



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION II
 101 MARIETTA STREET, N.W.
 ATLANTA, GEORGIA 30323

Report Nos.: 50-325/90-51 and 50-324/90-51

Licensee: Carolina Power and Light Company
 P. O. Box 1551
 Raleigh, NC 27602

Docket Nos.: 50-325 and 50-324

License Nos.: DPR-71 and DPR-62

Facility Name: Brunswick 1 and 2

Inspection Conducted: December 3 to 7, 1990

Inspectors: *[Signature]* 1/9/91
 W. P. Kleinsorge P.E., Reactor Inspector Date Signed

[Signature] 1/9/91
 J. J. Blake, Chief Date Signed
 Materials and Processes Section
 Engineering Branch
 Division of Reactor Safety

Approved by: *[Signature]* 1/16/91
 Caudle A. Julian, Chief Date Signed
 Engineering Branch
 Division of Reactor Safety

SUMMARY

Scope:

This special, announced inspection was a follow-up assessment of issues identified during the special maintenance team inspection conducted in the Spring of 1989, (as reported in Report No. 50-325,324/89-01).

Results:

The assessment showed that the licensee has made a concerted effort to address the concerns identified by the maintenance inspection team, especially in the areas of engineering support and support interfaces.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

J. Harness, General Manager Brunswick Nuclear Plant
R. Starkey, Manager Brunswick Nuclear Plant
*J. Simon, Operations Manager, Unit 1
*R. Helme, Manager, Technical Support
*E. Wilson, Manager, Nuclear Systems Engineering
*J. Leviner, Manager, Engineering Projects
*E. Quidley, Supervisor, Maintenance Support Engineering
*S. Smith, Manager, Unit 1 I&C
*P. Musser, Manager, Maintenance
*P. Smith, Supervisor, I&C Planning
*A. Cheatham, Manager, E&RC
*K. Altman, Manager, Regulatory Compliance
*M. Foss, Supervisor, Regulatory Compliance
*W. Dorman, Manager, QA/QC
*J. Holder, Manager, Outage Management and Modifications
*S. Callis, Licensing, On-Site Representative
*K. Enzor, CP&L Headquarters
G. Wertz, Supervisor, Reactor System Engineering
S. Boyce, Supervisor, ECCS Engineering
J. O'Conner, Supervisor, Electrical System Engineering
T. Groblewski, Supervisor, Component Engineering

Other licensee employees contacted during this inspection included craftsmen, engineers, technicians, and administrative personnel.

NRC Personnel

*W. Brach, Chief, Licensee Performance Qualification Evaluation Branch, NRR
*A. Gibson, Director, Division of Reactor Safety, RII
*N. Le, Licensing Project Manager, NRR
*R. Prevatte, Senior Resident Inspector

*Attended exit interview

2. Maintenance Assessment Inspection (TI 2515/108)

This inspection was conducted to assess the effectiveness of corrective actions taken as a result of Maintenance Team Inspection (MTI) conducted during January/ 1989, as reported in Report No. 50-325,324/89-01. This reinspection of the Brunswick maintenance program was performed by a two-man team during December 1990 utilizing the guidance given in TI 2515/108.

The inspectors concentrated the assessment in the following areas: 1) Material Condition of the Plant; 2) Maintenance Areas that were evaluated as poor, or missing during the original inspection; and 3) Areas that were not evaluated during the original inspection. The Maintenance Inspection Tree generated during the original inspection is included as Figure 1 to this report.

Material Condition of the Plant is reflected in block No. 1.2 of the Maintenance Inspection Tree, "Perform Plant Walkdown Inspection."

Maintenance areas that were evaluated as poor, or missing, during the original inspection were:

Section 4.0. Technical Support - Poor Performance.

Section 4.2. Engineering Support - Poor Program/Performance.

Section 4.3. The Role of Risk in the Maintenance Process - Poor Performance.

Section 6.5. Establish Support Interfaces- Poor Performance.

Areas not evaluated during the original inspection that were assessed this time included the following:

Section 2.0. Management Commitment and Involvement - Program.

Section 2.1. Application of Industry Initiatives - Program/Performance.

Section 4.1. Establish Internal/Corporate Communications Channels - Program/Performance.

Section 5.5. Perform Work Prioritization - Program.

Section 5.8. Provide Maintenance Procedures - Program.

Section 5.9. Conduct Post Maintenance Testing - Program/Performance.

Section 5.10. Review of Completed Work Control Documents - Program.

3. Previous Inspection Findings

The following adverse findings were identified by the MTI conducted at the Brunswick site during January 1989:

(Closed) Violation 50-325,324/89-01-01: "Failure to Take Adequate and Timely Corrective Action" - This item was examined and closed in NRC Inspection Report 50-325,324/90-04.

(Closed) Violation 50-325,324/89-01-02: "Failure to Establish Adequate Measures to Control Storage of Components With Sensitive Surfaces" - This item was withdrawn.

(Closed) Unresolved Item 50-325, 324/89-03: "10 CFR 21 Evaluation of SLC Pump Spring Failure" - This item was examined and closed in NRC Inspection Report 50-325,324/90-04.

(Open) Inspector Follow-up Item 50-325, 324/89-01-04: "Completion of CAC and MSIV GL 88 Testing for Brunswick Unit 2" - This item remains open.

4. Maintenance Assessment Results

Section 1.2. Perform Plant Walkdown Inspection

The inspectors conducted a walkdown inspection of vital plant areas; including the Turbine, Control and Unit 2 Reactor buildings, and the Service Water Intake Structure. Although the inspectors noted some corrosion problems, some thread engagement problems, a misaligned pipe support, and a hole in a Heating Ventilating and Air Conditioning duct, the plant had previously identified the majority of those items and entered them into the maintenance program for correction. Those few items not previously identified by the licensee and identified by the inspectors have now been entered into the maintenance program. The plant housekeeping is of the same high level and the plant is still in relatively good material condition.

Section 2.0. Management Commitment and Involvement

The inspectors assessed the commitment and involvement of the site management during discussions with site management, engineering and maintenance supervisors, and engineering and maintenance personnel. The impression that the inspectors received during these discussions was that the management of the site, and of the corporate offices, were committed to providing good engineering and maintenance staffs to support the operation of the units.

The inspectors concluded that the improvements in the maintenance program, noted during this assessment, appear to be the result of a management program to build up the technical support for maintenance in a systematic way. There did not seem to be any evidence of any attempt to "quick-fix" the symptoms found during the MTI.

Section 2.1. Application of Industry Initiatives

The inspectors reviewed the application of industry initiatives during discussions with engineering supervisors and during reviews of engineering procedures and programs. It appears that the licensee has established a good program for assuring that industry

initiatives are reviewed for application at Brunswick by technical support personnel. There are indications that maintenance practices at Brunswick are being compared with industry practices, and the staff at Brunswick are being encouraged to develop good practices that they can present to the industry.

Section 4.0. Technical Support

Based on the substantive improvements noted in the area of engineering support, the inspectors concluded that this area of the maintenance inspection tree should be rated as having a good program with satisfactory implementation.

Section 4.1. Establish Internal/Corporate Communications Channels

During this assessment, the inspectors looked for indications of open communications within the Brunswick staff and with corporate counterparts. It became evident during the inspection that the communication between operations, technical support, and maintenance staffs was much healthier than it appeared to be during the original inspection. During discussions with licensee personnel and the NRC resident inspectors it was noted that there appears to be an obvious spirit of cooperation between operations, technical support, and maintenance. The result of this cooperation is that maintenance now has a much better chance of being done when planned, with much less impact on operations, than in the past.

There were numerous indications that the corporate management is also attempting to improve the lines of communication; one of the most promising appears to be the establishment of corporate positions to coordinate counterpart communications between CP&L's three nuclear facilities.

Section 4.2. Engineering Support

There have been a number of changes in the engineering support area since the original Maintenance Team Inspection. One major change involved the consolidation of site engineering into a technical support organization with three major branches: Nuclear System Engineering, Engineering Projects, and BOP System Engineering. The Nuclear System Engineering branch contains the following sections: Nuclear Engineering, Reactor System Engineering, ECCS Engineering, Electrical System Engineering, and Chemical/FP Engineering. The Engineering Projects branch contains the following sections: Maintenance Support, Component Engineering, ISI/IST, Projects, and Tech Support Contract Clerical Support. The BOP System Engineering branch contains the following sections: Auxiliary Systems, Performance and Reliability Engineering, Cooling System Engineering, and Turbine System Engineering.

At the time of this assessment, the Nuclear System Engineering branch had thirty-two systems engineers "on board" with two vacancies and the BOP Systems Engineering branch had sixteen systems engineers "on board" with two vacancies, for a total of fifty-two systems engineering positions at the site.

Another major change, was the establishment of a Procurement Engineering Manager, with sufficient staff, to provide engineering support in the area of procurement, so that the systems engineers and the rest of the technical support organization could concentrate on providing engineering support to operations and maintenance.

The changes in the technical support organization created a significant amount of turnover in engineering personnel as the job functions and qualification/certification requirements for systems engineers became fully defined. The licensee has done an excellent job of recruiting engineers with four to six years of experience, with the temperament to be a systems engineer, to fill the vacancies.

The inspectors reviewed the engineering program and procedures to assess the changes since the original MTI. Particular emphasis was placed on the review of the following two procedures:

ENP-01, Volume XX, Rev. 007 - Technical Support Organization and Conduct of Activities.

ENP-606, Volume XX, Rev. 004 - System Engineer Certification and Qualification.

The inspectors also reviewed a sample of Engineering Work Requests and Technical Support Memos to evaluate the quality of the technical support that is currently being provided.

The inspectors concluded that there had been a significant improvement in the quality and the character of the technical support at Brunswick. The redefinition of the roles of the various engineering personnel, along with the reorganization, has provided the site with a "good" program in this area. During the week that the inspectors were doing this reassessment, there were strong indications that the implementation of the technical support program was better than "satisfactory"; but because a significant number of the systems engineers are relatively new to Brunswick and new programs tend to be fragile, rating of the implementation was "satisfactory".

Section 5.5. Perform Work Prioritization

The licensee's work prioritization program is effectively defined in BSP-36, Revision 0 "Nuclear Prioritization Procedure", and Attachment 1, "Priority Execution Guide", to O-MMM-003, Revision 8, "Corrective Maintenance (Automated Maintenance Management System)". The original inspection found a problem with the deferral of preventive maintenance; assessment of this issue is discussed in paragraph 5 of this report.

Section 5.8. Provide Maintenance Procedures

The 1988 Systematic Assessment of Licensee Performance (SALP) report indicated that the licensee was in the process of a Procedure up-grade program and had completed some 600 procedures of an approximate total of 1300. The licensee indicated that they are still on track with approximately 500 procedures left to revise by 1993. The licensee's maintenance procedure program is well controlled by O-MMM-001, Revision 13, "Maintenance: Conduct of Operation", O-MMM-002, Revision 002, "Standards for Preparing and Maintaining Maintenance Procedures", Operating Manual Volume 1, Book 1, "Administrative Procedures", Section 5, and O-MMM-003, Revision 8, "Corrective Maintenance (Automated Maintenance Management System)". Paragraph 6, of this report, discusses the subject of including manufacturers PM recommendations in the maintenance process.

Section 5.9. Conduct Post Maintenance Testing

The licensee implemented their Post Maintenance Test (PMT) Program with procedure O-MMM-003, Revision 8, "Corrective Maintenance (Automated Maintenance Management System)", with references to OI-39, Revision 017, "Handling of Work Request/Job Orders", PLP-08, Revision 1, "Repair and Replacement Program", ENP-16, Revision 027, "Procedure for Administrative Control of Inservice Inspection Activities" and ENP-17, Revision 010, "Pump and Valve Inservice Testing". Although the above procedures cover PMT adequately there is no "Flow Chart" to provide a clear picture of an involved process. The inspectors examined a representative sample of Work Request/Job Orders (WR/JOs), and found the PMT adequately delineated.

Section 5.10. Review of Completed Work Control Documents

The licensee clearly delineated the requirements for review of completed work documents (WO/JOs) in O-MMM-003, Revision 8, "Corrective Maintenance (Automated Maintenance Management System)". The inspectors reviewed six completed WR/JOs and found only one that did not adequately describe the root cause of the trouble (WR/JO 90-AULY1). The licensee concurred indicating that the "Cause of Trouble" was poorly written.

Section 6.5. Establish Support Interfaces

The MTI reported that below par communicative effort between maintenance, operations and engineering appeared to be delaying completion of WR/JOs. The licensee has made great strides in this area including reorganizing by the engineering organization, overhauling the operation of the Site Work Force Control Group (SWFCG), and establishing the Maintenance Clearance Resource Center (MCRC). The reorganization of the engineering organizations has permitted a more effective use of the engineering staff in support of the maintenance effort. The overhaul of SWFCG has greatly increased the completion percentage of scheduled WR/JOs. The MCRC a newly created organization, so far has only been used during the last two refueling outages, but has significantly streamlined the operational clearance process in that the speed of processing clearances has been increased and the total number of clearances has been reduced, thus greatly improving the maintenance effort. The MCRC is described in a CP&L Good Practice Identification Work Sheet Supplement dated October 20, 1991. The licensee indicated that they intend to extend the use of the MCRC to routine non outage maintenance work in the near future. The SWFCG activities are described in "Site Work Force Control Guideline" dated June 11, 1990.

A Maintenance Inspection Tree generated during this reassessment is included as Figure 2 to this report.

5. Deferral of Preventive Maintenance

The MTI identified as a weakness the licensee's lack of a tracking system to control the deferral of preventive maintenance (PM) activities. The licensee has revised O-MMM-004, "Preventive Maintenance", to include a flag on the PM Exception form for the inclusion of the items previous PM status, and a text caution for close scrutiny of the items' history to assure an informed decision on the deferral of the items' PM. The inspectors reviewed the status of a representative sample of PMs deferred since the implementation of the procedure revision and determined that the system appears to be functioning satisfactorily.

6. Manufacturer's PM Recommendations

The MTI identified as a weakness the fact that the licensee did not always implement manufacturer's PM recommendations. The licensee has revised ENP-20, "Engineering Work Request (EWR)", to assure that newly received written vendor recommendations be formally evaluated and implemented as appropriate. The licensee indicated that as part of the system engineer certification process, the system engineers are required to review the vendor technical manuals, and as a result of the review the system engineers have identified previously unidentified vendor recommended PM practices. The licensee provided the inspectors with a number of examples.

7. Protection of Sensitive Material Surfaces

The MTI identified a number of examples of weld prepared fittings and components, flanged components, and components with bellows that were not adequately protected. The inspectors made a walkdown inspection of both warehouse facilities and the plant, and found no current examples of inadequate storage or protection.

8. Configuration Control

The MTI identified a number of configuration control problems related to labeling. The licensee has instituted an aggressive plant wide labeling program, implemented by AI-97, "Plant Component, Piping, Panel Identification, Labeling, Valve Tagging; Permanent & Temporary Signs". This program if followed through should go a long way to curing the plant labeling problems.

9. Exit Interview

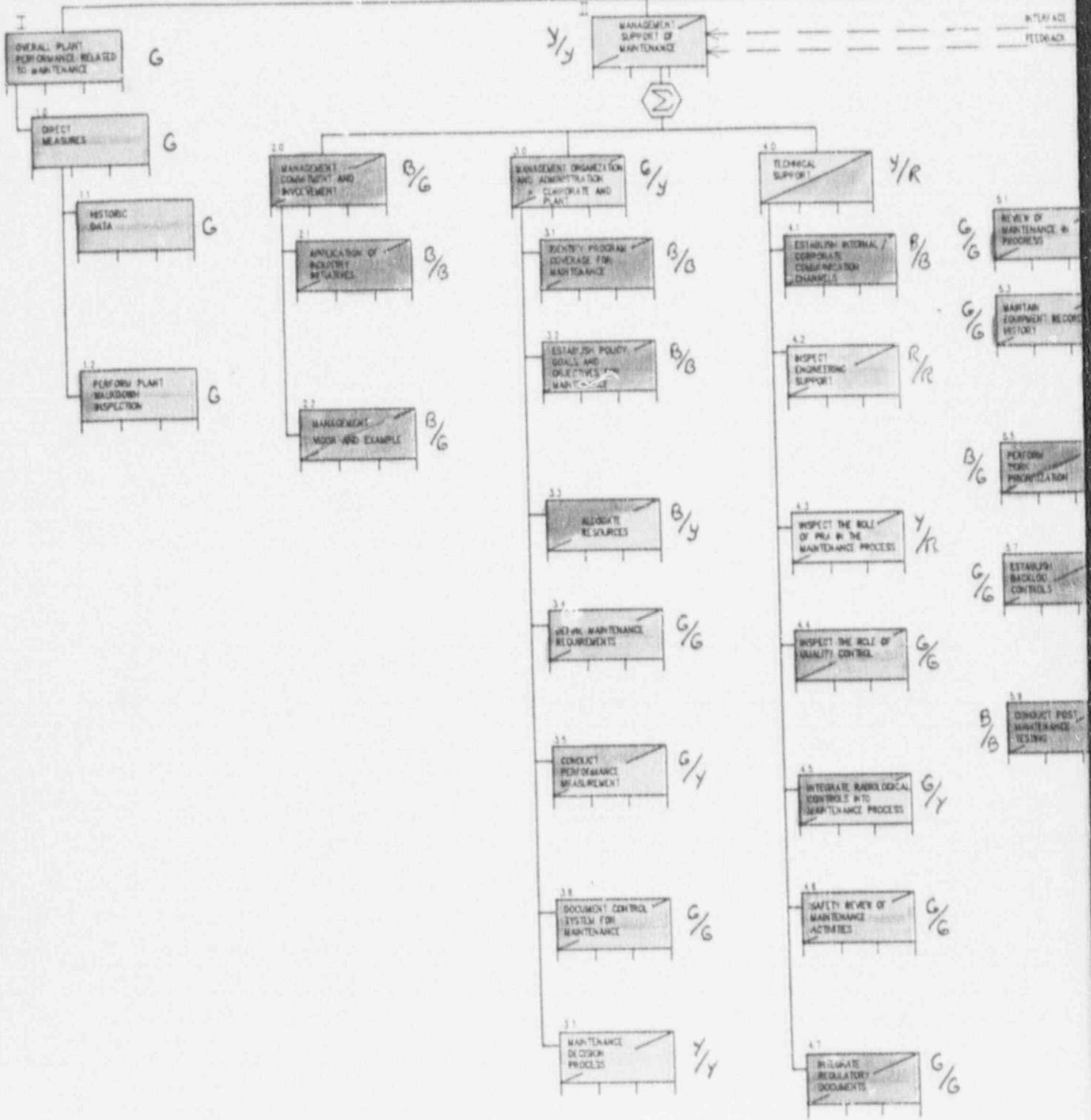
The inspection scope and results were summarized on December 7, 1990, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

TREE INITIATORS

PRESENTATION TO MAINTENANCE INSPECTOR

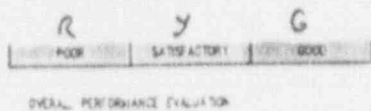
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- 2 PMA INSIGHTS
- 3 TOPICS OF INTEREST (CHECK VALVES, WOTS, AIR SYSTEMS, SHARBERS, INVERTERS)
- 4 PREVIOUS INSPECTION FINDINGS
- 5 OBSERVATION OF PLANT ACTIVITIES

OBJECTIVE: ESTABLISH & IMPLEMENT AN EFFECTIVE PLANT MAINTENANCE PROCESS



NOTE: THIS DIAGRAM IS USED IN CONJUNCTION WITH 425801, 425802, 425803, 425804, 425805, 425807 & 425808

FREE
ON TREE



BRUNSWICK
50-325,324 / 90-51
FIGURE 1
ORIGINAL MTI TREE

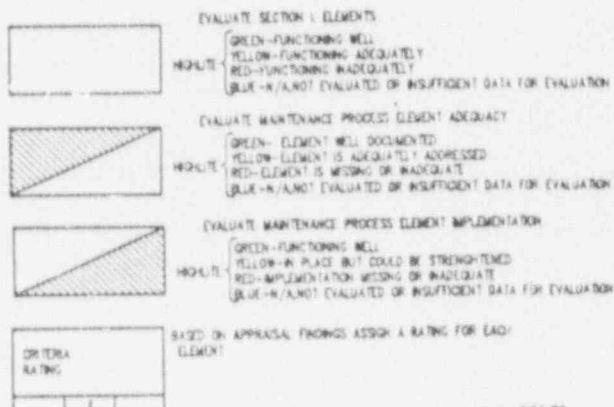
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WITH SUFFICIENT ELEMENTS TO CONTROL WORK ACTIVITY



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TREE INITIATORS

PRESENTATION MAINTENANCE INSPEC

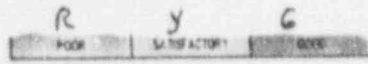
- 1 RECENT COMPONENT FAILURES
- 2 PRA INSIGHTS
- 3 TOPICS OF INTEREST (CHECK VALVES, MOTR, AIR SYSTEMS, SHAMBERS, INVERTERS)
- 4 PREVIOUS INSPECTION FINDINGS
- 5 OBSERVATION OF PLANT ACTIVITIES

OBJECTIVE:
ESTABLISH & IMPLEMENT
AN EFFECTIVE
PLANT MAINTENANCE
PROCESS



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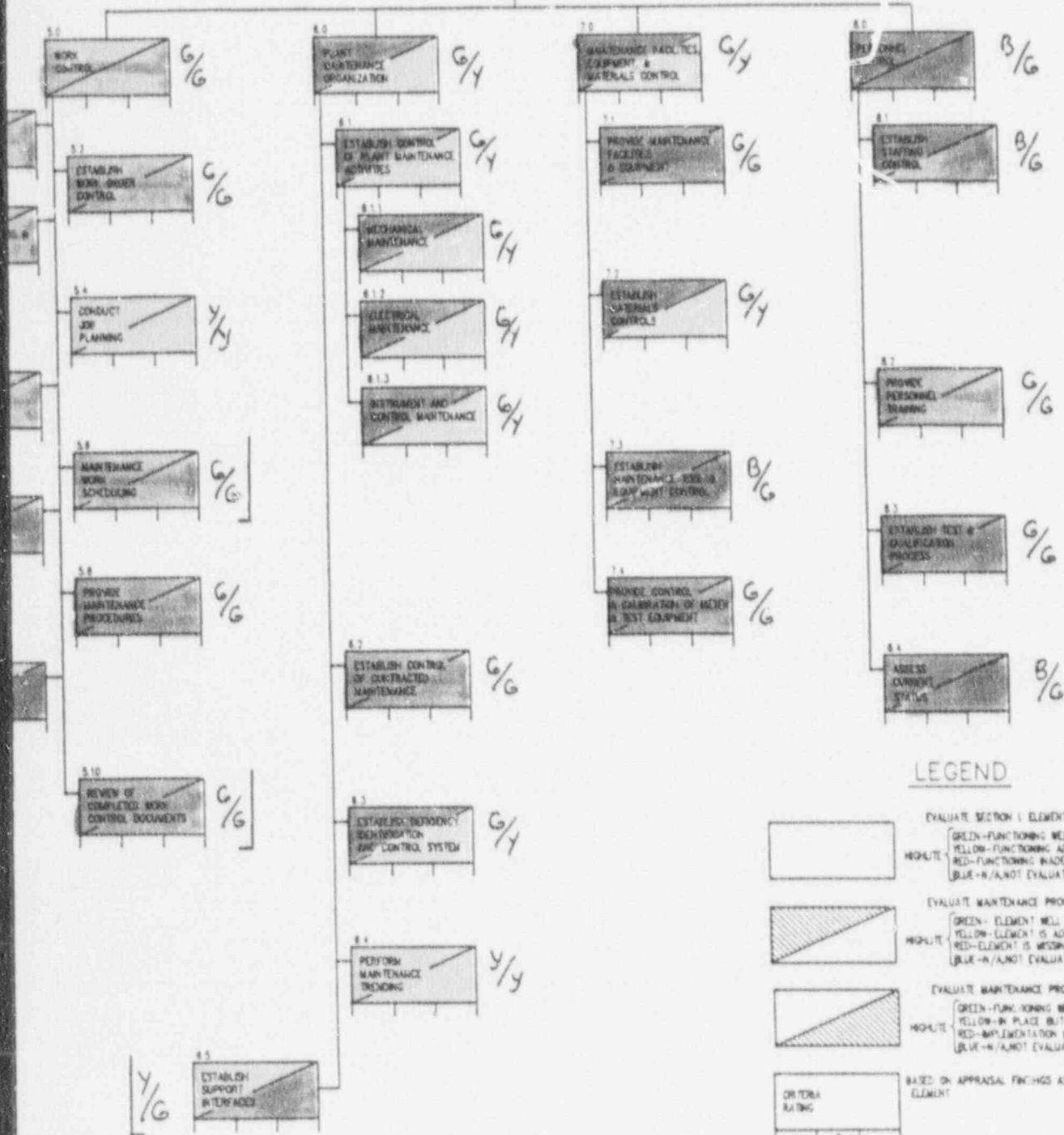


OVERALL PERFORMANCE EVALUATOR

BRUNSWICK
50-325,324 / 90-51

FIGURE 2
REASSESSMENT MTI TREE

WITH SUFFICIENT ELEMENTS TO CONTROL WORK ACTIVITY



SI
APERTURE
CARD
Also Available On
Aperture Card

LEGEND

- EVALUATE SECTION I ELEMENTS
 - GREEN - FUNCTIONING WELL
 - YELLOW - FUNCTIONING ADEQUATELY
 - RED - FUNCTIONING INADEQUATELY
 - BLUE - N/A/NOT EVALUATED OR INSUFFICIENT DATA FOR EVALUATION
- EVALUATE MAINTENANCE PROCESS ELEMENT ADEQUACY
 - GREEN - ELEMENT WELL DOCUMENTED
 - YELLOW - ELEMENT IS ADEQUATELY ADDRESSED
 - RED - ELEMENT IS MISSING OR INADEQUATE
 - BLUE - N/A/NOT EVALUATED OR INSUFFICIENT DATA FOR EVALUATION
- EVALUATE MAINTENANCE PROCESS ELEMENT IMPLEMENTATION
 - GREEN - FUNCTIONING WELL
 - YELLOW - IN PLACE BUT COULD BE STRENGTHENED
 - RED - IMPLEMENTATION MISSING OR INADEQUATE
 - BLUE - N/A/NOT EVALUATED OR INSUFFICIENT DATA FOR EVALUATION
- CRITERIA RATING
 - BASED ON APPRAISAL PRINCIPLES ASSIGN A RATING FOR EACH ELEMENT

8/5/78
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