of mixing of greases will not occur.

- Operations QA has not been effective in identifying and correcting these weaknesses. NRC Inspection Report 50-382/88-200 documented similar findings in that lubrication evaluations were not reviewed by the QA department and the concurrence with the equipment's vendor was not required or requested when changing the lubricant. This finding was documented during the NRC inspection at Waterford 3 during the period February 1-12, 1988.

  The above examples are indicative of a breakdown in the licensee's program for lubricating MOVs outside the containment.

This is an apparent violation of Procedure UNT-5-007, "Plant Lubrication Program." (382/8901-09)

The NRC inspectors audited several pieces of permanently issued M&TE for proper calibration and authorized extended use. All equipment was found to be within its calibration due date. Several pieces of equipment were found to have extended uses without proper authorization. The licensee responded to the NRC inspectors' findings by issuing Quality Notice QA-89-020. From January 23-26, 1989, the licensee conducted Surveillance Report QS-89-003 on approximately 1100 pieces of active M&TE. The surveillance report identified a number of additional findings requiring corrective actions. The NRC inspectors considered the licensee's response to this identified weakness to be satisfactory.

The NRC inspectors inspected the metrology laboratory. The metrology laboratory equipment had proper calibration stickers, was maintained in good condition, and was routinely calibrated.

4.4 Personnel Control

4.4.1 Scope

The NRC inspection and assessment of personnel control included the review of staffing control; personnel training; and current personnel control status.

4.4.2 Conclusions

The licensee has implemented effective controls for personnel staffing and training.

The licensee's maintenance staff appears to be adequate to provide coverage for required maintenance activities and to control the backlog of maintenance items. Adequate supervision of maintenance personnel was noted.

The training programs for maintenance personnel has been aggressive, particularly in providing mockup facilities of plant equipment to serve as training aids. Additional management attention is needed to ensure system engineers are adequately trained to perform their assigned tasks. Plant system descriptions utilized in the system engineers' self study training program were found to be incomplete and out of date.

The licensee has implemented an effective program for ensuring that work activities are performed by qualified individuals.

4.4.3 Findings

Staffing control in the maintenance department was determined to be good. Organization charts were maintained and the turnover rate was low for utility technicians. Vacancies that existed were primarily a result of promotion of technicians and first line supervisors. The worker-to-supervisor ratio for each maintenance discipline was approximately 7 to 1. This ratio appeared to be effective as was evident from the close supervision of the workers by the first line supervisors. Each maintenance organization had a staff of maintenance planners, procedure writers, and a technical assistant. This allowed the first line supervisors increased time for the close supervision of the workers. In addition, the maintenance manager had a staff of approximately six maintenance engineers. The NRC inspectors also noted that the system engineers were assigned maintenance project tasks to supplement the maintenance engineers during refueling outages. For example, the corrosion/erosion inspection and resulting repair of secondary plant piping was managed by a system engineer during the previous refueling outage.

The licensee performs most of the maintenance activities during the day shift. During the NRC inspection period, a high pressure safety injection pump failed during a postmaintenance test. The licensee demonstrated that they were capable of planning and initiating the maintenance activity to replace the pump thrust bearings during the night shift. The licensee was also able to support other maintenance activities which were ongoing during that period.

The NRC inspectors reviewed the maintenance activity backlog and determined that the licensee was able to support the required

maintenance activities in a timely manner. The backlog has increased during the past several months because of maintenance activities associated with correcting deficient fire seals. Work activities which affected safety-related equipment and power generation were being worked without significant backlog. Activities which require procurement of spare parts consists of less than 10 percent of the total backlog.

The licensee has received INPO accreditation for all their training programs. These programs are providing maintenance personnel with comprehensive classroom training supplemented by plant specific training mockups. The training for I&C personnel consists of basic electronic systems training and specific plant systems training on systems such as core protection calculators, control element drive mechanism control system, radiation monitors, and Westinghouse 7300 process controls. The licensee recently purchased a completely operational General Atomic radiation monitoring system which is identical to the system installed in the plant. This system is located at the onsite training facility. Several I&C technicians have also received specific training on this system at the vendor's training facility. The licensee's training facility has also been equipped with the Westinghouse 7300 process control system mockup for training on the plant installed process analog control system.

Because the plant has been in operation for a relatively short time (commercial operation in June 1985), the licensee has decided to have the experienced I&C technicians specialize in several systems rather than become qualified on all plant systems. Contract I&C technicians receive very little formal training. However, they are not assigned complicated systems to work on and generally perform no maintenance above a basic loop calibration, which is precisely described by procedure. The licensee's approach in providing lead specialist technicians on plant systems appeared to have increased the professionalism and pride of the technicians in maintaining plant equipment in good condition.

The NRC inspectors did observe several cases involving the improper use of hand tools. These observations were made mostly of mechanical maintenance personnel. Additional training in this area would be appropriate to improve efficiency and to ensure equipment and personnel safety.

The training program for the system engineers was found to consist of self-study activities. This program did not provide for training on previous industry experiences relevant to the individuals' assigned systems. The self-study program provided did not ensure that each individual was fully qualified to perform his assigned tasks.

The NRC inspectors identified a weakness in the plant systems training being provided to the system engineers and other station

personnel, who utilize the system descriptions for self study. An example of inadequate system descriptions were the Instrument Air System SD-63 and Nitrogen Gas Subsystem (contained in Compressed Gas System SD-64-0) descriptions. The NRC inspector noted that the only reference to the nitrogen accumulators in SD-64-0 was Figure 64-8, dated July 1, 1982. No description for the operating parameters was included, such as the pressure nitrogen gas is reduced to for supplying the instrument air header. The SD-63-0 Instrument Air System description only mentioned that safety-related valves have nitrogen accumulators to provide operating gas when the air compressors are not in service. The NRC inspectors reviewed the descriptions in the FSAR and noted that essentially no design basis information is provided on the requirements that the nitrogen accumulators are designed to meet for postulated accidents except for providing a list of valve operators that are supplied nitrogen when instrument air is lost. The system description for the safety injection system was compared with FSAR Section 6.3 and the system training materials. Several minor description errors were noted between the three referenced materials. The system descriptions were marked as "information only" and have not been updated since the architect engineer developed the material. The NRC inspectors were concerned that since such outdated material was readily available, it might be used by plant personnel to form their basis for knowledge of the systems.

An NRC inspectors attended the January 1989 safety meeting which was offered to all plant personnel. The subjects covered included: lost time accident policy; prejob safety meetings; and the safety manual. The NRC inspectors also attended part of the electrical maintenance group safety meeting. This meeting was attended by the electrical superintendent, foremen and shop personnel. The meetings were found to address pertinent safety issues.

The licensee's control over work performance by qualified personnel was reviewed in the areas of I&C and electrical maintenance. Each maintenance supervisor was found to have a copy of the personnel qualifications list for each maintenance individual. This list is updated periodically by the training coordinator to reflect each individual's qualifications. One instance was identified in which an I&C technician was performing a task for which the individual had not been fully qualified. This case had been recognized by the individual's supervisor, prior to performance of the activity. A waiver was initiated, as required by the licensee's program, authorizing the I&C technician to participate in the activity.

5.0 Inspector Followup Items

Inspector followup items are matters which require further review and evaluation by the NRC and/or the licensee. These items are used to document and track an issue to ensure adequate followup is accomplished.

An inspector followup item pertaining to development and implementation of a procedure to confirm the operability of the nitrogen accumulators is identified in Section 4.1.3 of this report.

6.0 Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether the items are acceptable, violations, or deviations. The following unresolved items were discussed in this report:

Section	Item No.	Subject
3.3.3	382/8901-02	Adequacy of HPSI pump surveillance test procedure and operability of pump
3.3.3	382/8901-03	Corrective action for low HPSI pump recirculation flow
3.3.3	382/8901-04	Seismic qualification of air operated valves with copper tubing on operator topworks
4.1.3	382/8901-07	Instrument loop calibration procedures performed over an extended interval

7.0 Program Assessment

This section presents the NRC inspection team assessment of the licensee's maintenance program, using the maintenance inspection tree described in "NRC Maintenance Inspection Guidance," Volume 1, September 1988. The team noted each assessment element relative to perceived licensee performance in fulfilling the maintenance program objective of that element. A summary presentation of the team's rating of all maintenance program elements is provided on the inspection tree as Attachment 2 to this report. The ratings are presented using a color coding scheme with each block broken into two elements. The upper left half of the block represents the process element adequacy, while the lower right half represents the adequacy of the process element implementation. The color ratings are based on the following criteria:

Green: Process element well documented or process element functioning well

Yellow: Process element adequately addressed or process element in place but could be strengthened

Red: Process element missing or inadequate or process element implementation missing or inadequate

Blue: Not evaluated or insufficient data for evaluation

8.0 Exit Interview

The NRC inspectors met with Mr. R. Barkhurst and other members of the licensee's staff at the end of this inspection on February 3, 1989. At this meeting, the NRC inspectors summarized the scope of the inspection and presented the inspection findings. The licensee did not identify as proprietary any of the materials provided to, or reviewed by, the NRC inspectors during this inspection.

Mr. W. Johnson, the NRC team leader, Mr. J. Milhoan, and Mr. W. Seidle met with Mr. J. Dewease and other members of the licensee's staff on February 10, 1989. At this meeting, inspection findings were discussed and overall conclusions concerning the Waterford 3 maintenance program were presented.

ATTACHMENT 1

DOCUMENTS REVIEWED

Procedures Reviewed

HP-1-101	Administrative Procedure ALARA Program Implementation
HP-1-105	ALARA Improvement Report
HP-1-110	Radiation Work Permits
HP-1-114	Installation of Temporary Lead Shielding
HP-1-117	Hot Spot Identification Report
HP-1-203	ALARA Committee Operation
HP-1-210	Health Physics Instrument Control
HP-1-213	Control of Reactor Containment Building Power Entries
HP-1-214	RCA Control Point Operation
MD-1-002	Control, Review, and Revision of Maintenance Data Forms
MD-1-004	Preventive Maintenance Schedule
MD-1-006	Control of Removed Plant Equipment
MD-1-007	Preventive Maintenance Task Identification
MD-1-011	Review and Approval of Procedures, Changes, Revision and Deletion; Control and Distribution
MD-1-012	Tool Control Procedure
MD-1-014	Conduct of Maintenance
MD-1-015	Measuring and Test Equipment Control
MD-1-016	Failure and Trend Analysis
MD-1-020	Equipment Qualification Program
MD-1-021	M&TE Accountability
MD-1-022	ASME Section XI Repairs and Replacement
MD-1-024	Maintenance Advisory Group
MD-1-026	Maintenance Department Work Center Planning
MD-1-027	MOV Testing, Maintenance and Trending Program
MD-1-028	Writer's Guide for Maintenance Department Procedures
MD-1-029	Check Valve Monitoring (Draft)
MD-1-030	Plant Vibration Program
MD-1-066	Pump Performance Monitoring
ME-3-200	Surveillance Procedure, Station Battery Bank and Charger (Weekly)
ME-3-210	Surveillance Procedure, Station Battery Bank and Charger (Quarterly)
ME-3-230	Battery Service Test
ME-3-410	Motor Operated Valve Thermal Overload Channel Calibration
ME-4-021	Maintenance Procedure: Emergency Diesel Generator
ME-4-055	Maintenance Procedure, Main, Unit Auxiliary and Startup Transformer Maintenance (Weekly)
ME-4-121	Maintenance Procedure: 4.16 KV Switchgear
ME-4-131	Maintenance Procedure: 4.16 KV G.E. Magne-Blast Breaker
ME-4-155	Maintenance Procedure, Reactor Trip Switchgear Breakers
ME-7-006	Maintenance Procedure, 480 VAC and Loss Squirrel Cage Induction Motors
ME-7-008	Motor Operated Valves
ME-7-007	Using MOVATS 2150 System for Testing MOVs
ME-13-015	Battery Charger Capacitor Replacement

MI-1-005	Administrative Controls of Calibration and Maintenance
MI-1-006	Calibration and Loop Check Frequency for Process Instrumentation
MI-3-301	Pressurizer Pressure HI Loop Check and Calibration
MI-3-305	Steam Generator Level Loop Check and Calibration
MI-3-306	Steam Generator Level Loop Check and Calibration
MI-3-316	Pressurizer Pressure (Wide Range) Loop Check and Calibration
MI-3-366	Fuel Handling Building Ventilation System Normal Effluent Exhaust Particulate and Gaseous Radiation Monitor Channel Functional Test
MI-3-372	Control Room Outside Air Intake Isolation Radiation Monitor Functional Test
MI-5-211	Calibration of Control Valves and Accessories
MI-5-521	Turbine Building Switchgear Room Inlet HUT-IT-5211 and 5212 Calibration
MM-4-002	Vibration Measurement and Limits for Rotating Equipment
MM-6-002	Valve Operator Maintenance
MM-6-003	Rotating Equipment Maintenance
MM-6-004	Shaft Coupling Alignment and Belt Tensioning Procedure
MM-6-008	Radioactive Filter Cartridge Replacement
MM-6-011	General Torquing and Detorquing
MM-6-105	Limitorque Motor Operator Maintenance
MM-8-003	Pressurizer Heater Removal and Replacement
NOAP-018	Project Evaluation and Information Request
NOEP-105	SIMS Engineering Closure
NOEP-316	Technical Review of Vendor Information
NOP-005	Corrective Action
NOP-010	Control of Vendor Information
NOP-019	Nonconformance/Indeterminate Qualification Process
NOSAP-103	Evaluation of Industry and In-House Events
NTC-106	Instrument and Control Maintenance Training
NTC-107	Electrical Maintenance Training
NTC-108	Mechanical Maintenance Training
NTC-112	Basic Electricity and Electronics Training
NTC-118	Electrical Maintenance Administrative Training
NTC-119	Basic Electrical Training
NTC-120	Advanced Electrical Training
NTC-121	Continuing Training - Electrical Maintenance Department
NTC-122	Mechanical Maintenance Administrative Training
NTC-123	Basic Mechanical Training
NTC-124	Advanced Mechanical Training
NTC-125	Continuing Training - Mechanical Maintenance Department
NTC-127	General Plant Systems Training
NTC-129	Maintenance Department Contractors Training and Qualification
NTP-003	Nuclear Operations Training Records
NTP-005	Training Materials
NTP-109	Maintenance Department Contractors Training
OP-2-008	Hot Machine Shop and Decontamination Area Ventilation System Qualification
OP-3-016	Instrument Air System
OP-3-019	Nitrogen System

OP-9-003	Emergency Feedwater
OP-9-008	Safety Injection System
OP-100-009	Control of Valves and Breakers
OP-100-011	Section XI Pump and Valve Reference Data and Acceptance Criteria
OP-901-045	Off-Normal Procedure - Severe Weather and Flooding
OP-901-047	Off-Normal Procedure - Toxic Chemical Release
OP-903-030	Safety Injection Pump Operability Verification
OP-903-032	Quarterly ISI Valve Tests
OP-903-033	Cold Shutdown ISI Valve Tests
OP-903-046	Emergency Feedwater Pump Operability Check
OP-903-053	Fire Protection System Pump Operability Test
OP-903-054	Fire Protection Valve Lineup Check
OP-903-056	Fire Protection System Functional Test
OP-903-057	Fire Protection System Flow Test
OP-903-058	Fire Hose Station Valve Cycling Check
OP-903-059	Sprinkler System Functional Test
OP-903-060	Fire Hose Station Inspection
OP-903-063	Chilled Water Pump Operability Verification
OP-904-012	Emergency Feedwater Pump Environmental Qualification Maintenance Input
PE-1-005	Systems Engineering Program
PE-1-009	Emergency Diesel Generator Data Trending and Evaluations
PLG-9-001	Planning and Scheduling Departmental Procedure Development Review and Approval; Change and Revision; and Deletion "Non-Safety Related"
PLG-9-004	Planning and Scheduling Departmental Procedure Data Processing "Non-Safety Related"
PLG-9-007	Routine Scheduling of Station Activities
QAP-012	Corrective Action
UNT-1-002	Procedure Classification, Numbering and Format
UNT-1-003	POM Procedure Development, Review and Approval; Change and Revision; Deletion
UNT-1-015	Equipment Qualification Program
UNT-2-004	Chilled Water System
UNT-4-002	Field Control of Technical Documents
UNT-4-035	Control of Vendor Information
UNT-5-002	Condition Identification
UNT-5-003	Clearance Requests, Approval and Release
UNT-5-005	Working Hour Policy for Nuclear Safety Related Work
UNT-5-007	Plant Lubrication Program
UNT-5-009	Disposition of M&TE Nonconformances
UNT-5-010	Independent Verification Program
UNT-5-011	Calibration and Control of M&TE
UNT-5-012	Repetitive Task Identification
UNT-5-015	Work Authorization Preparation and Implementation
UNT-6-010	Event Notification and Reporting
UNT-7-003	Control of Consumable Materials
UNT-7-004	Technical Specification Surveillance Control
UNT-7-005	Cleanliness Control
UNT-7-006	Housekeeping

UNT-7-017	Confined Space Entry
UNT-7-019	Heat Stress Program
UNT-7-021	Spare Parts Equivalency Evaluation Report/Parts Quality Level Determination
UNT-7-025	Plant Trending Program
UNT-8-013	Materials and Stores Department Receiving, Handling and Storage
UNT-8-043	Handling and Storage of Hazardous Materials by the Materials and Stores Department

Miscellaneous Documents Reviewed

Maintenance Directive No. 22, Maintenance Personnel Individual Training Plans
Failure Data Trending Quarterly Report (November 10, 1988)
Audit Report SA-87-013.1, Control of Measuring and Test Equipment
Surveillance Report QS-88-020, Record Searches From M&TE Nonconformances
Surveillance Report QS-88-032, Refuel 2 Outage Activities
Surveillance Report QS-89-003, M&TE Issue and Tracking
Quality Notice QA-89-020, M&TE
Licensee Event Report 88-023-00, Spray Pump Inoperable Due to Inadequate Procedure Control of M&TE
Licensee Response to Generic Letter 83-28, Item 4.1
Potentially Reportable Event PRE-88-048, Grease Found to Be Indeterminate for SI-331A, 331B, 332A, 401A, and 401B
Environmental Qualification Input File, Limitorque Motor Operators
Limitorque Maintenance Update 88-2
Licensee Response to NRC Bulletin 85-03
Startup Test SFG-24-001, Station Air
Startup Test SFG-23-001, Instrument Air
Weekly Task Report, Tasks Past Due Date, Weeks of January 20, 1989 and January 29, 1988
Weekly Task Report, Tasks Past Late Date, Weeks of January 20, 1989 and January 29, 1988
SIMS Corrective Maintenance Reports, Weeks of January 20, 1989 and January 29, 1988
Vibration and Temperature Data, Control Room Ventilation System Fan B
Emergency Feedwater System Task Schedule
Emergency Feedwater System Repetitive Tasks
SMR CC-004, Station Modification Request for Dry Cooling Tower Fan Motor Pedestals
Audit Report SA-88-029.1, Maintenance
Availability Investigation Report - Dry Cooling Tower Fan Motors
Quarterly System Outage Schedule
LP&L Evaluation Report, Lubrication Evaluation for Emergency Feedwater System
Environmental Qualification Input File, Emergency Feedwater System Components
Component Data Summary Sheets, Emergency Feedwater System
Completed Surveillance Test Records for HPSI Pumps for 1987 and 1988
Notebook, MOV Program and Information
Surveillance Report QS-88-001, Plant Lubrication Program
Drawing G-153, Sheet 4 of 6, Emergency Feedwater System
Drawing G-167, Sheet 1, High Pressure Safety Injection System

OA&ID Activities Report
Surveillance Report QS-88-025
System Descriptions: Station Air System, Safety Injection System, Instrument Air System, and Compressed Gas System
Information Sheets, All Safety-Related MOVs
LP&L Internal Memos, Responses to NRC Information Notices 82-10, 84-10, 84-36, 85-02, 85-20, 85-22, 86-03, 86-29, 86-71, 88-23, and 88-28

Equipment History Files Reviewed

Safety Injection System
Main Turbine
Emergency Feedwater System
Instrument Air System
Other specific component files

Task Cards Reviewed

MWO SPM-001	Reactor Trip System Trip Circuit Breaker 1 Instruction ME-4-155
MWO SPM-002	Reactor Trip System Trip Circuit Breakers 5 Instruction ME-4-155
MWO 000437	Operability Verification of SIMPM0002B
MWO 015005	Operability Verification of SIMPM0002B
MWO SIA401	EQ, SI-401A
MWO SIB401	EQ, SI-401B
MWO CAR103	EQ, CAR-201A
MWO SIXA23	EQ, SI-332A
MWO SIXAB	EQ, SI-331A
MWO CAR203	EQ, CAR-201B
MWO SIXB23	EQ, SI-332B
MWO SIXB13	EQ, SI-331B

Condition Identification Reports Reviewed

259034	Reactor Coolant Pump B Torque Arm Damper Assembly Springs
259394	HPSI Pump B Recirculation Orifice Suspected to be Clogged
261182	Excessive Motor End Bell Clearance on Dry Cooling Tower Fan Motor 3-SA

Technical Manuals Referenced

452000405	Wafer Sphere Butterfly Valves
452001150	Plant Lubrication Manual
457000272	HPSI Pump
457000345	Nash Rotary Air Compressors
457000364	Emergency Feedwater Pumps and Drivers
457000490	Masoneilan Control Equipment
457002390	Bettes Valve Actuators

Work Authorizations Reviewed

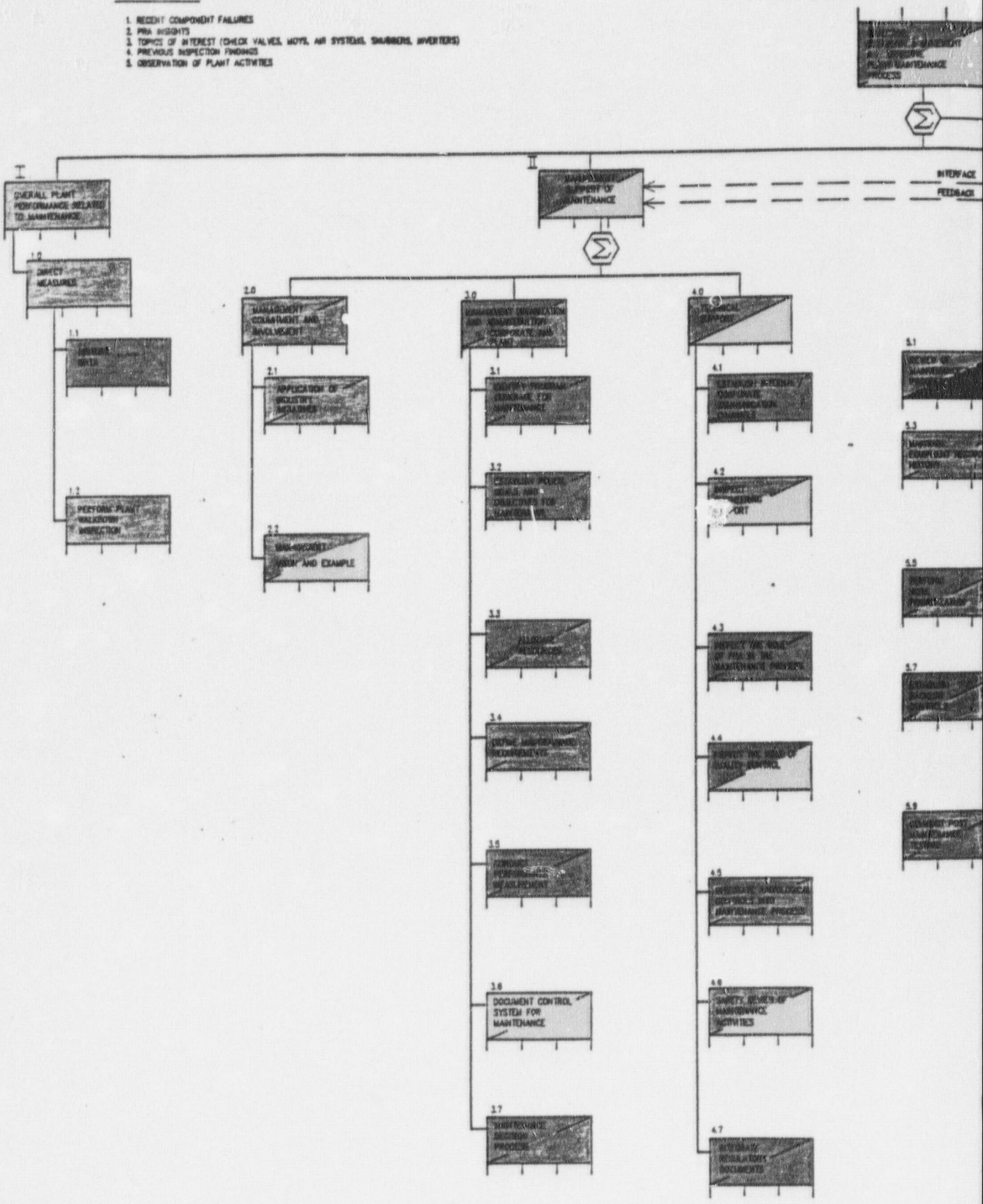
028549	Remove Old Lubricant and Relubricate: SIMVAAA225A, SIMVAAA228A, SIMVAAA226B, SIMVAAA225B, SIMVAAA227B, SIMVAAA228B, SIMVAAA226A, SIMVAAA227A
01000230	HPSI Pump AB Discharge Valve Operator
01000667	Repair Packing Gland Leak on SI-205B
01001929	Wrong Lubricant in EFWMVAAA220B
01003897	Pressurizer Pressure Surveillance
01004041	Verify Operability of HPSI Pump B
01006672	Test CAREMTR311A ISM
01006673	Test CAREMTR311B ISM
01006714	Test SIEMTR311A 8D
01016715	Test SIEMTR311A 8H
01006716	Test SIEMTR311A 8M
01006730	Test SIEMTR311B 8D
01006731	Test SIEMTR311B 8H
01006733	Test SIEMTR311B 8M
01006815	Clean and Inspect 4160 Volt Switchgear 3B3S
01017413	SI-332B Does Not Meet Lubrication Requirements
01007541	Diesel Generator A Maintenance and Test
01007542	Diesel Generator B Maintenance and Test
01008035	Lubricate MS-416
01009313	Replace Handwheel Bevel Gear on SI-226A
01009579	Verify Operability of HPSI Pump B
01011879	Lubricate CARMVAAA201A
01011880	Lubricate CARMVAAA201B
01011930	Replace Handwheel on SI-332A
01012369	Lubricate BA-113B
01012370	Lubricate BA-133
01012880	Pressurizer Pressure Surveillance
01012884	Steam Generator Level Surveillance
01012886	Steam Generator Level Surveillance
01013687	Pressure Switch Calibration
01013851	Replace BUNA-N Seals on SI-139A
01016412	Lubricate SI-120A
01016790	Lubricate SI-219B
01016791	Lubricate SI-225B
01016820	Lubricate SI-226B
01016918	Lubricant in SI-331B Does Not Meet Requirements
01016919	Lubricant in SI-401B Does Not Meet Requirements
01017206	Nitrogen Accumulator Check Valve
01017751	Replace Lubricant in SI-401A
01017764	Replace Lubricant in SI-401B
01017773	Replace Lubricant in SI-332B
01017776	Replace Lubricant in SI-331A
01018074	Replace Lubricant in SI-331B
01018144	Nitrogen Accumulator Check Valve
01018533	Grinding Noise in MS-119
01020310	Instrument Air Compressor A

01021060	Reactor Trip System Trip Circuit Breaker 1 Functional Test
01021205	Reactor Trip System Trip Circuit Breaker 2 Functional Test
01022104	Repair Chilled Water Manual Valve
01022135	Radiation Monitor Surveillance
01022481	Instrument Air Compressor A
01022801	Low HPSI Pump B Recirculation Flow
01022994	Containment Spray Pump A - Perform Vibration Survey
01023360	Charging Pump A - Machine Suction Check Valve
01023484	Verify Operability of Battery AB-S
01024101	CPC Power Supply
01024394	Calibrate SIIFI7121-B
01025605	Verify Operability of Battery B-S
01025686	Charging Pump A - Perform Pump Maintenance
01025705	Verify Operability of HPSI Pump A
01026010	Maintenance and Operability Check on Startup Transformer 3A
01026147	Radiation Monitor Surveillance
01026428	Temperature Loop Calibration
01026789	Implement DC-3116
10126881	Replace Bearings on Dry Cooling Tower Fan 5-SA Motor
01027036	Instrument Air Compressor A
01027319	Instrument Air Compressor
01027694	Charging Pump A - Rework Pulsation Damper
01028053	Instrument Air Compressor A
01028614	Test Manway Stud Tensioner
01029059	Containment Spray Isolation Valve - Perform Routine Inspection for Gear Operated Manual Valves
01029599	Quarterly Surveillance on Battery 3A-S
01029816	Radiation Monitor Surveillance
01029865	Coupling Alignment Verification on Chilled Water Pump B
01030615	Station Air Compressor B
01030713	DC Voltage Standard
01030904	CPC A Functional Test
01030972	Rebuild Spare Air Compressor
01031720	Reorient Orifice in High Pressure Safety Injection System Recirculation Line
01031752	High Pressure Safety Injection Pump B - Replace Inboard and Outboard Thrust Bearings

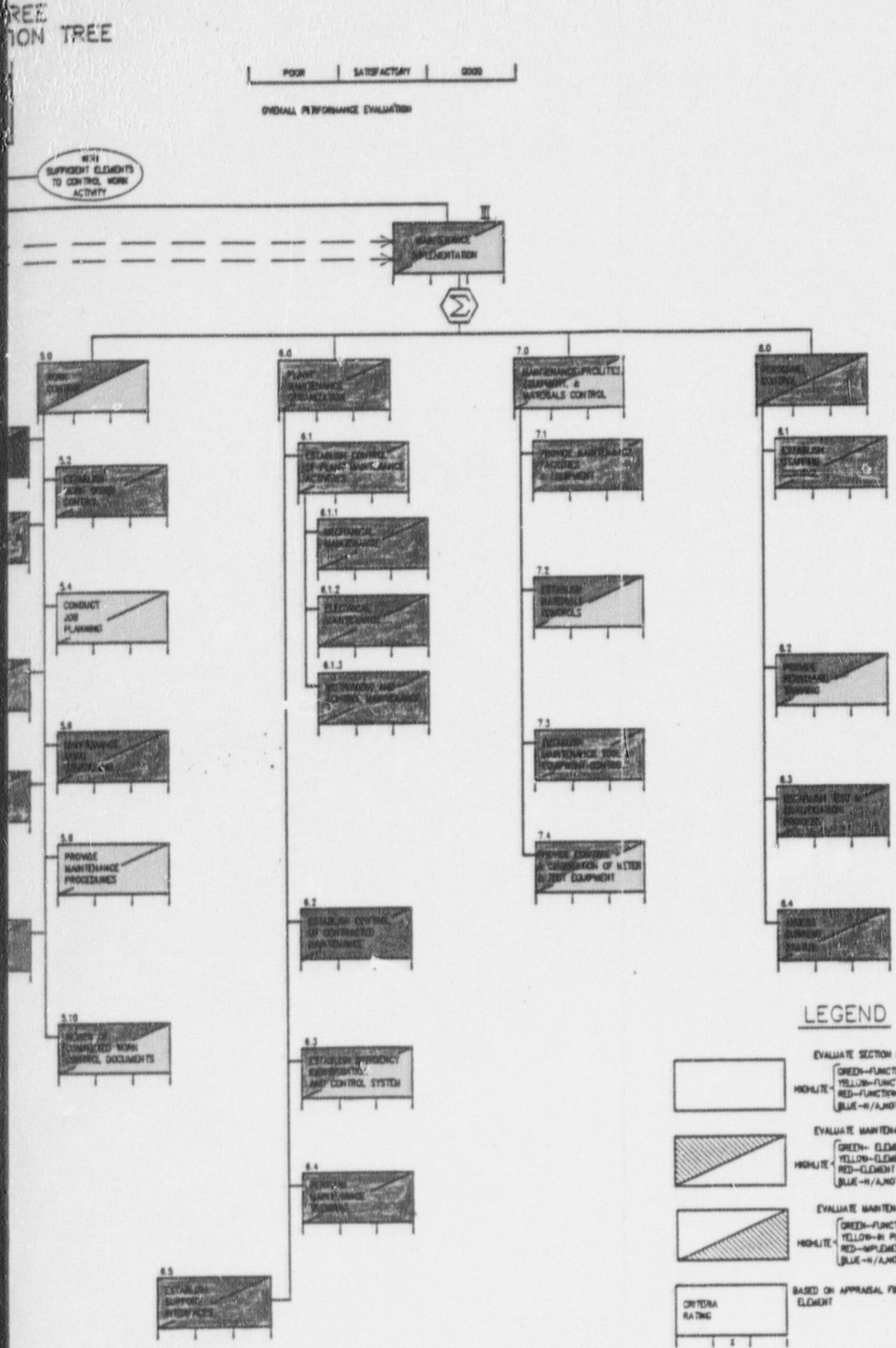
PRESENTATION T
MAINTENANCE INSPEC

TREE INITIATORS

1. RECENT COMPONENT FAILURES
2. PRA INSIGHTS
3. TOPICS OF INTEREST (CHECK VALVES, MOVS, AIR SYSTEMS, SNUBBERS, INVERTERS)
4. PREVIOUS INSPECTION FINDINGS
5. OBSERVATION OF PLANT ACTIVITIES



NOTE: THIS DWG. IS USED IN CONJUNCTION WITH 425801, 425802, 425803, 425804, 425806, 425807 & 425808.



LEGEND

EVALUATE SECTION I. ELEMENTS

HIGHLITE:
- GREEN—FUNCTIONING WELL
- YELLOW—FUNCTIONING ADEQUATELY
- RED—FUNCTIONING INADEQUATELY
- BLUE—N/A,NOT EVALUATED OR INSUFFICIENT DATA FOR EVALUATION

EVALUATE MAINTENANCE PROCESS ELEMENT ADEQUACY

HIGHLITE:
- GREEN— ELEMENT WELL DOCUMENTED
- YELLOW—ELEMENT IS ADEQUATELY ADDRESSED
- RED—ELEMENT IS MISSING OR INADEQUATE
- BLUE—N/A,NOT EVALUATED OR INSUFFICIENT DATA FOR EVALUATION

EVALUATE MAINTENANCE PROCESS ELEMENT IMPLEMENTATION

HIGHLITE:
- GREEN—FUNCTIONING WELL
- YELLOW—IN PLACE BUT COULD BE STRENGHTENED
- RED—IMPLEMENTATION MISSING OR INADEQUATE
- BLUE—N/A,NOT EVALUATED OR INSUFFICIENT DATA FOR EVALUATION

CRITERIA RATING — BASED ON APPRAISAL FINDINGS ASSIGN A RATING FOR EACH ELEMENT

8/15/88
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