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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555



JAN 31 1991

Mr. Thomas E. Tipton
Director of Operation, Management
and Support Services
Nuclear Management and Resources Council
Suite 300
1776 Eye Street, NW
Washington, D.C. 20006

Dear Mr. Tipton:

I am forwarding to the Nuclear Management and Resources Council (NUMARC) the results of the U. S. Nuclear Regulatory Commission (NRC) staff's evaluation of the Institute of Nuclear Power Operations (INPO) document 90-008, "Maintenance Programs in the Nuclear Power Industry," March 1990 (hereinafter referred to as INPO 90-008). The staff performed this evaluation to respond to the letter of April 17, 1990, from Byron Lee, Jr. (NUMARC) to James M. Taylor (NRC), and also to determine if INPO 90-008 would satisfy one of the criteria being used by the NRC to determine the need for maintenance rulemaking. This criterion is described in SECY-90-137, "Proposed Criteria to Be Used in Determining When Industry Progress in the Area of Maintenance Would Be Sufficient to Obviate a Need For Rulemaking." This criterion requires the NRC staff to perform an analysis and submit its recommendation to the Commission on the adequacy of the industry's commitment to a maintenance performance standard that would be acceptable to the NRC.

In performing its evaluation, the NRC staff compared INPO 90-008 to the general objectives of the NRC maintenance inspection guidance, SECY 89-325, "Revised Policy Statement and Enforcement Criteria Related to the Maintenance of Nuclear Power Plants," and the draft regulatory guide "Maintenance Programs for Nuclear Power Plants." The enclosure provides the results of the staff's evaluation.

Initially, the NRC staff found that INPO 90-008 generally met the objectives of the NRC documents noted above with the exception of the following four areas:

1. Tagout or clearance logs and status boards
2. Long range maintenance planning
3. Specific industrial safety for electrical safety, fire protection, confined spaces, and inerted atmospheres
4. Risk significance in the planning, scheduling, and prioritization of maintenance (including balance-of-plant systems)

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During discussions with the NRC staff, INPO indicated that revisions to INPO 90-008 are in progress. The revisions are planned to incorporate existing material from INPO performance program documents and should address the first three areas. However, the fourth area, integration of risk significance into the maintenance process, continues to be a weakness in INPO 90-008. In a letter of December 27, 1990, from James H. Sniezek (NRC) to Kenneth A. Strahl (INPO), the NRC staff noted its recent reviews and emphasis in this area and also communicated its concerns with the industry's current practices and performance in this area. In a response of January 14, 1991 to the NRC letter, INPO staff discussed plans to review this area. An appropriate revision to INPO 90-008 would address these concerns and would also resolve the only remaining area resulting from our review of INPO 90-008. Satisfactory resolution of these four areas would allow the NRC to find INPO 90-008 acceptable as an industry maintenance standard.

Please review the enclosed staff evaluation report, identify any factual inaccuracies or necessary corrections, and provide confirmation of industry actions taken or planned to address the four areas discussed above and described in Section 4.0, Findings, of the enclosed report.

I would be pleased to discuss this matter with you, if necessary, at your convenience. Your reply to this letter is requested by February 19, 1991.

Sincerely,

ORIGINAL SIGNED BY

William T. Russell, Associate Director
for Inspection and Technical Assessment
Office of Nuclear Reactor Regulation

Enclosure: As Stated

cc: W. Kindley, INPO

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STAFF EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION OF
THE INSTITUTE OF NUCLEAR POWER OPERATIONS DOCUMENT 90-008,
"MAINTENANCE PROGRAMS IN THE NUCLEAR POWER INDUSTRY"

1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) has placed a greater emphasis on the conduct of maintenance at nuclear power plants for several years. From 1980 to 1985, the staff conducted maintenance surveys and site visits. In June 1986, the staff published the results in NUREG 1212, "Status of Maintenance in the U.S. Nuclear Power Industry 1985." The NRC continued researching maintenance practices in other industries and countries. In November 1988, the staff issued NUREG 1333, "Maintenance Approaches and Practices in Selected Foreign Nuclear Programs and Other Industries: Review and Lessons Learned."

During this same period, the NRC revised the entire inspection program. The revised program included mandatory team inspections in "areas of emphasis" selected by NRC management. Maintenance was selected as the first area of emphasis. In February of 1988, the NRC started the Maintenance Team Inspection Program. The NRC began the inspection program to provide a systematic method for determining the status of maintenance throughout the nuclear power industry by performing this inspection at each site. These Maintenance Team Inspections, which were first performed in July 1988, will continue until April 1991.

In parallel with other NRC efforts during this period, the NRC also considered maintenance rulemaking. The NRC issued a policy statement on March 23, 1988, and a proposed maintenance rule in November 1988. On June 26, 1989, the Commission agreed to hold the final draft rule on maintenance in abeyance for 18 months from the effective date of a revised policy statement (issued in December 1989) and agreed to have the staff evaluate the need for regulatory action. In July 1989 the staff issued for public comment a draft regulatory guide to support the proposed maintenance rule.

In September 1989, the Commission requested that the staff recommend criteria to be used in determining when industry progress in the area of maintenance would be sufficient to obviate a need for rulemaking. On May 25, 1990, the Commission approved the use of the four proposed criteria contained in SECY 90-137. Criterion 3 states, "Licensees are committed to the implementation of a maintenance performance standard acceptable to the NRC." Criterion 4 states, "Licensees have in place or are committed to an evaluation program for ensuring sustained performance in the maintenance area." These two criteria reinforce the emphasis placed on this issue in the policy statement on maintenance SECY 89-325, "Revised Policy Statement and Enforcement Criteria Related to the Maintenance of Nuclear Power Plants." By issuing this policy statement, the NRC focused the industry, through the Nuclear Management and Resources Council (NUMARC), on the development of a document defining the industry's maintenance program.

The Institute of Nuclear Power Operations (INPO) conducts routine plant evaluations and periodic corporate evaluations of utilities. The primary documents used for these evaluations are the, "Performance Objectives and Criteria for Operating and NTOL Plants" and "Performance Objectives and Criteria for Corporate Evaluations." These program-level documents are comprised of objectives and criteria established by INPO and agreed to by the member utilities for each functional area evaluated. The "performance objectives" are the goals of excellence and the "criteria" are the expectations associated with meeting each of the performance objectives.

In March of 1990, INPO combined portions of the INPO plant and corporate evaluation documents relating to maintenance in order to create INPO document 90-008, "Maintenance Programs in the Nuclear Industry" (hereinafter referred to as INPO 90-008). In April of 1990, NUMARC provided INPO 90-008 to the NRC as part of industry's efforts to improve maintenance and with a request that the NRC recognize INPO 90-008 as the industry's maintenance standard.

2.0 DISCUSSION

The staff analyzed INPO 90-008 as part of the evaluation of the need for maintenance rulemaking in accordance with the criteria specified in SECY 90-137. The staff performed the analysis to determine if INPO 90-008 met the general objectives of the NRC Maintenance Inspection Guidance, the NRC Policy Statement of December 8, 1989, and the draft Regulatory Guide, "Maintenance Programs for Nuclear Power Plants." The staff chose the NRC Maintenance Inspection Guidance as the primary document for comparison because it includes the elements of the policy statement and the draft regulatory guide and because it is the most detailed of these documents.

The NRC Maintenance Inspection Guidance is divided into three major areas: 1) Overall Plant Performance Related to Maintenance, 2) Management Support of Maintenance, and 3) Maintenance Implementation. An assessment of these areas is developed by addressing criteria associated with each of the following eight sections:

Overall Plant Performance Related to Maintenance

Section 1.0, "Direct Measures." Plant performance with respect to reliability of equipment, operability and availability of equipment, and equipment maintainability.

Management Support of Maintenance

Section 2.0, "Management Commitment and Involvement." The degree to which corporate and plant management is committed to and involved in the maintenance process determines the degree of effort assigned in establishing, implementing, and improving maintenance.

Section 3.0, "Management Organization and Administration." The adequacy of a maintenance program and its implementation is determined by proper organization and administration by management and its administrators.

Section 4.0, "Technical Support." An effective maintenance process requires adequate technical support.

Maintenance Implementation

Section 5.0, "Work Control." The procedures, work documents, and administrative controls used in the implementation of the maintenance process determine whether the maintenance process is effective and can be performed in a timely manner.

Section 6.0, "Plant Maintenance Organization." The organization established for maintenance must adequately support the plant maintenance requirements.

Section 7.0, "Maintenance Facilities, Equipment, and Materials Control." Effective maintenance must be supported by adequate facilities, equipment to perform maintenance and proper materials control to ensure the required materials are used.

Section 8.0, "Personnel Control." Personnel staffing, training, and qualification are essential to properly support effective maintenance.

In the Maintenance Team Inspection Guidance, these eight sections are further subdivided and expanded to provide detailed assessment guidance. The staff conducted a detailed and comprehensive correlation of INPO 90-008 to the NRC Maintenance Inspection Guidance. The staff chose these eight sections of the NRC Maintenance Inspection Guidance as an appropriate level of detail for reporting the results of the staff's evaluation.

3.0 EVALUATIONS

3.1 EVALUATION OF SECTION 1.0

The NRC Maintenance Inspection Guidance for Section 1.0, "Direct Measures," states the following:

Direct measures of a plant's maintenance performance should be determined and rated. The inspection is to consider the following two areas: 1) The historic data should be reviewed and rated as to the impact maintenance has had. 2) Perform plant condition verification during a plant-wide walkdown, consider the latest licensee inspections reports, and verify closeout actions during the inspections.

The staff found that INPO 90-008 addressed most of the general objectives of the NRC Maintenance Team Inspection Guidance for Section 1.0, including subsections

- 1.1, "Historical Data"
- 1.2, "Perform Plant Walkdown Inspection"

However, the staff found the following item was inadequately addressed in INPO 90-008:

Verification that equipment is out of service for maintenance, which is an objective of subsection 1.2.

3.2 EVALUATION OF SECTION 2.0

The NRC Maintenance Inspection Guidance for Section 2.0, "Management Commitment and Involvement," states the following:

The inspection of management commitment and involvement should be directed towards determining the emphasis management places on supporting and being involved with the maintenance process. The inspection is to consider the emphasis placed on nuclear industry programs and initiatives. The management actions are to be determined, reviewed, verified, and rated as to their effectiveness.

The staff found that INPO 90-008 addressed the general objectives of the NRC Maintenance Team Inspection Guidance for Section 2.0 including subsections:

- 2.1, "Application of Industry Initiatives"
- 2.2, "Management Vigor and Example"

3.3 EVALUATION OF SECTION 3.0

The NRC Maintenance Inspection Guidance for Section 3.0, "Management Organization and Administration," states the following:

The inspection of management organization and administration should be directed to determining how management supports maintenance activities, what long range (annual, semiannual) maintenance activity plan has been established, how the maintenance activity plan has been implemented and is being controlled, and how resources are being controlled. The inspection should be conducted by first determining the guidelines and then verifying by sampling of selected systems or components that the guidelines are being implemented as intended.

The staff found that INPO 90-008 addressed most of the general objectives of the NRC Maintenance Team Inspection Guidance for Section 3.0 including the following subsections:

- 3.1, "Identify Program Coverage for Maintenance"
- 3.2, "Establish Policy, Goals, and Objectives for Maintenance"
- 3.3, "Allocate Resources"
- 3.4, "Define Maintenance Requirements"
- 3.5, "Conduct Performance Measurement"
- 3.6, "Document Control System for Maintenance"
- 3.7, "Maintenance Decision Process"

However, the staff found the following two items were either not addressed or inadequately addressed in INPO 90-008:

1. Issuance of a long range maintenance plan, which is an objective of subsection 3.1
2. Definition of when emergency maintenance can or should be used, which is an objective of subsection 3.4

3.4 EVALUATION OF SECTION 4.0

The NRC Maintenance Inspection Guidance for Section 4.0, "Technical Support," states the following:

The effectiveness of the technical support organizations should be inspected with regard to maintenance. Review selected maintenance work orders, observe maintenance activities, and sample the preparation of work orders. During the inspection, the effectiveness of technical support and communications should be considered.

The staff found that INPO 90-008 addressed most of the general objectives of the NRC Maintenance Team Inspection Guidance for Section 4.0 including the following subsections:

- 4.1, "Inspect Internal/Corporate Communication Channels"
- 4.2, "Inspect Engineering Support"
- 4.3, "Inspect The Licensee's Acknowledgement of Risk Significance In The Maintenance Process"
- 4.4, "Inspect the Role of Quality Control"
- 4.5, "Integrate Radiological Controls Into The Maintenance Process"
- 4.6, "Safety Review of Maintenance Activities"
- 4.7, "Integrate Regulatory Documents"

However, the staff found the following two items were either not addressed or inadequately addressed in INPO 90-008:

1. Consideration of risk and priority of maintenance in planning, scheduling, and prioritization of work, relative to equipment importance and consequences of time out of service or failure, which is an objective of subsection 4.3
2. Integration into the maintenance process of industrial safety, specifically with respect to electrical shock, fire protection, confined spaces, and inerted atmospheres which are objectives of subsection 4.6

3.5 EVALUATION OF SECTION 5.0

The NRC Maintenance Inspection Guidance for Section 5.0, "Work Control," states the following:

The inspection and rating of the work control process includes the subjects of work order documentation, equipment history, planning and scheduling, and document review.

The staff found that INPO 90-008 addressed most of the general objectives of the NRC Maintenance Team Inspection Guidance for Section 5.0 including the following subsections:

- 5.1, "Review of Maintenance in Progress"
- 5.2, "Establish Work Order Control"
- 5.3, "Maintain Equipment and History Records"
- 5.4, "Conduct Job Planning"
- 5.5, "Perform Work Prioritization"
- 5.6, "Maintenance Work Scheduling"
- 5.7, "Establish Backlog Controls"
- 5.8, "Provide Maintenance Procedures"
- 5.9, "Conduct Post-Maintenance testing"
- 5.10, "Review of Completed Work Control Documents"

However, the staff found the following six items were either not addressed or inadequately addressed in INPO 90-008:

1. Adherence to tagout procedures when verifying equipment is properly tagged out of service, which is an objective of subsection 5.1
2. Verification of the status of work when on hold, which is an objective of subsection 5.2
3. Proceduralization of a method to document, revise, and perform emergency maintenance, which is an objective of subsection 5.2
4. Prioritization of maintenance on balance-of-plant systems considering the effects of this maintenance on safety, which is an objective of subsection 5.5
5. Incorporation into the scheduling process of a tracking system for identifying maintenance requests being performed, which is an objective of subsection 5.6
6. Integration into backlog controls of the maintenance backlog for balance-of-plant equipment and its potential effects on safety, which is an objective of subsection 5.7

3.6 EVALUATION OF SECTION 6.0

The NRC Maintenance Inspection Guidance for Section 6.0, "Plant Maintenance Organization," states the following:

The inspection of a plant maintenance organization should be based on observation of licensee activities and responses to unusual events, how the organization supports maintenance activities, how the maintenance activities are controlled and implemented, how personnel are controlled, how the organization establishes documentation, and how open the lines of communication between plant management and craft personnel are.

The staff found that INPO 90-008 addressed the general objectives of the NRC Maintenance Team Inspection Guidance for Section 6.0 including subsections:

- 6.1, "Establish Control of Plant Maintenance Activities"
- 6.2, "Establish Control of Contracted Maintenance"
- 6.3, "Establish Deficiency Identification and Control System"
- 6.4, "Perform Maintenance Trending"
- 6.5, "Establish Support Interfaces"

3.7 EVALUATION OF SECTION 7.0

The NRC Maintenance Inspection Guidance for Section 7.0, "Maintenance Facilities, Equipment and Materials Control," states the following:

The following areas are to be used to inspect and rate the facilities, equipment, and material controls with regard to their support of the maintenance process:

- o Maintenance facilities and equipment
- o Material controls
- o Maintenance tool and equipment control
- o Control and calibration of metering and test equipment
- o Plant condition inspections
- o Inspections to determine the extent to which the plant practices, procedures, and layout support policies, goals and objectives

The staff found that INPO 90-008 addressed the general objectives of the NRC Maintenance Team Inspection Guidance for Section 7.0 including subsections:

- 7.1, "Provide maintenance facilities and equipment"
- 7.2, "Establish materials controls"
- 7.3, "Establish maintenance tool and equipment control"
- 7.4, "Provide control and calibration of metering and test equipment"

3.8 EVALUATION OF SECTION 8.0

The NRC Maintenance Inspection Guidance for Section 8.0, "Personnel Control," states the following:

The inspection should consider personnel control, training, and qualification. Interviews should be conducted with management from the maintenance manager down to the work supervisor, the training and qualification manager, and the personnel manager. Inspections should be made by selectively sampling personnel qualification records and spot checking against work performed to verify qualifications.

The staff found that INPO 90-008 addressed most of the general objectives of the NRC Maintenance Team Inspection Guidance for Section 8.0 including subsections:

- 8.1, "Establish Staffing Control"
- 8.2, "Provide Personnel Training"
- 8.3, "Establish Test and Qualification Process"
- 8.4, "Assess the Current Personnel Control Status"

However, the staff found the following item was not addressed in INPO 90-008:

Establishment of staffing controls that address complement availability on shift for emergency maintenance, which is an objective of subsection 8.1.

4.0 FINDINGS

The staff performed the evaluations discussed herein and found that INPO 90-008 did not address or inadequately addressed 12 items. These items can be grouped into five general areas as follows:

1. Tagout or clearance logs and status boards
2. Long Range Maintenance Plan
3. Specific industrial safety for electrical safety, fire protection, confined spaces, and insried atmospheres
4. Emergency Maintenance
5. Risk significance in planning, scheduling, and prioritization of maintenance including balance-of-plant systems

During discussions with the NRC staff, the INPO staff indicated that it is making proposed revisions to INPO 90-008 to address the NRC staff's findings in the first three areas (tagout and status control, long range maintenance plan, and industrial safety). The revisions are planned to incorporate existing material from INPO performance program documents and should address these three areas. In further discussions with the NRC staff regarding emergency maintenance, INPO indicated that the industry's position was to conduct emergency maintenance using the normal work control process. This item appears in the Maintenance Inspection Guidance but is lacking in INPO 90-008. However, the NRC staff finds the stated industry position on emergency maintenance to be acceptable. After the NRC staff had discussions with INPO staff, the remaining item, the integration of risk significance into the maintenance process, continued to be an open issue. The staff finds this to be a weakness that requires resolution in INPO 90-008.

If the revisions to INPO 90-008, "Maintenance Programs in the Nuclear Power Industry," are incorporated as proposed by INPO and the issue of integration of risk significance into the maintenance process is adequately addressed, the NRC staff would find that there is reasonable assurance that the document meets the general objectives of the NRC Maintenance Inspection Guidance and hence that it meets the objectives of the NRC policy statement and the draft regulatory guide.