U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-373/89010(DRS); 50-374/89010(DRS)

Docket Nos. 50-373; 50-374 Licenses No. NPF-11; NPF-18

Licensee: Commonwealth Edison Company
P. O. Box 767
Chicago, IL 60690

Facility Name: LaSalle County Station, Units 1 and 2

Inspection At: LaSalle Site, Marseilles, Illinois

Inspection Conducted: May 1-5, 15-19, and 25, 1989

Inspectors: S. D. Eick, Team Leader — Date: 6/26/89

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J. Roman, Illinois Department
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Approved by: F. J. Jablonski, Chief
Maintenance and Outages Section — Date: 6/27/89

Inspection Summary

Inspection on May 1-5, 15-19, and 25, 1989 (Reports No. 50-373/89010(DRS); No. 50-374/89010(DRS))

Areas Inspected: Special announced team inspection of maintenance, support of maintenance, and related management activities. The inspection was conducted utilizing Temporary Instruction 2515/97, the attached Maintenance Inspection Tree, and selected portions of Inspection Modules 62700, 62702, 62704, 62705, and 92701 to ascertain whether maintenance was effectively accomplished and assessed by the licensee.

Results: Areas of strength and weakness were identified as discussed in the Executive Summary. Overall implementation of the licensee's maintenance program is synopsized in Section 4.0 and was determined to be satisfactory. There were three violations: failure to adequately test the bypassing of diesel generator trips as required by the Technical Specification; failure to adequately review diesel generator test procedures; and failure to take prompt corrective action on potential common mode failure of Limitorque MOV torque switches.

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DETAILS

1.0 Persons Contacted

Commonwealth Edison Company (CECo)

*D. Galle, Vice President, BWR Operations
*G. Diederich, Station Manager
*T. Hammerich, Regulator Assurance Supervisor
*W. Huntington, Services Superintendent
*N. Kalvianakis, General Manager (BWRs)
*T. O'Conners, Mechanical Maintenance Master Mechanic
*J. Payton, Electrical Maintenance Master Electrician
*J. Renwick, Production Superintendent
*W. Sheldon, Assistant Superintendent, Maintenance
*B. Shelton, Corporate Director of Engineering Performance

U. S. Nuclear Regulatory Commission (NRC)

*H. Miller, Director, Division of Reactor Safety, RIII
*R. Cooper, Chief, Engineering Branch, RIII
*F. Jablonski, Chief, Maintenance and Outage Section, RIII
*R. Lanksbury, Senior Resident Inspector
*W. Shafer, Chief, Project Branch 1, RIII

Illinois Department of Nuclear Safety

*J. Roman, Site Representative

*Denotes those present at the exit meeting on May 25, 1989.

Other licensee personnel were contacted as a matter of routine during the inspection.

2.0 Licensee Action on Previous Inspection Findings

2.1 (Closed) Violation (373/88006-02 and 374/88006-02): Failure to take timely corrective action to close out Discrepancy Records (DR). The inspector verified by interviews and reviews of a procedure and records that the licensee had implemented the corrective action indicated in the response to the violation dated May 3, 1988. The open DRs that resulted in the violation had been closed and review of selected completed DRs indicated corrective action was adequate. The Quality Control (QC) supervisor reports the status of all open DRs to station management at the biweekly Department Head's meeting. The DR Procedure, LAP-1500-3 had been revised to provide additional guidance to people filling out DRs. QC provided station management with a monthly written report that discussed the status of DRs. On May 5, 1989, licensee's records indicated that there were 64 open DRs with 25 open greater than

90 days. Justification for the DRs to be open greater than 90 days appeared to be adequate. The inspector has no further concerns in this area. This item is closed.

3.0 Introduction to the Evaluation and Assessment of Maintenance

This inspection was conducted to evaluate the extent that a maintenance program had been developed and implemented by the licensee of LaSalle County Station. Three major areas were evaluated: (1) overall plant performance as affected by maintenance; (2) management support of maintenance; and (3) maintenance implementation. This inspection was based on the guidance provided in NRC Temporary Instruction 2515/97, "Maintenance Inspection," and Drawing 425767-C, "Maintenance Inspection Tree." The drawing, which is attached to this report, was used as a visual aid during the exit meeting to depict the results of the inspection.

The goals of this inspection were to evaluate maintenance activities to determine if maintenance was accomplished, effective, and assessed by the licensee to assure the preservation or restoration of the availability and reliability of plant structures, systems, and components to operate on demand.

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

3.1 Performance Data and System Selection

3.1.1 Historic Data

The inspectors reviewed plant operations history data since January 1, 1989, to assess the licensee's performance in meeting established goals. The data pertained to reactor trips, Engineered Safety Feature (ESF) actuations, and force outage rate. Results were:

- One unplanned reactor trip occurred on Unit 1 and no trips occurred on Unit 2. The reactor trip was not maintenance related. The goal was < 3.

- Six ESF actuations occurred on Unit 1 and seven occurred on Unit 2. No goal for 1989 had been established; however, the 1988 goal was < 12.

- Forced outage rate for Unit 1 was 2.8%; Unit 2 was 0%. The goal was < 4.5%.

Overall performance in the above areas exceeded the established goals set by station management.

The inspectors also assessed other data furnished by the licensee to ascertain the availability and operability of selected systems since January 1989. Results of this review indicated that the availability of the Emergency Diesel Generators (EDG), Residual Heat Removal (RHR), and High Pressure Core Spray/Reactor Core Isolation Cooling (HPCS/RCIC) was greater than 97% for both units. No plant goals, however, were established in these areas. The licensee indicated that goals would be established when INPO had given guidelines on acceptable numbers based on industry experience. The inspectors indicated to the licensee that an assertive management might have set goals for these areas based on plant history instead of guidance from INPO.

The licensee utilized goals to measure if maintenance was accomplished. The criteria included maintenance backlog and preventive maintenance (PM) and corrective maintenance (CM) PM/CM ratio. However, the licensee had not established goals for measuring effectiveness of maintenance such as the number of limiting conditions for operations due to equipment problems and number of power reductions due to equipment problems.

The inspectors also reviewed data that described the LaSalle operating history in terms of availability, operability, reliability, and radiation exposure. Included were Licensee Event Reports (LERs), the latest Systematic Assessment of Licensee Performance (SALP) report, completed NRC inspection reports and other industry data. Primarily, the inspectors were sensitive to technical and managerial problems that appeared to be maintenance related. Results of this review indicated that there were potential weaknesses in procedure adequacy. LER 88-18 identified the failure of the 1B EDG output breaker to close in 13 seconds. Root cause was identified as worn parts, which were not required to be inspected by the applicable PM procedure.

Based on the results of these reviews the inspectors were sensitive to the issues and potential weaknesses that existed. During this inspection, concerns were identified that related to the weaknesses and are discussed throughout this report.

3.1.2 System Selection

The systems and components selected for this inspection were based on a Probabilistic Risk Assessment (PRA) study furnished to the team by the Reliability Applications Section of the Office of Nuclear Reactor Regulation. The systems/components selected were:

Electrical

Battery (U-2)
Battery Charger (U-2)
Emergency Diesel Generators (EDG) (U-1): (Div. I(Swing), Div. II, Div. III)
Drywell Pneumatic System (U-1, U-2)
Intrument Air (IA) System (U-1, U-2)

Mechanical

HPCS Pumps (U-1, U-2)
IA System (U-1, U-2)
Low Pressure Core Injection (LPCI) Pumps (U-1, U-2)
RHR Relief Valves (U-1, U-2)
RHR Containment Isolation Valves (U-1, U-2)

Instrumentation

EDG
IA
Instrumentation Nitrogen (IN)
Overcurrent Relays (4160V Breakers)
Undervoltage relays (Load Shedding and Degraded Relays)

3.2 Description of Maintenance Philosophy

The inspectors reviewed site policy statements, administrative procedures, organization charts, established goals, and documents that described improvement programs for the maintenance process. The licensee did have a documented comprehensive maintenance plan that included milestones and completion dates for improvement programs and goals. Discussions by the inspectors with selected managers indicated that those personnel were knowledgeable and aware of established performance goals.

The inspectors determined that the licensee's maintenance program was appropriately balanced between CM and PM. The licensee's predictive maintenance program was at the early stages of implementation and similar to the the rest of the industry in areas such as performance monitoring of heat exchangers, erosion/corrosion pipe monitoring, vibration analysis, oil sampling, and thermography. No overall evaluation was made in the area of predictive maintenance. The licensee's philosophy of maintenance included only limited principles of reliability centered maintenance (RCM). For example the licensee recently performed an RCM Study of the Feedwater System and plans to have additional RCM System studies performed.

LaSalle performed diagnostic Motor Operator Valve Analysis and Testing System (MOVATS) tests for MOVs described in Bulletin 85-03 "Motor Operated Valve Common Mode Failure During Plant Transients Due To Improper Switch Settings." However, diagnostic testing of non-bulletin safety and non safety-related MOVs was not accomplished; therefore, the licensee's program in this area was considered behind the industry. It was noted that the licensee recently implemented a valve test program which appeared to be more comprehensive than MOVATS.

3.3 Observations of Current Plant Conditions and Ongoing Work Activities

3.3.1 Current Material Condition

The inspectors performed general plant as well as selected system and component walkdowns to assess the general and specific material condition of the plant to verify that Work Requests (WRs) had been initiated for identified equipment problems, and to evaluate housekeeping. The selected systems and components are identified in Section 3.1.2 of this report.

Walkdowns included an assessment of the buildings, components, and systems for proper identification and tagging, accessibility, fire and security door integrity, scaffolding, radiological controls, and any unusual conditions. Unusual conditions included but were not limited to water, oil or other liquids on the floor or equipment; indications of leakage through ceiling, walls or floors; loose insulation; corrosion; excessive noise; unusual temperatures; and abnormal ventilation and lighting. Results are as follows:

- Housekeeping appeared to be satisfactory for a plant in operation. However, housekeeping was lax in some areas. For example, anti-contamination clothing was laying on the floor in the RHR corner rooms. Debris and tools were noted on the Control Rod Drive (CRD) filter skid and in several other areas of the plant. The inspectors did not identify any calibrated tools that were not properly controlled.

- In the auxiliary electric room for Unit 2, the inspectors noted a tag dated April 20, 1989, for the solenoid valve continuity lights for Automatic Depressurization System (ADS) valve, 2821-F013R. This tag identified that the lights were not lit. The solenoids must energize to open the ADS valve. The inspectors also identified two other ADS solenoid valve lights that were not lit and no WRs had been issued. There was no effect on operability of the solenoid valves because the problem was determined to be burned out light bulbs. Discussion with licensee personnel determined that the operator's equipment rounds log did not require the equipment operators to verify the status of these lights. The licensee initiated a change to the operator rounds log to require the monitoring of ADS solenoid continuity lights.

- In the area of the Unit 1 IN system compressors, the inspectors noted that all pressure and temperature indicators lacked calibration stickers, and several nameplates were missing from the indicators. Licensee personnel stated that Instrument Maintenance (IM) Department kept a master index of all plant instruments, indicators and gauges calibration frequency and due date; therefore, no calibration stickers were required on installed instrumentation. An examination of the master index revealed that all IN system indicators were in calibration. Licensee personnel also stated that a program to update component identifier nameplates was in progress.

- In Unit 2A Condensate and Condensate Booster Pump Room, the inspectors noted that several pressure gauge name plates did not match the particular gauges to which they were attached. This condition could lead to operator confusion in recording parameters for logs and/or maintenance evolutions. The licensee corrected this condition after the inspector identified it.

- Unit 2C Booster Pump (2C 07BC) had oil leaking at the thrust end bearing drain. The licensee prepared a WR to repair the oil leak.

- Unit 2C Condensate Booster and Condensate Pump had a leaking check valve at the flange and the Booster pump had a packing gland leak on the cutout valve. The licensee prepared a WR to repair the leaks.

- Jacking bolts were not backed off from the feet of Unit 2A, 2B, and 2C Condensate Booster and Condensate pumps and Unit 1A and 1B DG. The licensee prepared a WR to adjust the jacking bolts.

- In Unit 2A Reactor Feed Pump Room, the inspectors noted that oil had collected on the floor, apparently from a valve actuator located overhead. No WR had been written to repair the actuator. A check later in the day revealed that more oil had accumulated. A WR was subsequently written to repair the actuator.

- In the control room, the inspectors noted that the wiring "tunnels" between the front and back of the control consoles lacked any form of fire protection equipment even though the area contained open wiring panels and electrical buswork, and was frequently used when performing surveillance checks. Outside the access doors to these tunnels there were signs that indicated the presence of fire extinguishers, but the extinguishers were not visible from the access doors. In the event of electrical fire in the tunnel, the inspectors determined maintenance personnel would not be able to expeditiously locate fire fighting equipment. The plant Fire Marshall agreed to review this concern.

There was a requirement to tag components that needed maintenance. The inspectors noted deficiency tags hung on various equipment and verified that WRs had been initiated. Except as noted, in general, equipment problems identified by the inspectors during plant and system walkdowns had already been identified by the licensee. None of the problems identified had a detrimental affect on operability.

3.3.2 Ongoing Work Activities

The inspectors observed ongoing work in electrical, mechanical and instrument maintenance areas. The inspectors selected these activities from the plan of the day listings, work assignments in individual maintenance shops, and through discussions with individual foremen. Where possible, safety significant activities were chosen for followup.

All maintenance activities were witnessed/observed to determine if those activities were performed in accordance with required administrative and technical requirements. Work activities were assessed for the following areas:

Administrative approval prior to start of work.
Equipment properly tagged.
Replacement parts acceptable.
Approved procedures available and properly implemented.
Work accomplished by experienced and knowledgeable personnel.
Appropriate post maintenance testing included and conducted.
QC involvement.

3.3.2.1 Ongoing Electrical Maintenance (EM)

The inspectors observed portions of four electrical maintenance/ surveillance activities as discussed below:

LOS-DG-SA3 - D/G Semi-Annual Operability Test With Response Time

LST 89-047 - Contact Closure Verification Test for 10.20 and "0" D/G Relays

LST 89-048 - HPCS D/G Relay Contact Verification-Unit 1 and Unit 2

WR #89497 - 2B D/G did not shutdown from remote, local or emergency button

The inspectors concluded that the performance of electrical maintenance activities was accomplished by skilled maintenance personnel. The mainterance personnel appeared knowledgeable in the work performed. Communications between electrical maintenance, operations, and technical staff were satisfactory. However, concerns were identified during observations of surveillance activities LOS-DG-SA3.

- Technical Specifications (TS) 4.8.1.1.2a.4 and 5, required that the start of EDGs for surveillance tests occur once every 184 days (semi-annual) from ambient conditions. Contrary to the TS requirement, the licensee did not perform semi-annual surveillance, LOS-DG-SA3, from ambient conditions because the surveillance procedure incorrectly specified an idle start prior to performance of the fast start, which negated the start of the EDG from ambient conditions. The inspectors determined that in February 1986, the licensee modified the EDG lube oil system; provided a separate lube oil system for the turbo chargers; and revised procedures for the EDG semi-annual surveillance tests. Semi-annual operability test procedure SA-1 (Rev 4) applicable to Diesel "0" was issued February 6, 1986. Procedure SA-2 (Rev 6) applicable to diesels "1A" and "2A" was issued June 11, 1986. Procedure SA-3 (Rev 7), applicable to diesels "1B" and "2B" was issued January 15, 1987. Procedure LOS-DG-SA3, revised in January 1987, incorrectly retained the steps that required pre-warming and shut down of the diesels prior to conducting the semi-annual surveillance tests; therefore, the semi-annual tests were done pre-warmed for all five EDGs since the revision of these procedures. The inspectors determined that the Technical Staff Supervisor and Operations Engineer did not adequately review the revised surveillance procedures in accordance with Procedure No. LAP-820-2, which resulted in violation of Unit 1 and Unit 2 TS (373/89010-01; 374/89010-01).

  The inspectors noted that QC was not involved with the surveillances witnessed by the inspectors. Further discussion with licensee personnel determined that QC involvement in surveillance activities was not an integral part of the licensee's commitment to excellence. Lack of QC involvement in surveillance activities was considered an example of inadequate management vigor in the maintenance/surveillance process. QC involvement in surveillance activities may have detected the problem with the semi-annual EDG surveillance test that was identified by the NRC during this inspection.

3.3.2.2 Ongoing Mechanical Maintenance (MM)

The inspectors observed portions of four mechanical maintenance activities as discussed below:

2CD078B - Lube Condensate Coupling.

WR L85283 - Repair Dewatering Pump.

WR L87642 - Perform LES EQ112 MOV Inspection.

WR L89180 - Disassemble and Clean HPCS Sump Pump Check Valve.

The inspectors concluded that the performance of mechanical activities was accomplished by skilled maintenance personnel. The maintenance personnel appeared knowledgeable of the work performed. However, concerns were identified during the observation of the following work:

- WR L85283 - During the disassembly of the pump, the inspector observed that the mechanic applied a gear puller to the coupling half in an attempt to pull the hub from the shaft but did not place a soft-face between the pump shaft and the gear puller stem. Although no damage was observed, lack of the use of a soft-face could cause damage to the shaft and to the stem of the puller.

- WR L87642 - During the disassembly of the Limitorque valve actuator, the inspector observed that the mechanic removed the valve handwheel by use of a gear puller. Again, the mechanic had failed to place a soft-face between the gear puller stem and the device being removed. The mechanic exerted considerable pressure on the handwheel through the puller. Although damage could have resulted to the valve stem, none was observed.

When questioned about the activities, the licensee responded that the mechanics normally use soft-faces to protect equipment. However, in these instances, soft-faces were not used because the shaft was to be replaced and if, the stem of the valve actuator had been damaged, it would have been cheaper to replace than to try to fix it. The inspector noted that every gear puller in the tool issue room had severely damaged stem tips. This appeared to indicate a laxness in the use of soft-faces when the need exits to prevent damage to equipment. This aspect of mechanical maintenance was considered skill of the craft and not commensurate with good maintenance practice.

3.3.2.3 Ongoing Instrumentation and Control Maintenance

The inspectors observed portion of six I&C maintenance activities as discussed below:

LIS-HP-102 - Calibrate HPCS Pump Discharge Pressure Indication

LIS-PC-104 - Calibrate High Drywell Pressure HPCS Initiation

LIS-RI-109 - Calibrate Unit 1 RCIC Turbine Exhaust Diaphragm High Pressure Isolation

LIS-NB-110 - Calibrate Unit 1 Reactor (Rx) Low Pressure RCIC Isolation

LIS-NB-401 - Test Unit 2 Rx Vessel Low Level 3 Scram, Channel A1 & A2 and RHR Isolation

LIS-NB-408 - Test Unit 2 Rx Vessel Low Low Water Level HPCS Initiation

The inspectors concluded that the performance of I&C activities was effectively accomplished by skilled maintenance personnel. The maintenance personnel appeared conscientious and knowledgeable of the work performed. Observations were noted during the following work which indicated good maintenance practice:

- During performance of LIS-NB-110 and LIS-PC-104, the technician operating the pressure detector isolation valves wore glove liners, even though the area was not contaminated. Licensee personnel stated that a general precaution in all IM Department maintenance procedures was to treat all water as potentially contaminated.

- IM had installed special valve nameplates at all detector/instrument racks to aid technicians in identifying detector isolation and test port valves in the performance of instrument surveillances. These nameplates minimized the possibility of technicians inadvertently isolating the wrong detectors.

- LERs 88-007, 88-008, 88-023 were written for ESF isolation or Reactor Protection System (RPS) trip due to incorrect electrical jumper installation during maintenance. A program was in progress to install permanent "banana" jacks at commonly used wiring and terminal connection points to preclude incorrect jumper installation.

3.3.3 Radiological Controls

The inspector observed maintenance work being performed in contaminated/radiation areas, movement of tools/equipment to and from these areas, and interactions between maintenance and radiation protection personnel. There appeared to be sufficient radiation protection support and oversight of the ongoing work observed; As Low As Reasonably Achievable (ALARA) reviews were not required for the jobs observed.

Radiological controls, posting, and labeling were good. Cleanliness and housekeeping have significantly improved and were generally good considering the station was involved in a major painting program.

Through observation of work in progress, attending work planning meetings, and discussion with licensee personnel, the inspector determined that radiological controls were integrated into the maintenance process as follows:

- Experienced radiation protection persons reviewed that section of the Radiation Work Permit (RWP) written by the maintenance department to determine the need for radiological controls and to determine if an ALARA review was required.

- A radiation protection representative attended job scheduling meetings.

- Station dose goals were established and work group doses were tracked.

- Proposed facility changes were formally reviewed by the ALARA group.

- Communications between the maintenance and radiation protection departments had increased, leading to better understanding of each department's problems.

- Monitoring to support RWP issuance, RWP job coverage, and use of dosimetry appeared good. The RWPs were sufficiently developed and detailed to assure adequate coverage.

- Dose tracking was used as an ALARA tool.

The inspector noted weaknesses in the following areas:

- The ALARA department did not provide input into the maintenance planning system until after the RWP had been written by Radiation Protection which sometimes caused delays of work, and pressure on the ALARA group to perform reviews for jobs that had been scheduled for the day in which the ALARA was made. To correct this problem, a new experimental program had been recently implemented ("ALARA Traveler") which requires the maintenance work analyst to submit the WR to ALARA for input before completion of the WR. The "ALARA Traveler" system will also allow ALARA input at an earlier stage in the development of the WR to factor lessons learned into the planning process, and to identify measures such as shielding, ventilation, and other radiological controls that should be considered by the work analyst.

- Sufficient notice of impending work was not always given to the radiation protection department so that adequate health physics support was available which caused work delays. There was no indication however, that work was performed without sufficient radiological controls.

- RWPs were frequently not picked up and used on the day the job was scheduled to begin and within 24 hours after the survey used for the RWP was performed. As a result, Radiation Control Technicians (RCTs) were required to resurvey (verify RWP doses) which caused increased personnel exposure.

Upper management support for radiological controls and ALARA programs appeared adequate, which was evident in the support for the "ALARA Traveler" system and for a program (Insight) designed to

develop better communication/understanding between Radiation Protection and Maintenance. However, based on discussions with station personnel, it appeared that better communication could be developed between radiation protection and maintenance foremen planners and work analysts.

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

The inspectors reviewed the licensee's activities in the areas of facilities, equipment, and material control to assess support given to the maintenance process. Interviews were conducted with various maintenance management and craft personnel to determine the policies, goals, and objectives; and followup observations were performed to determine the extent to which the plant practices, procedures, equipment, and layout supported the maintenance process.

3.3.4.1 Facilities

The electrical maintenance workshop area was located in the service building and appeared to be somewhat small for the 36 electricians. There was an electrical tool room located adjacent to the shop area. The Master Electrician, foremen, and work analysts were located near the shop area.

The mechanical maintenance workshop area was located in the service building next to the electrical shop and appeared adequate and had reasonably adequate work bench area for mechanics. The mechanical shop area contained a contaminated materials work area, a weldshop and a tool room. Mechanical maintenance supervision, work analysts, and other mechanical maintenance support personnel were located adjacent to the shop area. The mechanical shop contained drills, lathes, and other equipment to support mechanical maintenance.

The instrument maintenance workshop area was located in the auxiliary building next to the control room. The shop area was somewhat cramped but reasonably well laid out. The Master Instrument Mechanic and foremen were located adjacent to the shop. The tool room and work analysts were distant from the instrument shop in the turbine building. IM had a hot calibration shop which was located in the reactor building quite a distance away from the general shop area. The facilities appeared adequate, but somewhat inconvenient because of the separation between the shop area, the tool room, and the hot calibration shop.

Several mockups of plant equipment were available for training maintenance personnel. Examples of mockups were recirculation pump seals, control rod drives, electric motors, pumps, Limitorque valve operator, diesel generator air start motors, valve cutaways, and electrical switchgear.

The licensee was in the planning stages of constructing a new service building. Plans were to relocate all maintenance shops, tool rooms, and personnel in the new service building. The new facility will provide increased area for maintenance shops. The licensee plans to make the mechanical work shop into an enlarged contaminated materials work area.

3.3.4.2 Material, Equipment and Tool Control

The warehouse facility included good level A and level B storage space. Physical control of access to the warehouse facility was good, environmental controls were effective, and cleanliness and housekeeping aspects were very good. Shelf life of parts was controlled with tags that stated the cure date and expiration date. Controls for consumable materials such as solvents and cleaners, thinners, paints, oil, grease, and gasket materials appeared to be effective. A separate storage section had been established for flammable materials and those that required special handling, such as hazardous materials, and those with safety precautions. One concern was identified regarding tool control:

- Electrical safety checks were not performed on power tools in the electrical and mechanical shops. These same checks were performed annually in the I&C shop but were not documented. A procedure for these checks, LES-GM-102, Revision 0, had been written to facilitate these checks, but was not utilized.

A strength in the area of equipment storage was as follows:

- The licensee implemented, through Maintenance Department Memorandum Number 21, dated December 12, 1988, a detailed and comprehensive program for PM of mechanical items for extended storage in the storeroom. This procedure included items under Q/Regulatory items and balance of plant (BOP) items. The items covered and the periodicity of checks addressed vendor and/or original equipment manufacturer's requirements for PM of stored components and selected parts.

3.3.4.3 Control and Calibration of Measuring and Test Equipment (M&TE)

Control of M&TE was generally good in that defective or "calibration due" instruments were segregated from those in calibration and acceptable for use. Procedures were developed for the issue, return and recall of M&TE. The individual checking out an instrument; the work order, procedure, or location used; date out and date returned were recorded for permanent records. Control of M&TE in the electrical equipment room was poor in that technicians could freely enter and sign out M&TE.

All three maintenance disciplines maintained an M&TE lab. Much of the certified test equipment onsite was sent offsite to System Operations Analysis Department (SOAD) for calibration. All M&TE labs rely on SOAD to retain calibration records and furnish information regarding calibration due date.

The I&C M&TE lab provided training to technicians in the calibration of various gauges to be used in pressure testing equipment by use of secondary standards installed in the I&C lab. The secondary standards calibration status was traceable through SOAD to national standards. The mechanical M&TE lab personnel verified calibration of micrometers before and after use with secondary standards, again traceable to SOAD. All equipment in the three labs was identified by a unique identifier.

The inspector checked the status of the following M&TE items for calibration due date and calibration traceability to national standards: Bruel and Kjaer Type 2511 Vibration Meter, Gould Model 13-4715-4X Thermocouple Amplifier, Tektronix 475 Oscilloscope, and TTD 1000A Master Torque Tester. All these M&TE were within calibration due date and traceable through SOAD to national standards. The licensee's activities and records for control, calibration, and management of M&TE met program requirements and commitments. However, none of the M&TE labs were monitored for temperature and humidity levels, as stated in procedure LAP-300-9, Revision 8, which required environmental controls for storage of M&TE. Vendor manuals for M&TE included very broad environmental specifications for storage, for example, temperature of 70 degrees and humidity between 10% and 90%. These parameters were the typical conditions encountered at the LaSalle station. There were no known M&TE problems caused by inadequate storage.

3.4 Review and Evaluation of Maintenance Accomplished

3.4.1 Backlog Assessment and Evaluation

The inspectors reviewed the amount of work accomplished as compared to the amount of work scheduled. The area of interest was that work which could affect the operability of safety-related equipment or equipment considered important to safety, such as some balance of plant components. Maintenance work item backlogs were evaluated for safety impact of deferrals, and causes such as lack of personnel, lack of trained/qualified personnel, lack of parts or engineering support.

3.4.1.1 Corrective Maintenance Backlog

The backlog of both outage and non-outage CMWRs was tracked by the maintenance department by use of a computerized system. Backlog information could be obtained from the computer at anytime. A tracking report was issued weekly to management on the status of the backlogs. The current as well as previous week's backlog were listed so increasing trends were were readily observed. A monthly

report on the backlog was issued to management which contained expanded information regarding estimated manhours and actual manhours to complete work requests. The licensee tracked the number of non outage CMWRs older than 90 days. Since February 1989 the percentage of CMWRs older than 90 days has been maintained at approximately 42% which meets the licensee goal of 43%. The number of CMWRs on hold for parts was not published in the backlog reports. Each department kept track of CMWRs on hold for parts; MM had 29, EM had 43, and IM 15.

The inspectors determined that on May 5, 1989, the non-outage CMWR backlog was 151 for MM, 228 for EM, and 92 for IM. The CM backlog was low and within the capabilities of current staff. The inspectors reviewed several non-outage and outage backlogged CMWRs and determined that none had impact on operability. However, based on the review of the actual time spent on non-outage CMWR completed during the past 12 months which was provided from the computer history and included in the monthly report to management, the inspectors determined that the actual number of hours to complete the CMWRs compared to the estimated hours was always greater. For example, average ratios of actual hours divided by estimated hours was 1.54 for MM, 2.21 for EM, and 1.63 for IM. Even so, based on the number of craftsman and increasing the licensee estimated hours to complete the backlog using the above factors, there was only approximately two weeks work for MM, five weeks for EM, and less than one week for IM.

3.4.1.2 Preventive Maintenance Backlog

Preventive maintenance WRs (PMWRs) were also tracked by a computerized system. PM was accomplished by non scheduled WRs and by scheduled PMs, which were mostly accomplished using procedures rather than work requests. The scheduled PMs were tracked by the General Surveillance Program (GSRV). Also included in the PM program were lubrications which were tracked monthly. The inspectors noted that the non scheduled PMWRs did not have any completion dates. Also, review of a printout of GSRV PMs showed many had no reason for deferral listed. The licensee had just initiated a requirement on April 17, 1989, to list a reason for deferral. The ratio of PM hours to total maintenance hours averaged about 63% during the past year, which was higher than the industry median of 42% and the INPO goal of 60%. Based on the review of licensee records, the inspectors determined that the non scheduled non-outage PMWR backlog was 81 for MM, 52 for EM, and 34 for IM. The backlog was low and represented less than two weeks of work. The backlog had decreased about 50 WRs since February 1, 1989. There was also a backlog of scheduled GSRV PMs of 88 for MM and 47 for EM and lubrication PMs of 29 for MM and 12 for EMs. No estimates of times to complete the GSRV and lubrication PMs were available, but it appeared completion of the PMs was within the capability of the maintenance department. Review of the outage and non-outage backlog of PMWRs identified some WRs which could adversly affect operability. They were WRs L86386 thru 86405, L47636, and L66478 and are described in sections 3.4.2.1. and 3.6.1.

3.4.2 Review and Evaluation of Completed Maintenance

The inspectors selected the equipment and systems identified in Section 3.1.2 of this report for further review. The purpose of this review was to determine if specified electrical, mechanical, and I&C maintenance on those selected systems/components was accomplished as required. This review included:

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

Evaluation of the extent that vendor manual recommendations, IE Bulletins (IEB), IE Notices (IEN), Service Information Letter (SILs), Significant Operating Experience Record (SOERs), and other outside source information was utilized.

Evaluation of the extent that maintenance histories, Nuclear Plant Reliability Data System (NPRDS) information, LERs, negative trends, rework, extended time for outage, frequency of maintenance, and results of diagnostic examinations was analyzed for trends and root-causes for modification of the PM process to preclude recurrence of equipment or component failures.

Evaluation of completed CMWRs and PMWRs for use of qualified personnel, proper prioritization, QC involvement, quality of documentation for machinery history, description of problems and resolutions, and post maintenance testing.

Evaluation of work procedures for inclusion of QC hold points, acceptance criteria, user friendliness, and general conformance to NUREG/CR-1369.

Backlogs for selected components.

3.4.2.1 Past Electrical Maintenance

The inspectors determined that the electrical maintenance philosophy did include some concept of RCM. The concepts included vibration analysis of motors, analysis of EDG lubrication oil, and thermography. Electrical maintenance activities were generally balanced between PM and CM.

The inspectors evaluated the extent that vendor recommendations, IENs, and General Electric (GE) Service Advice Letters (SALs) were utilized in electrical maintenance for the components selected.

The inspectors reviewed the following procedures during the evaluation:

LES-DC-101, "24, 125, 250 Volt Battery Inspection," Revision 7.

LES-DC-101D, "250 Volt Battery Inspection," Revision 0.

LES-DC-102D, "Unit 1 250 Volt Battery Charger Inspection," Revision 0.

LES-DC-103D, "250 Volt D.C. Battery Charger Capacity Test," Revision 0.

LES-GM-103, "Inspection of 4.16 Kv and 6.9kV ITE Circuit Breakers," Revision 7.

LES-GM-106, "Inspection and Maintenance of GE Magna Blast Circuit Breaker," Revision 6.

The inspectors reviewed selected vendor source documents to determine if the requirements specified were incorporated into the appropriate maintenance procedure. The source documents reviewed were:

Environmental Qualification (EQ) Binder EQ-DS006	RHR Motors
Vendor Manual No. 36	125 Battery Charger
Vendor Manual No. 147	RHR and HPCS Motors

The inspectors verified that the following GE SALs and IENs were addressed in the appropriate maintenance procedures:

GE SAL 313.1	Station Auxiliary Switches
GE SAL 313.1A	Tuf-Loc Sleeve Bushings
IEN 84-29	General Electrical Magne Blast Breaker Problems
IEN 86-07	Woodward Governor
IEN 88-12	Overgreasing of Electrical Motors
IEN 88-27	Deficient Electrical Terminations
IEN 88-83	Inadequate Testing of Relay Contacts in Safety-Related Logic Systems
IEN 88-88	Degradation of Westinghouse ARD Relays

No problems were noted; however, the inspector had a concern regarding the licensee's draft evaluation of IEN 88-83. This IEN pertained to inadequate tests of relay contacts in safety-related logic systems. The draft evaluation stated that LaSalle Station was in compliance with functional test requirements set forth in Technical Specifications. However, during this inspection it was determined that a contact in the EDG automatic bypass circuit was not functionally tested. Based on this lack of a functional test, the licensee should reassess the draft evaluation of IEN 88-83. This is of particular interest because a similar problem was identified at another of the licensee's stations. More information about this subject is on Page 19 of this report.

The inspectors reviewed the component failure history for the electrical components and systems selected to determine whether methods had been established and implemented for detecting repetitive failures and adverse quality trends, and whether appropriate corrective action had been taken to address adverse trends. The

inspectors also utilized NPRDS and LERs in the review to ascertain the effectiveness of the licensee's trend analysis and root-cause analysis. As a result of this review, the inspectors did not identify any adverse trends; however, the licensee did not have an established program to identify subtle trends in plant aging or common mode failures in electrical components by model number. The system engineer did trend certain performance attributes of the EDG that could indicate emergent problems. Additionally, oil samples from electric motors and transformers were analyzed, but the results were not trended.

The inspectors reviewed the following completed WRs for use of qualified personnel, proper prioritization, QC involvement, quality of documentation for work history and understanding of problems and post maintenance testing.

L69839	Replace ADS solenoids
L72702	Inspection of RHR motor space heater cables
L74105	Ten year EQ inspection of RHR motor
L73458	Oil leak main feed breaker
L83217	Cycling of EDG cooling pump breaker
L84134	Repair/replace circuit breaker
L85730	Inspect/repair "0" EDG

The inspectors identified the following concerns:

- WR L69839 - This WR did not clearly state the reason the ADS solenoid valve was replaced. Considerable effort and time were expended by the inspector before the reason could be determined. The is considered a weakness in establishing a viable work history.

- WR L74105 - The inspectors reviewed the work package and determined that: (1) steps that specified torquing did not identify a torque value nor reference a document that identified torque requirements; (2) station traveler allowed contractors, that performed the work, authorization to "n/a" steps on the traveler. The licensee did not review the completed WR package to determine acceptability of "n/a" steps, and (3) the completed WR package was not reviewed by appropriate station personnel for acceptability for EQ maintenance requirements. In this case the inspectors reviewed EQ Binder, EQ-LS006 to determine if maintenance requirements were correctly identified in the WR package. Tab E of the EQ binder included torque requirements when the motor was disassembled for the 10 year EQ inspection. The station traveler in the WR package had steps that included torque values; however, several steps were marked "n/a". The licensee contacted the vendor, GE, to determine which fasteners had specific torque requirements. GE subsequently sent a letter to the licensee that identified specific torquing requirements. This letter resolved the inspectors' concerns with torquing. Although actual problems in this case did not exist, the inspectors considered the licensee's practices weak

in not providing acceptance criteria and allowing contractors to bypass procedural requirements without adequate licensee review. Similar problems were identified in the mechanical area as discussed in Section 3.4.2.2.

The inspectors reviewed the following procedures for inclusion of QC hold points, acceptance criteria, and user friendliness:

LES-EQ-102, "Testing of Environmentally Qualified Motors," Revision 3.

LES-EQ-120, "Minimum Resistance Meggering and Polarization Index," Revision 2.

LTS-500-210, "Unit 2 Integrated Division III ECCS Response Time Test," Revision 0.

LTS-800-7, "0 D/G Trips and Trip Bypasses Logic Test," Revision 2.

- The inspectors identified a concern with Procedure LTS-800-7. Technical Specifications 4.8.1.1.2d.7 and 13 for LaSalle Station required the verification of automatic bypassing of the EDGs automatic trips, during an ECCS actuation except from differential current; overspeed; and emergency stop button. Procedure LTS-800-7 was utilized to comply with this TS requirement, however, the procedure did not functionally check that the associated electrical contact opened in the automatic bypass circuit when required during an ECCS actuation. Rather, the procedure specified that a lead be lifted from the relay contact to simulate an open contact. As delineated above, failure to functionally verify automatic bypassing of the appropriate EDG automatic trips during surveillance tests is a violation of Unit 1 and Unit 2 Technical Specifications (373/89010-02; 374/89010-02).

The inspectors reviewed the current backlog for the specified electrical components to determine if maintenance had been accomplished. The inspectors determined that maintenance was not effectively accomplished in all cases as there was backlog of WRs that could adversely effect the operability of some components as follows:

- WRs L86382 through L86405 - These WRs pertained to the inspection of several MOVs to ascertain if torque switches were white in color (melamine). The vendor, Limitorque, had submitted a 10 CFR 21 report, in November 1988 that pertained to the potential common mode failure of torque switches. WRs L86382 through L86405, requested in January 1989, were classified as priority B1 and scheduled for Unit 2's refuel outage which was on going at the time, but the inspections were not performed. These WRs were classified as backlog. Failure to take adequate action on this matter was identified as a violation which is discussed at length in section 3.6.1.

- WRs L47636 and L66478 - These WRs pertained to the upgrade of solenoid discharge valves for the 2A and 2B EDG fuel oil transfer pumps. The upgrade of the valves included utilization of improved internals such as Viton "O" rings instead of the EPDM "O" rings which were not compatible with the fluid medium of fuel oil. The licensee had experienced problems with the valves either sticking open or closed. The valves, 2DO004 and 2DO014, [illegible] ically open when the fuel oil transfer pump is needed to transfer oil from the fuel oil storage tank when the EDG day tank level reaches a prescribed level, and also act as anti-siphon valves when closed. Therefore, the reliability of the solenoid discharge valves is important to assure a supply of fuel oil to the EDGs during an emergency event.

  From a failure analysis perspective, the inspectors were concerned that the problem with the incompatibility of the valve internals with the fuel oil decreased the reliability of the valves. In addition to the potential for valve failure just explained, other possible failure mechanisms existed. For example, the valves will fail closed on loss of power to the solenoid from a blown fuse, failed circuit breaker, or a failed rectifier because the solenoid is dc from the same ac source.

  The valve upgrade was not performed during the Unit 2 refueling outage as scheduled and the licensee had not established adequate controls to monitor the performance of the valves during surveillance testing. Thus the licensee's lack of forthright action to this known problem resulted in increased potential for common mode failure and potential impact on the operability of all EDGs onsite; therefore, the licensee's performance in this case was poor. The licensee was in the process of amending the surveillance test to include specific monitoring of valve performance to identify degradation until the valve intervals are replaced with compatible materials.

Based on the review of completed WRs, backlog, and work history of PRA selected components, maintenance procedures, and the licensee's actions in source documents, such as IENs, the inspectors concluded that past performed electrical maintenance had been accomplished in a satisfactory manner. The status of the backlog, based on the problems identified in the review of the above WRs, was considered unacceptable. However, this was not caused by weakness of the electrical maintenance organization but by ineffective engineering support to not pursue timely completion of corrective action for the above WRs.

3.4.2.2 Past Mechanical Maintenance

The licensee initiated the concept of RCM into its mechanical maintenance philosophy. The inspector noted that the licensee collects information, such as lubrication samples and other data, but does not trend the information to aid in the decision process of determining what, if any, PM tasks should be performed, increased, or decreased.

The inspectors reviewed selected vendor source documents and maintenance procedures to determine if the requirements specified in the vendor manual were incorporated into the appropriate maintenance procedure. The vendor manuals reviewed were:

10 and 93 RCIC RCIC Pump and Turbine
57 LPCS Pump
78 Condensate and Condensate Booster Pump
153, 154, 155, and 156 Diesel Generator and supplements
174 HPCS Pump
204 Reactor Turbine Driven Feed Pump and Turbine
389 Crosby Safety and Relief valves

The maintenance procedures reviewed contained the PMs recommended in the vendor manuals. The procedures reviewed were:

LTS-600-10 "In-service Test of Relief Valves," Revision 4
LMP-GM-06 "Test/Repair of Relief Valves," Revision 0
LMP-R1-1 "Reactor Core Isolation Coolant Pump," Revision 0

- Procedures had not been developed for lubrication of the flexible coupling covered under the Lubrication Surveillance Program or for the disassembly of the HPCS or LPCS Pumps. The licensee utilized Station Travelers for the specific unit being worked on. The traveler did not require documentation of the torquing of the coupling bolts after lubrication nor did it require the mechanic to record the torque wrench serial number or calibration data. The licensee was in the process of developing procedures to be used for this PM. During the inspection, the licensee initiated a coupling lubrication tracking system that requires recording torque value, wrench serial number, and calibration data.

The inspector reviewed 20 WRs completed in 1987 and 1988 for the LPCS relief valve, RHR relief valves, Reactor Turbine Driven Feed Pump, EDG air compressor and other relief valves that had the cause of failure identified as "Set Point Drift". The work requests were reviewed for accuracy, technical content and completeness. Some of the specific attributes evaluated were:

Adequacy of work instruction.
Description of work performed.
Post maintenance testing.
Use of qualified personnel.
Proper prioritization.

Areas of concern are identified below:

- In general, the WRs were prioritized as B1, B2 or C. The majority of the work requests reviewed were completed in a timely manner. However, several with a B1 priority were not started within one day as required by procedure LAP-1300-1.

For example, WR L79301 for work on the turbine driven Reactor Feed Pump was dated April 5, 1988, but the alignment data sheet indicated that work was performed October 13, 1988.

- WRs L79301 and L85885 for non-safety-related work on the 2A turbine driven Reactor Feed Pump were performed by contractors. The contractor Mandatory Hold Point Form MCCO QA-20 did not list QC hold points although the task included not alignment and greasing the coupling. There was a requirement in each WR to torque the coupling bolts and apply grease to the coupling. Neither the torque value, torque wrench serial number nor calibration data were documented on the WRs. The type of grease to be used in this application was not documented nor was the type of grease actually used identified. There was no requirement for the licensee's Quality Assurance (QA) Engineer to review either WR; therefore, the missing information had not been noted by the licensee. The description of work performed in WR L79301 did not match with the instructions written and no resolution of the difference was noted by the inspector. The work instruction in WR L85885 directed that the coupling be greased and the coupling bolts be torqued. The description of work performed erroneously stated torque was not applicable because no piping was removed. The inspector determined that the lack of adequate QC coverage of contractor work and the sparse instructions given in the description of work contributed to the lack of proper documentation. Similar problems were identified in the electrical area as described in Section 3.4.2.1. It appeared that licensee oversight of contractor work on non-safety-related balance of plant components was weak.

- The inspector reviewed five WRs that documented work performed on the 1B EDG air compressor. The air compressor continued to blow head gaskets shortly after each repair. The licensee had contacted the vendor about the problem and was advised to use different torque values to eliminate the condition. Only two of the WRs documented the identification number of the torque wrench used and stated that the bolts had been torqued to the specified values. This appeared to be a problem with rework, which is discussed further in Section 3.5.

- The description of work performed on WRs L81011, L84591, L84715, L84947, and L84980 for maintenance performed on relief valves in the Standby Liquid Control, Feedwater, and RHR systems identified "Set Point Drift" as the cause of relief valve failure. The descriptions were not detailed enough for the inspector to determine if the cause of the failure was properly determined.

- Release for work and work instructions appeared to be adequate in most instances. However, it was difficult to follow the flow of work to be accomplished and determine if the work had been completed. A reader had to assume that numerous steps had been completed because initials were only placed in close

proximity to an instructional step. When rework was required on at least one RHR testable check valve, the flow of work could not be followed. The inspector reviewed the steps with the mechanic that was assigned to complete the rework. The flow of work was confusing even to the mechanic who completed the work. The area of concern was resolved; however, for work history and understanding of problems, the inspector determined the documentation to be poor and inconsistent with good maintenance practice.

Based on the review of work requests as described above, the inspectors were concerned with the lack of documentation of torque applied, along with inadequate documentation of torque information. Also, the control of contractors, QC coverage of contractors, and documentation of work performed were inadequate.

The inspectors reviewed the current backlog of PMs for the specified mechanical system components and determined that PMs were adequately accomplished and there was no backlog that could immediately affect the operability of the plant. Except for the problems noted above mechanical maintenance work appeared to be completed by qualified personnel in a satisfactory manner.

3.4.2.3 Past Instrumentation and Control Maintenance

The inspectors determined that the I&C maintenance philosophy did include the concept of RCM. LaSalle had a history of problems with pressure switches and differential pressure switches manufactured by Static-O-Ring, Inc. (SOR). IM was in the process of replacing the SOR pressure switches with Rosemount pressure transmitters and trip units on an "as needed" basis. IM trended calibration data for SOR pressure switches still installed in the plant as well as the newer Rosemount transmitters. The inspectors reviewed the calibration history for three SOR switches that IM was tracking and noticed no undetected adverse trends. In addition, IM had increased the frequency of calibration for SOR switches above that called for in the equipment vendor manual.

IM also used the Total Job Management (TJM) program to identify and track equipment problems and maintenance histories for common instruments throughout the plant.

The inspectors evaluated the extent that vendor recommendations, IEBs, IENs, SILs, and other source information was utilized in I&C maintenance. The components selected for the evaluation were the Rosemount, Inc. pressure transmitters. The inspectors reviewed the following documents:

10 CFR 21 Report from Rosemount, Inc., dated 9 February 1989.

IEN 89-42, "Failure of Rosemount Models 1153 and 1154 Transmitters."

Procedure LIS-PC-104, Revision 1, "Unit 1 High Drywell Pressure HPCS Initiation Calibration."

Vendor Manual "Model 1153B Alphaline Pressure Transmitters for Nuclear Service," No. 4302, Revision E.

- The 10 CFR 21 Report documented a problem with pressure transmitters that manifests itself as degraded response time over full range and/or overall increased response time. The modification engineer responsible for replacement of SOR switches with Rosemount transmitters and trip units at LaSalle evaluated this problem and incorporated an additional voltage and/or current check of the transmitter loop to be performed during routine surveillances, for example: LIS-PC-104. A review of recent LIS-PC-104 calibration results did no indicate any undetected transmitter performance trends. The Rosemount 10 CFR 21 Bulletin did not apply to LaSalle because Rosemount transmitters had been installed for greater than the 36 month "trouble" period referred to in the Bulletin. The inspectors determined that this evaluation and procedure implementation reflected alert responsiveness to industry I&C equipment problems.

The inspectors reviewed selected vendor source documents to determine if requirements specified were incorporated into the appropriate maintenance procedure. The source documents reviewed were:

GEK-7320(c) "Instructions and Recommended Parts for Maintenance, Magne-Blast Circuit Breakers," No. 39.

Ingersoll-Rand UL-102A Dual Control Regulator No. 194 (Instrument Nitrogen System).

Rosemount 710DU Master Trip Unit.

The inspectors verified that the vendor recommendations were adequately addressed in the appropriate procedures.

The inspectors reviewed component failure history for the I&C components and systems selected to determine whether methods had been established and implemented for detecting repetitive failures and adverse quality trends, and whether appropriate corrective action had been taken to address adverse trends. The inspectors also utilized NPRDS and LERs in the review to ascertain the effectiveness of the licensee's trend analysis and root cause analysis. The inspectors identified a concern with the licensee's engineering approach to root cause evaluation which is discussed further in Section 3.6.1 of this report.

The inspectors reviewed completed CMs and PMs for use of qualified personnel, proper prioritization, QC involvement, quality of documentation for work history and understanding of problems and post maintenance testing. The inspectors identified the following concern:

- Work Request WL72702 - Ten Year EQ Inspection of 1A RHR Pump: The work package specified insulation resistance testing of pump motor windings as part of the inspection. The procedure data sheet, Attachment A of LEP-GM-120, did not specify whether the 2500 megohm resistance readings for the motor windings were temperature corrected to 40°C as specified by the RHR motor EQ supplement, EQ-LS006 and IEEE 43-1974. The inspectors determined that the data sheet was weak in that there was no acceptance criteria specified for motor winding resistance. The minimum acceptable resistance for EQ motors was much higher than for standard 4.16kV motor windings (100 megohms to 5 megohms). There was no evaluation of this maintenance performed by technical support engineers even though the work package called for an evaluation. In general, the inspectors determined that the documentation for this maintenance item was poor and inconsistent with good maintenance practice.

The inspectors reviewed the following procedures for inclusion of QC hold points, acceptance criteria, and user friendliness:

LES-GM-103, "Inspection of 4.16kV and 6.9kV I.T.E. Circuit Breakers," Revision 7.

LEP-GM-120, "Maintenance Resistance Meggering and Polarization Index," Revision 2.

LIP-DG-506, "Unit 1 HPCS Diesel Generator (1E22-8001) Air Start Receivers and Pressure Indication Calibration," Revision 0.

LIP-GM-941, "Replacement of EQ Rosemount 1153 Series B Transmitters," Revision 1.

WL74675, "Repair/Adjust Load/Unload Setpoints for 2B Instrument Nitrogen Compressor."

WL83334, "Replace 1B D/G Output Breaker."

WL88542, "Replace 2A D/G Immersion Heater Control Temperature Switch."

The procedures were detailed, contained vendor recommended refurbishment, required tools, QC hold points, and necessary acceptance criteria, although the acceptance criteria were vague on the LEP-GM-120 Data Sheet. The procedures were considered user friendly.

The inspectors reviewed the current backlog for the specified I&C components to determine if maintenance had been accomplished. Specifically, the inspectors assessed the backlog of open WRs for EDG instrumentation. The inspectors determined that maintenance was adequately accomplished and there was no backlog that could effect the operability of the components.

Based on the review of completed CMs, backlog, and work history of PRA selected components, maintenance procedures, and the licensee's actions toward source documents, such as IENs, the inspectors concluded that past performed I&C maintenance had been accomplished in a satisfactory manner.

3.5 Maintenance Work Control

The inspectors reviewed several maintenance activities to evaluate the effectiveness of the maintenance work control process to assure that plant safety, operability, and reliability were maintained. Areas evaluated were control of maintenance work orders, equipment maintenance records, job planning, prioritization and scheduling of work, control of maintenance backlog, maintenance procedures, post maintenance testing, completed documentation, and review of work in progress.

The inspectors reviewed the area of maintenance planning to determine if maintenance work activities were adequately controlled. Maintenance planners for three departments (MM, EM, IM) coordinate inputs from the departmental General Surveillance schedule and the Operations Department monthly schedule. In conjunction with the Work Planning Department, planners sequence CM, PM, and surveillance maintenance activities to coincide with equipment evolutions on a daily basis. Rad/Chem Department maintains an ALARA coordinator for maintenance planning involving RWPs. The ALARA coordinator schedules radiation surveys for work located in radiation/contaminated areas. All three maintenance departments maintained personnel to handle the dual role of scheduler/planner. The Work Planning Department in the daily Work Planning meeting is ultimately responsible for coordinating maintenance activities among departments to coincide with the Operations schedule.

All maintenance departments maintained a file of "forced outage" work packages, that is, work that was ready to commence at the next outage. In addition, IM conducted staging of all replacement parts for each work activity requiring parts.

The inspectors reviewed the method used by the licensee to schedule and prioritize (CM/PM) maintenance work. The inspectors discussed the matter with work scheduling personnel and reviewed information used in this area. WRs are routed to the Operations Engineer for prioritization. The priority assigned indicated the urgency of

the WR to both planning and scheduling. WRs were prioritized into the following categories: A - immediate work required, B1 - work must be started today, B2 - work should be scheduled to start within the next week, B3 - work should be started as soon as practical, as described in the WR procedure LAP-1300-1. The inspectors identified concerns with the prioritizing of WRs.

Approximately 60% of the WRs had a B2 priority. The inordinately high percentage of B2 WRs appeared to decrease the effectiveness of the priority system because WRs that required work to start within one week could be lost in the large population of B2 WRs and not be closed in a timely manner or adequately evaluated to determine the effect deferral of the work would have on operability of equipment. For example:

- WRs 86382 through 86405 were requested in January 1989 in response to a 10 CFR 21 report written in November 1988 concerning MOV torque switches. The priority was B2 but the work required was not performed prior to the end of the Unit 2 outage in February 1989. These WRs still remain on backlog. For further details about the torque switch problem see Section 3.6.1 of this report.

- WR 66478 was approved by the maintenance department on March 14, 1988, to upgrade diesel fuel oil pump discharge valves 2D0004 and 2D0014. The work priority was B2 but the work was not performed during the Unit 2 Fall 1988 refuel outage and still remains on backlog. For further details, see Section 3.4.2.1. of this report.

- Assigned priorities are subject to change at the daily Work Planning meeting, but the changes in priority are not always updated in the maintenance management program (TJM). A recent licensee self assessment identified that over 50% of CMWRs completed in the past year were either Priority A or B1. The assessment identified that this situation did not allow for adequate planning and scheduling of corrective maintenance. The license was reviewing the WR prioritization system.

During review of corrective action implementation for LER 88-019, the inspectors determined that the licensee had not followed the work control process system. LER 88-019 identified that the 1B EDG output breaker had not closed in the required 13 seconds. The licensed attributed the cause to worn parts . These same parts were not inspected in the 2B EDG output breaker or HPCS breakers. No documented technical evaluation had been performed to justify not inspecting the breakers. This is discussed further in Section 3.6.1 of this report.

The inspectors reviewed implementation of the method utilized for monitoring rework. Rework was recorded on a special form when caused by procedure deficiencies, engineering or design problem material defects, failure of post maintenance testing, training

inadequacies, or personnel errors. The licensee published a quarterly report that showed the number of WRs which required rework and listed the reasons for the rework. During 1988, 110 WRs required rework and 30 so far in 1989. As previously discussed in Section 3.4.2.2, the inspectors identified five failures within two months of the 1B EDG air start motor air compressor head gasket. The inspectors inquired if the rework program had identified these rework items. The failures had not been identified by the rework program. The licensee stated that the rework program was primarily limited to failures during post maintenance testing but it was recognized that identifying failures after the equipment had been operating was a problem. For this reason, the licensee was changing the rework program to the Failure Analysis Program which utilizes PADS.

3.6 Engineering Support of Maintenance

The inspectors evaluated the extent to which engineering principles and evaluations were integrated into the maintenance process. This was accomplished by review of maintenance work orders, activities associated with failure analyses, and other maintenance activities to evaluate the effectiveness of engineering support. Areas reviewed were engineering support to PM, material qualifications, compliance with codes and regulations, system engineering concepts, industry initiatives and post maintenance testing.

3.6.1 System Engineering

The "system engineer" concept was recently implemented at LaSalle. Specific system assignments to individual system engineers were made during the past six months. An instruction entitled, "System Engineer Position Description," was issued during April 1989. The instruction described the duties and responsibilities of system engineers and the training requirements. Since the instruction was only recently issued, it was not possible to evaluate how well the system engineers kept pace with the duties assigned in the instruction.

The inspectors discussed the duties, responsibilities, and experience levels with supervision and system engineers. The average experience level of the 28 system engineers was about 3½ years. System engineers did not review WRs for their assigned system prior to implementation unless specifically requested because of problems or the need for special instruction on the WR, nor were they routinely involved in the identification of post maintenance testing. A recently implemented Problem Assessment Date Sheet (PADS) program to facilitate systematic root cause and failure analysis of systems/components was utilized at LaSalle. The potential exists for the engineers to be bypassed by the PADS system, leading to quality trends, common work failures and repetitive failures going undetected. For example, technical support and system engineers were not included in the PADS evaluation unless the Work Analyst requested their involvement.

During the observation and review of maintenance activities, the inspector identified the following three concerns in the system engineer area:

- The system engineer assigned the EDG was an individual with an electrical background; consequently his lack of familiarity with EDG mechanical aspects resulted in his being unaware of the failure mode of the EDG fuel oil transfer pump solenoid discharge valves, which was to "fail close."

- Status of the MOVs affected by a 10 CFR 21 report issued by Limitorque on November 8, 1988, was not adequately addressed by the responsible Technical Staff engineer to ensure proper assessment by cognizant plant management. The report pertained to common mode failure of melamine torque switches. The report pertained to specific Limitorque model types and serial numbers, which were known by the licensee to be installed at LaSalle Station. The cause of failure of the melamine torque switch was identified by the vendor as post mold shrinkage, which was affected by temperature and age. Corporate Engineering sent a letter that described the required corrective action to the plant on December 23, 1988, which was not received at the plant until December 30, 1988. The specified actions included review of valve stroke times, performing some stroke time tests, and replacement of switches on a priority basis. However, no completion dates were specified.

  The December 23, 1988, letter was superseded by a Corporate Engineering letter dated March 23, 1989, which required a response from the plant by April 11, 1989, regarding replacement of the torque switches. However, that letter was not received at the plant until May 3, 1989. There appeared to be a significant problem with getting important correspondence from the corporate office to the LaSalle site, and then appropriately distributed at the site.

  The inspectors requested the status of the MOVs affected by the report that had not yet been inspected. Information requested by the inspectors included: (1) MOVs that were affected by IEB 85-03, (2) MOVs that required repositioning to perform their safety function (active), and (3) MOVs that functioned as containment isolation valves. Information was furnished the next day and identified five IEB 85-03 MOVs (2-Unit 1 and 3-Unit 2) that had not been inspected for melamine torque switches. The licensee also identified MOVs located in harsh environment that had not been inspected. Further discussion with the licensee determined that Generic Letter 88-07, "Modified Enforcement Policy Relating to 10 CFR 50.49, Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," had not been considered by the licensee for applicability. As a result, the licensee had

not written a "Justification for Continued Operation" (JCO) for the MOVs that had not been inspected and were located in harsh environment. There were approximately 30 Unit 2 MOVs that were not inspected even though the unit had been in an outage until February 8, 1989. The failure to inspect MOVs with a possible Part 21 defect or to issue a JCO in a timely manner is considered a violation of 10 CFR 50, Appendix B, Criterion XVI. (373/89010-03, 374/89010-03)

Based on the inspectors' review of correspondence between the corporate office and the plant site, it was unclear who had the lead responsibility in regard to this 10 CFR 21 report. The poor communications between Corporate Engineering and the LaSalle Station contributed to the delay in determining the extent of a reported potential common mode failure of safety-related equipment.

- A technical evaluation had not been documented for the 2B EDG output breaker when no inspection was performed as required by the corrective action in LER 88-019. The licensee performed a technical evaluation during this inspection, which the inspectors determined to be satisfactory.

Based on the scope of the responsibilities and experience levels, it appeared that it would be some time before the system engineering concept would be fully implemented, and effective at LaSalle.

3.6.2 Technical Support

There were several groups of technical staff engineers that were involved in modifications, inservice inspection (ISI), inservice testing (IST), EQ parts, and plant performance.

The licensee recently implemented a failure analysis program that utilized PADS. This program required a PAD if failure caused the components to be inoperable, more than 80 hours were expended to repair a component, or a component failed the post maintenance test. There had been approximately 15 PADS issued but only three were resolved. Discussions with licensee personnel determined that revisions to PADS process were under consideration. Since approximately 80% of the PADS were still open, the inspectors could not evaluate the effectiveness of the measures for failure analysis.

The inspectors reviewed the measures established to identify diverse trends in equipment performance. Trends of results were evident for predictive maintenance in the areas of vibration data and lube oil samples.

Attempts were made by the licensee to utilize work history that currently was put in the TJM. A trend was defined as three corrective WRs issued on a component in a period of 12 months. The inspectors considered this as a "gross" approach because potential trends over

time or trends common to a specific model number would not be identified. The established frequency, three occurrences in 12 months, was the same for all components and did not consider the importance of a component to safety. See Section 3.4.2.1 for additional information about trending.

Some examples of inadequate technical support described in this report are the failure to pursue timely corrective action for WRs described in Section 3.4.2.1, and failure to provide acceptance criteria for motor winding resistance as well as failure to perform a technical evaluation of insulation resistance testing of the 1A RHR pump motor windings described in Section 3.4.2.3 of this report.

3.7 Maintenance and Support Personnel Control

The inspectors reviewed the licensee's staffing control and staffing needs. Inspection activities included interviews with plant personnel, training facility observations, in plant observations and review of documentation.

The licensee had developed a comprehensive plan for personnel control, which was proceduralized and integrated into the maintenance process. The organization chart was available and generally up to date. Selected personnel at various management levels were interviewed and were found to be knowledgeable of responsibilities and accountability. The staffing requirements for the Mechanical, Electrical and I&C departments appeared to be adequate for non-outage work. These departments were supplemented with contractor services during heavy work loads during outages.

Personnel training records showed that each plant employee, including contractor personnel, received site specific, security and radiological control training. Refresher training in these areas was conducted on a regular basis. The licensee also implemented specific task training for contractors hired during outages. The maintenance training program was accredited by INPO in March 1987.

Training and qualification records were reviewed for approximately 15 maintenance personnel that participated in maintenance activities witnessed by the inspectors. Training records were available and documented all training received. The inspectors determined from review of the training records that personnel were trained and qualified to perform the assigned maintenance activities.

The inspector observed the licensee's maintenance training facilities and noted the use of mock-ups for all maintenance disciplines.

3.8 Review of Licensee's Assessment of Maintenance

The inspector evaluated the licensee's quality verification process in the maintenance area by the review of audit reports, surveillance reports, corrective action documents, and the maintenance

self-assessment. The documents were reviewed to assess technical adequacy, root cause analysis, timeliness of corrective action, and justification for closeout of corrective action documents.

3.8.1 Audits and Surveillance

The inspector reviewed results of QA audits 1-89-36, 1-89-37, 1-88-38, and 1-88-39. The audits were performance based. Maintenance activities were witnessed and assessed for root cause and possible maintenance program weaknesses.

The inspector reviewed records of 12 QA audits and 15 QA surveillances of maintenance performed between January 1988 and April 1989. The QA audits and surveillances were performance based and management gave adequate attention to the areas of closing audit findings and followup of corrective actions.

QA deficiencies were tracked by computer, which generated a printout for quarterly followup. The printout described the problem, type of audit/surveillance, root cause code, auditee's response and new status. The status of the deficiencies was documented and filed by the assigned QA inspector.

The inspector also reviewed the licensee's QC surveillance program. There was no formalized followup system for QC surveillance concerns; QC surveillance concerns were passed on to the responsible department and closed out with no followup to ensure department corrective action or attention to the problem. As a result of the inspector's concern, the "Quality Control Surveillance Program" procedure (LAP-1700-12) was revised to ensure followup by QC before surveillance concerns are closed out.

The licensee utilized experienced personnel and technical experts to conduct audits and surveillance.

3.8.2 Review of Maintenance Self-Assessment

The inspector reviewed the report of the licensee's self-assessment of maintenance performed in October 1987, which consisted of team members from four CECo plants, CECo corporate office and INPO. This self-assessment included evaluation of 16 maintenance areas. A copy of the self-assessment was sent to QA for utilization in QA followup audits of maintenance. Based on reviews and comparisons with other industry self-assessments of maintenance and the results of this current NRC inspection, the inspectors concluded that the licensee's self-assessment was programmatic and not performance based. However, a "Conduct of Maintenance" program was initiated that has the potential to improve corrective, preventive, and predictive maintenance. Estimated implementation date of the program is April 1991.

3.8.3. Effectiveness of Corrective Action

Findings from maintenance audits were closed with an assessment of effectiveness of the corrective action. QA audits of maintenance were performance based; deficiencies were identified and tracked with completion dates established for corrective actions. A total of eight findings were reviewed by the inspector and appeared to be adequate. Audit finding 1 from Maintenance Audit 01-88-25 identified three of 59 Temporary System Changes reviewed did not have the Safety Evaluations attached. Monthly followups were performed by QA and the audit was closed based on review of approximately 20 Temporary System Changes which were completed and in the packages.

4.0 Synopsis

4.1 Overall Plant Performance

4.1.1 Performance Indicators

None of the historical data indicated poor performance in maintenance. However, goals had not been set to reduce ESF actuations and increase availability of EDG, RHR, and HPCS/RCIC systems.

4.1.2 Plant Walkdowns

Housekeeping was considered good. Overall, the material condition of the plant was considered satisfactory.

4.2 Management Support of Maintenance

4.2.1 Management Commitment/Involvement

Management was committed to improve maintenance activities at LaSalle as shown by the work completed on assigned sections of the Conduct of Maintenance.

The inspectors identified strengths in the licensee's maintenance program that indicated management was committed to the improvement of the maintenance process at LaSalle. For example:

- Active participation in industry initiatives such as Institute of Nuclear Power Operations, Boiling Water Reactor Owners Group, Electrical Power Research Institute, Nuclear Utility Management and Human Resource Committee.

- Scheduled milestones and completion dates of assigned sections of the Conduct of Maintenance.

- Personnel knowledgeable of and dedicated to the Conduct of Maintenance.

- Use of reliability centered maintenance type study on the Feedwater system.

Based on weaknesses identified during this inspection, it was apparent that continued involvement and strong commitment by management is necessary to improve maintenance activities to the level desired by Commonwealth Edison. For example:

- Lack of QC involvement in surveillance activities.

- Untimely, inadequate, and non-aggressive corrective action associated with the Limitorque 10 CFR 21 report regarding melamine torque switches.

- Narrowly scoped diagnostic program for motor-operated valves as compared to other sites that have been inspected.

- Lack of comprehensive trending program for corrective maintenance.

- Inadequate followup and correction of a similar deficiency in relay contact testing that was identified at another licensee site and in IEN 88-83.

- Inadequate controls to monitor the performance of the solenoid discharge valves for the fuel oil transfer pump for the 2A and 2B Emergency Diesel Generators that experienced periodic failure from degradation.

- Non-aggressive maintenance response to troubleshoot and repair deficiency noted on Automatic Depressurization System valve continuity.

4.2.2 Management Organization and Administration

The inspection indicated satisfactory performance of the management organization in the administration of the maintenance program. Overall, meeting 1989 goals established by the Plant Manager and Maintenance Department were considered a strength. In general, performance exceeded goals that were established. Other strengths noted included:

- A long range maintenance plan had been established as specified in the Conduct of Maintenance manual.

- Plant improvements such as the plant painting program had made definite housekeeping upgrades. Proposed facilities improvement should also help consolidation of groups.

However, based on the weaknesses noted below, it was apparent that the administration of the maintenance program needs increased management attention. For example:

- No system was implemented to require a technical justification for work deferment.

- Work classified as planned preventive maintenance did not define when the work was to be done.

- Performance indicators did not measure effectiveness of maintenance such as the number of limiting conditions for operation and power reductions due to equipment problems.

4.2.3 Technical Support

The licensee's technical support of maintenance was considered inadequate in numerous instances. The weaknesses, if left uncorrected, could lead to poor plant performance. Some weaknesses were:

- Poor communications between corporate and LaSalle Station on Limitorque 10 CFR 21 report which led to untimely corrective action. Total scope and status of Limitorque's Part 21 letter was not known by technical staff department.

- Technical Staff had limited involvement in root cause and failure analysis associated with Program Analysis Data Sheets.

- Poor technical support in the review of procedures resulted in inadequate surveillance testing of Emergency Diesel Generators, and acceptance criteria were not specified on data sheets for RHR pump motor winding resistance testing.

- Trending program did not consider component significance.

- The overall level of system awareness and technical knowledge of system engineers was low in many instances, even though the average level of experience was 3½ years.

- Inadequate support from the Technical Staff caused some backlogged preventive maintenance work requests to have the potential to affect equipment operability.

4.3 Maintenance Implementation

4.3.1 Work Control

The licensee's work control activities were considered satisfactory with the following strength.

- Backlog of corrective and preventive maintenance was low.

The inspectors noted that weaknesses did exist as follows:

- Difficult to understand the type of work performed based on worker's log.

- Time required to complete maintenance tasks ranged from 1.5 to over twice that estimated.

- Completed torquing values were not consistently documented.

- The work request priority system was not consistently followed. In numerous instances high priority work requests were deferred for an extended time period without technical justification.

- Work request cause codes were not used for trending.

4.3.2 Plant Maintenance Organization

The licensee's performance in this area was considered satisfactory. Strengths and weaknesses were identified, such as:

- I&C maintenance department used the Total Job Management program to identify and track equipment problems for common instruments; use of identification tags on valves and installation of permanent test jacks will help decrease personnel errors.

- Contractor personnel were allowed to deviate from procedures and perform activities without adequate licensee oversight.

- There was a laxness in mechanical maintenance area shown by the use of soft-faces that had the potential to damage equipment during disassembly.

4.3.3 Maintenance Facilities, Equipment and Material Control

The inspectors considered the licensee's performance as satisfactory. The following weaknesses were identified:

- Control of M&TE in the electrical shop was based on an "honor system."

- Storage areas of M&TE did not monitor temperature and humidity.

- Electrical safety checks were not performed as prescribed.

4.3.4 Personnel Control

Management personnel were knowledgeable of responsibilities and accountability. Staffing requirements for the maintenance departments appeared adequate for non-outage work. Maintenance was adequately supplemented with contractor services during heavy work loads.

5.0 Exit Meeting

The inspectors met with licensee representative (denoted in Paragraph 1) on May 25, 1989, at LaSalle County Station Units 1 and 2 and summarized the purpose, scope, and findings of the inspection. The inspectors discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. The licensee did not identify any such documents or processes as proprietary.

APPENDIX A

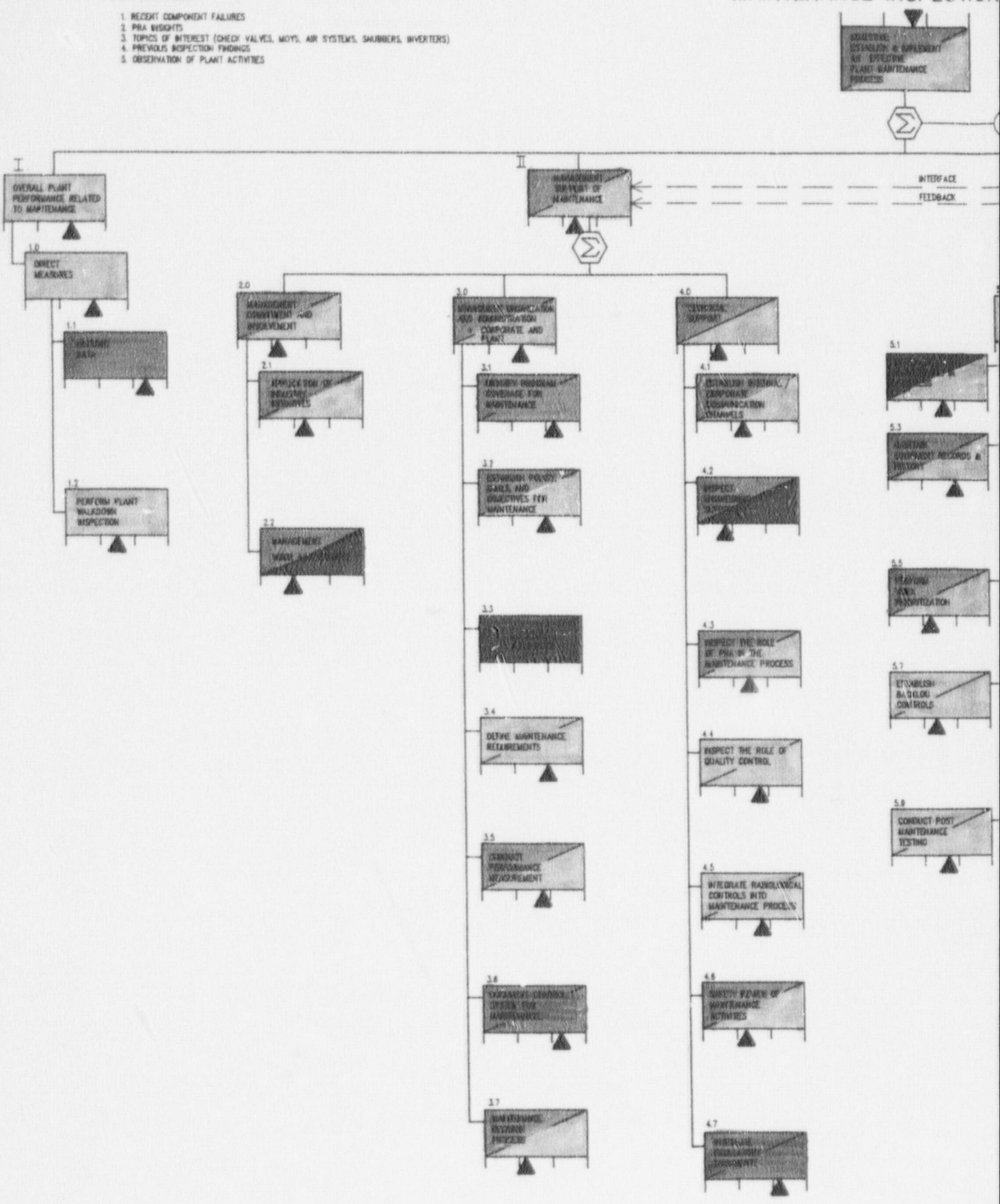
ADS	Automatic Depressurization System
ALARA	As Low As Reasonably Achievable
BOP	Balance of Plant
BWR	Boiling Water Reactor
CECO	Commonwealth Edison Company
CM	Corrective Maintenance
CMWR	Corrective Maintenance Work Request
CRD	Control Rod Drive
DC	Direct Current
DG	Diesel Generator
DR	Discrepancy Record
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EM	Electrical Maintenance
ESF	Engineered Safety Feature
EQ	Environmental Qualification
GE	General Electric
GEI	General Electric Instruction
GEK	General Electric Vendor Manual
GE SAL	General Electric Engineering Service Advice Letter
GE SIL	General Electric Service Information Letter
GSRV	General Surveillance
HPCI	High Pressure Coolant Injection
IA	Instrument Air
I&C	Instrument and Control
IEB	IE Bulletin
IEN	IE Notice
IN	Instrument Nitrogen
IM	Instrumentation Maintenance
INPO	Institute for Nuclear Power Operations
K	Kilo
LER	Licensee Event Reports
LPCI	Low Pressure Coolant Injection
LPCS	Low Pressure Core Spray
MM	Mechanical Maintenance
MOV	Motor Operated Valve
MOVAT	Motor Operated Valve Analysis
M&TE	Measuring and Test Equipment
NPRDS	Nuclear Power Reliability Data System
NRC	Nuclear Regulatory Commission
PADS	Program Analysis Data Sheet
PM	Preventive Maintenance
PMWR	Preventive Maintenance Work Request
PRA	Probabilistic Risk Assessment
QA	Quality Assurance
QC	Quality Control
RCM	Reliability Centered Maintenance
RCT	Radiation Control Technician
RHR	Residual Heat Removal

RPS	Reactor Protection System
RWP	Radiation Work Permit
RX	Reactor
SAL	Service Advise Letter
SALP	Systematic Assessment of Licensee Performance
SIL	Service Information Letter
SOAD	System Operational Analysis Department
SOER	Significant Operating Experience Report
SOR	Static-O-Ring
TJM	Total Job Management
TS	Technical Specification
V	Volt
WR	Work Request

PRESENTATION TREE
MAINTENANCE INSPECTION

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

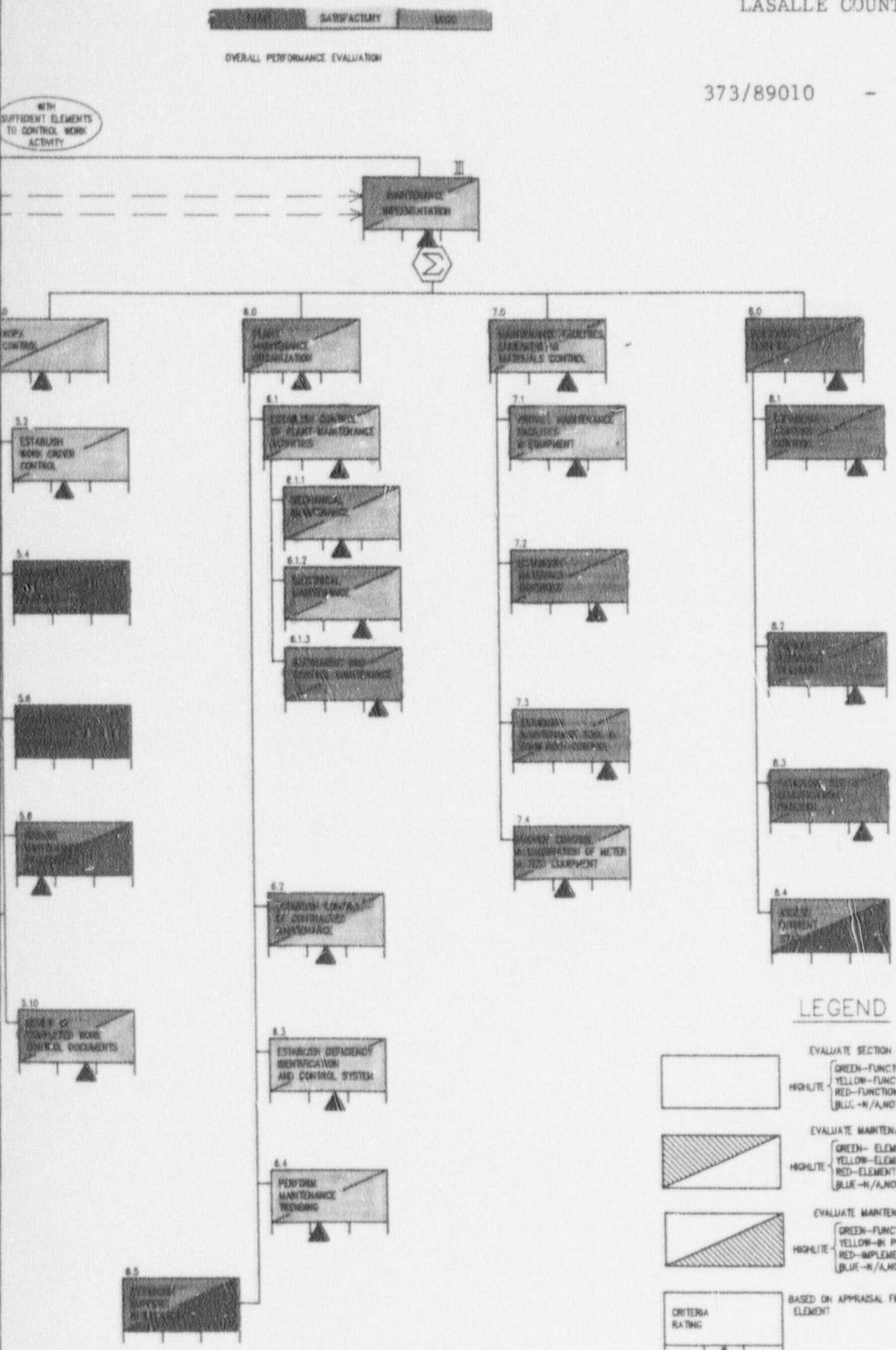


NOTE: THIS DWG. IS USED IN CONJUNCTION WITH 425801, 425802, 425803, 425804, 425806, 425807 & 425808.

TREE

LASALLE COUNTY STATION

373/89010 - 374/89010



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