UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 21, 1997

The Honorable Newt Gingrich
Speaker of the United States
House of Representatives
Washington, DC 20515

Dear Mr. Speaker:

Pursuant to Subtitle E of the Small Business Regulatory Enforcement Fairness Act of 1996, 5 U.S.C. 801, the Nuclear Regulatory Commission (NRC) is submitting Revision 2 of Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants."

Regulatory Guide 1.160 provides guidance on methods acceptable to the NRC staff for complying with the NRC's maintenance rule, 10 CFR 50.65.

We have determined that this regulatory guide is not a "major rule" as defined in 5 U.S.C. 804(2). We have confirmed this determination with the Office of Management and Budget.

Enclosed is a copy of Revision 2 of Regulatory Guide 1.160, which will be distributed to affected licensees and other interested parties.

Sincerely,

Dennis K. Rathbun, Director
Office of Congressional Affairs

Enclosures:
Regulatory Guide 1.160,
Revision 2
Regulatory Analysis

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 21, 1997

The Honorable Al Gore
President of the United
States Senate
Washington, DC 20510

Dear Mr. President:

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 21, 1997

Mr. Robert P. Murphy
General Counsel
General Accounting Office
Room 7175
441 G Street, NW.
Washington, DC 20548

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U.S. NUCLEAR REGULATORY COMMISSION

Revision 2
March 1997

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 1.160

(Draft was DG-1051)

MONITORING THE EFFECTIVENESS OF MAINTENANCE AT NUCLEAR POWER PLANTS

A. INTRODUCTION

The NRC published the maintenance rule on July 10, 1991, as Section 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." The NRC's determination that a maintenance rule was needed arose from the conclusion that proper maintenance is essential to plant safety. As discussed in the regulatory analysis for this rule,[1] there is a clear link between effective maintenance and safety as it relates to such factors as the number of transients and challenges to safety systems and the associated need for operability, availability, and reliability of safety equipment. In addition, good maintenance is also important in providing assurance that failures of other than safety-related structures, systems, and components (SSCs) that could initiate or adversely affect a transient or accident are minimized. Minimizing challenges to safety systems is consistent with the NRC's defense-in-depth philosophy. Maintenance is also important to ensure that design assumptions and margins in the original design basis are maintained and are not unacceptably degraded. Therefore, nuclear power plant maintenance is clearly important in protecting public health and safety.

Paragraph (a)(1) of 10 CFR 50.65 requires that power reactor licensees monitor the performance or condition of SSCs against licensee-established goals in a manner sufficient to provide reasonable assurance that such SSCs are capable of fulfilling their intended functions. Such goals are to be established commensurate with safety and, where practical, take into account industry-wide operating experience. When the performance or condition of an SSC does not meet established goals, appropriate corrective action must be taken. For a nuclear power plant for which the licensee has submitted the certifications specified in 10 CFR 50.82(a)(1) (i.e., plants undergoing decommissioning), Paragraph (a)(1) of 10 CFR 50.65 applies only to the extent that the licensee must monitor the performance or condition of all SSCs associated with storing, controlling, and maintaining spent fuel in a safe condition, in a manner sufficient to provide reasonable assurance

[1]NRC Memorandum to All Commissioners from J. Taylor on "Maintenance Rulemaking," June 27, 1991. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 2120 L Street, NW., Washington, DC; the PDR's mailing address is Mail Stop LL-6, Washington, DC 20555; phone (202)634-3273; fax (202)634-3343.

USNRC REGULATORY GUIDES

Regulatory Guides are issued to describe and make available to the public such information as methods acceptable to the NRC staff for implementing specific parts of the Commission's regulations, techniques used by the staff in evaluating specific problems or postulated accidents, and data needed by the NRC staff in its review of applications for permits and licenses. Regulatory guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

This guide was issued after consideration of comments received from the public. Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience.

Written comments may be submitted to the Rules Review and Directives Branch, DFIPS, ADM, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

The guides are issued in the following ten broad divisions:

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2. Research and Test Reactors
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4. Environmental and Siting
5. Materials and Plant Protection
6. Products
7. Transportation
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9. Antitrust and Financial Review
10. General

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APPENDIX A

DRAFT REGULATORY ANALYSIS FOR THE IMPLEMENTATION OF 10 CFR 50.65, "REQUIREMENTS FOR MONITORING THE EFFECTIVENESS OF MAINTENANCE AT NUCLEAR POWER PLANTS"

SUMMARY

The NRC staff proposes to endorse an industry guidance document (NUMARC 93-01, Revision 2A, dated July 9, 1992), "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," to implement § 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." This regulatory analysis was developed to support the NRC staff's decision.

The maintenance rule requires commercial nuclear power plant licensees to monitor the effectiveness of maintenance activities for safety-significant plant equipment in order to minimize the likelihood of failures and events caused by the lack of effective maintenance. The provisions of the maintenance rule and NUMARC-93-01 are described and discussed in the text of Draft Regulatory Guide DG-1020, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants."

The NRC staff proposes to endorse an industry guidance document to implement the maintenance rule in order to maximize the leadership role of the industry in the area of maintenance. The performance-based, results-oriented characteristics of the maintenance rule make industry cooperation desirable to realize the full benefits of the rule. The NRC staff originally considered adopting its own regulatory guidance without reference to industry guidance. However, this option was rejected in favor of endorsing NUMARC-93-01. Details of the staff's original effort are contained in Reference 1.

NUMARC-93-01 provides guidelines to utilities on identifying structures, systems, and components (SSCs) within the scope of NRC's maintenance rule. Appropriate performance criteria are to be established at the plant, system, train, and, in rare cases, component levels. Performance criteria are to be compared to actual SSC performance to determine the need for additional speci-

fic goals and monitoring. A basic concept of the industry guidance is that all SSCs within the scope of the rule will be covered by the preventive maintenance provisions [10 CFR 50.65(a)(2)] of the rule, and in addition, some SSCs will be subject to goal setting and monitoring as described in 10 CFR 50.65(a)(1). Further discussion of the provisions of the NUMARC guidance may be found in Appendix B, "Backfit Analysis," to this guide.

Costs and benefits associated with the implementation of the maintenance rule are contained in the regulatory analysis that was provided for the rule (Ref. 2). In addition, NUMARC plans to assemble cost and benefit information as part of a validation and verification program for their proposed guidance document.

The maintenance rule is to become fully effective on July 10, 1996.

1. STATEMENT OF THE PROBLEM

1.1 Background

On July 10, 1991, the Commission published (56 FR 31324) 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" (may be referred to hereafter as "the maintenance rule" or "the rule"). Along with the rule, the Commission also published (56 FR 31306 to 31323) supplementary information to explain its decision.

The NRC staff was assigned the task (item III of the Staff Requirements Memorandum (SRM) dated June 28, 1991, Ref. 3) to develop implementing regulatory guidance for the rule. The SRM indicated that the Commission desired to be closely involved and directed the staff to keep the Commission informed about the development of the regulatory guidance.

On August 16, 1991, the industry, through the Nuclear Management and Resources Council (NUMARC), sent a letter to the Chairman of the NRC (Ref. 4) expressing a desire to develop an industry guidance document for implementing the rule. NUMARC suggested that the NRC staff could then endorse that document in a regulatory guide. Shortly thereafter, the NRC Executive Director for Operations (EDO) organized a steering group of NRC managers to coordinate and supervise the NRC staff efforts.

A public meeting of the steering group and NUMARC representatives was held on August 21, 1991. Criteria for an acceptable industry guidance docu-

ment, schedule, and coordination of effort were discussed. The NRC staff representatives indicated that the staff would proceed to develop regulatory guidance in parallel with, but independent of, the NUMARC effort. This parallel effort was undertaken in order to give the staff the necessary insights into the proper content of the regulatory guidance and to provide an alternative if the NUMARC guidance could not be adopted for some reason.

An NRC staff working group was organized by the NRC Office of Research (RES) to develop a draft regulatory guide. Drafts of both the NUMARC guidance document and the staff's draft regulatory guide were completed and placed in the NRC public document room during the next several months. A number of public meetings were held to discuss the content and progress of the industry guidance document.

The NRC staff working group essentially completed work on their draft regulatory guide in early June 1992. On June 12, 1992, the steering group met with NUMARC and announced that the NUMARC guidance document could be endorsed by the NRC if agreement could be reached on a number of issues. A second NRC staff working-level task group was organized by the Office of the EDO to meet with NUMARC working-level representatives in a series of public meetings to resolve the remaining issues associated with the planned endorsement of the NUMARC guidance. On July 10, 1992, NUMARC submitted a draft guidance document (NUMARC-93-01, Revision 2A) entitled "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." This document satisfied the NRC's primary concerns.

On July 17, 1992, the Commission sent an SRM to J. M. Taylor (Ref. 5) indicating their concurrence with the staff's proposed approach, as described in SECY-92-229 dated June 25, 1992 (Ref. 6). Also on July 17, 1992, the Deputy EDO (acting as chairman of the steering committee) sent a letter to NUMARC (Ref. 7) stating that the industry guidance would be acceptable pending resolution of a few clarification issues, as well as the industry's verification and validation (V&V) effort.

The V&V effort is being initiated by NUMARC at several plants to test the guidance document on several representative systems (see Ref. 8). V&V results might lead to changes in the guidance based on lessons learned by trial implementation at the plants. The NRC staff is participating in the V&V effort; the V&V effort is intended to be complete in January 1993.

The final regulatory guide to implement the industry guidance is scheduled to be issued by June 30, 1993.

1.2 Discussion

This regulatory analysis was developed to support implementation of regulatory guidance that endorses NUMARC 93-01, Revision 2A, dated July 9, 1992. The purpose of this regulatory analysis is to document the basis for the staff's decision to endorse this industry guidance.

The regulatory requirement (the maintenance rule) is in place and will take effect on July 10, 1996. An analysis of costs and benefits was prepared as part of the regulatory analysis for the rule, and therefore, no separate cost/benefit analysis has been prepared for the regulatory guide. NUMARC is assembling cost and benefit figures as part of their V&V program and these will be provided when they are available.

2. OBJECTIVES

The objectives of the regulatory guidance are to explain the concepts of the rule, provide illustrations and examples, provide for consistent implementation by licensees, provide for consistent audit and inspection by both industry and the NRC, and define acceptable norms for implementation.

3. ALTERNATIVES

The alternatives available to the staff are either to endorse an industry guidance document or to prepare a regulatory guide developed by the staff without reference to industry guidance.

4. CONSEQUENCES

4.1 Costs and Benefits of Alternatives

Costs and benefits of the maintenance rule are presented in the regulatory analysis for the rule (Ref. 2). The results of that analysis are summarized in Appendix B to this guide. NUMARC is accumulating cost and bene-

fit estimates for their guidance document from the utilities participating in the V&V program. These estimates will be made available to the NRC within the next few months.

The staff is relying on the regulatory analysis for the rule as an estimate of costs and benefits associated with adopting the NUMARC guidance. Neither the original regulatory guide developed independently by the staff nor the NUMARC guidance will directly affect these costs and safety benefits.

4.2 Impacts on Other Requirements

The maintenance rule, as well as its implementing guidance, could have a wide but varying impact on other existing requirements. The results of monitoring the effectiveness of maintenance may indicate that appropriate changes to other requirements should be considered.

One specific objective in implementing a regulatory guide that endorses a guidance document produced by the nuclear industry is to avoid duplication of effort on the part of licensees by relying on their knowledge and experience. The objective is to achieve a synergistic relationship between the implementation of the maintenance rule and the other applicable requirements. For example, licensee maintenance efforts could, with some exceptions, reduce the effects of equipment aging. At the same time, the effective maintenance programs that are specifically developed to mitigate aging should directly increase the effectiveness of each licensee's maintenance efforts.

4.3 Limitations of the Guidance

The basis for the staff's decision to endorse a guidance document prepared by the industry is, to some extent, dictated by the characterization of the rule as performance-based and results-oriented. The requirements of the rule will be met if systems, structures, and components within its scope are being effectively maintained to ensure that they will perform their intended functions. Intentionally, little detail is offered in the rule concerning the details of its implementation. Thus, it is imperative that the NRC and industry both understand and support the implementation guidance. Implementation guidance should be instructive but not restrictive because maintenance results, not maintenance procedures, are the focus of the rule.

Existing licensee and industry programs are expected to be utilized to the extent possible. The full and enthusiastic cooperation and leadership of the industry would help to achieve maximum benefits from the rule. These objectives, the benefits of which are not easily quantified, are considered to be fundamentally important to the successful implementation of the rule.

The staff worked closely with NUMARC as they developed their guidance document to ensure that the requirements and intent of the maintenance rule would be addressed. Accordingly, at this time, the proposed regulatory guide endorses the NUMARC guidance without modification. It is expected that the V&V program will result in changes to the NUMARC guidance. If, as expected, changes are needed and are shown to be acceptable to the staff, then no changes or additions to the NRC regulatory guide will be necessary as a result of the V&V program.

5. RECOMMENDED ACTION

At the present time, the NRC staff proposes to publish regulatory guidance that endorses NUMARC-93-01 without modification. The staff will actively participate in the industry-sponsored V&V program in order to confirm its decision. The performance-based, results-oriented charactistics of the maintenance rule make industry cooperation vital to successful implementation of the rule.

The NRC staff originally wrote its own regulatory guidance without reference to industry guidance in order to provide insights to the NRC staff and to provide backup in case the industry guidance could not be endorsed. This NRC guidance document was not adopted, and the NRC staff decided to endorse NUMARC 93-01. Details of the staff's original effort are contained in Reference 1.

The NRC staff's regulatory guidance and the industry guidance each provide suitable implementing guidance to the industry. Either is consistent with the intent of the rule and the regulatory analysis that was prepared to support the rule.

6. IMPLEMENTATION

6.1 Schedule

MILESTONE	DATE
Regulatory Guide Published for Public Comment	11/92
Industry V&V Program To Test Industry Guidance Complete	1/93
OMB Approval of Information Collection Requirements under the Paperwork Reduction Act	1/93
Final Regulatory Guide Published	6/93
NRC Workshops on Regulatory Guidance	6/93 through 6/96
Maintenance Rule Takes Effect	7/96

6.2 Relation to Other Existing or Proposed Requirements

Future initiatives that are related to maintenance should be compared with the performance-based, results-oriented approach of the maintenance rule in order to identify potential conflicts.

REFERENCES

1. G. Zigler et al., "Regulatory Analysis for the Draft NRC Regulatory Guide for Implementing the § 50.65 Rule," Science and Engineering Associates Report, SEA 91-554-02-A:2, Albuquerque, New Mexico, September 1992.*

2. J. Taylor, NRC Memorandum to All Commissioners Entitled "Maintenance Rulemaking," June 27, 1991 (Final Maintenance Rule, Statement of Considerations, and Regulatory Analysis enclosed).*

3. NRC Memorandum from S. J. Chilk to J. M. Taylor, Subject "Staff Requirements - Affirmative/Discussion and Vote," Item III, June 28, 1991.*

4. Letter from B. Lee, Jr., NUMARC, to I. Selin, NRC, August 16, 1991.*

5. Memorandum from S. J. Chilk, NRC, to J. M. Taylor, NRC, Subject: "SECY-92-229 - Implementing Guidance for the Maintenance Rule, 10 CFR 50.65," July 17, 1992.*

6. NRC Policy Issue SECY-92-229, from J. M. Taylor to the Commissioners, Subject: "Implementing Guidance for the Maintenance Rule, 10 CFR 50.65," June 25, 1992.*

7. Letter from J. H. Sniezek, NRC, to T. Tipton, NUMARC, July 17, 1992.*

8. NRC Memorandum from Owen Rothberg to Robert L. Baer dated August 27, 1992, "Report of Meeting With NUMARC and Nuclear Utility Representatives To Discuss NUMARC's Verification and Validation Program for the Maintenance Rule (10 CFR 50.65)."*

*Copies are available for inspection or copying for a fee from the NRC Public Document Room at 2120 L Street NW., Washington, DC; the PDR's mailing address is Mail Stop LL-6, Washington, DC 20555; phone (202)634-3273; fax (202)634-3343.

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Travis, R., J. Taylor, and J. Chung, "Generic Risk Insights for General Electric Boiling Water Reactors," NUREG/CR-5692, prepared for the NRC by Brookhaven National Laboratory, May 1991.

Vesely, W. E., et al., "Measures of Risk Importance and Their Applications," NUREG/CR-3385, prepared for the NRC by Battelle Columbus Laboratories, July 1983.