

July 14, 1995

SECY-95-179

FOR: The Commissioners

FROM: James M. Taylor /s/
Executive Director for Operations

SUBJECT: STATUS OF THE MAINTENANCE RULE

PURPOSE:

To inform the Commission about:

1. The results of the Maintenance Rule Pilot Program
2. The updated status of NRC staff Maintenance Rule activities

SUMMARY:

The Maintenance Rule Pilot Program demonstrated that the Maintenance Rule can be successfully implemented by the industry and inspected by the NRC staff. As a result of lessons learned from the pilot program, the NRC staff has added clarifications to the draft Maintenance Rule Inspection Procedure. The Nuclear Energy Institute (NEI) has proposed to issue clarifications to the industry implementation guidance document, which the NRC staff will review when submitted. Although clarification of the industry guide may be desirable, implementation of the Maintenance Rule as currently scheduled should proceed. Before July 10, 1996, when the rule will go into effect, the NRC staff will develop an inspector training program and provide training in all the regions on the final Maintenance Rule Inspection Procedure. Following the effective date of the Maintenance Rule, the NRC staff will conduct baseline inspections at all nuclear power plant sites.

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BACKGROUND:

The Maintenance Rule, 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," was issued on July 10, 1991, to be effective on July 10, 1996. In contrast to the agency's traditionally prescriptive (or programmatic) regulatory approach, the Maintenance Rule is primarily a performance-based rule. This has necessitated a new approach for the development of implementation and inspection guidance.

The NRC staff last briefed the Commission on the status of the Maintenance Rule on January 29, 1993. The last Commission paper that provided the status of the Maintenance Rule was SECY 92-229, "Implementing Guidance for the Maintenance Rule, 10 CFR 50.65," dated June 25, 1992.

Requirements of the Maintenance Rule

The Maintenance Rule has both performance-based and prescriptive aspects. The performance-based aspects of the rule include that licensees: 1) establish the performance and condition goals, and the requisite equipment monitoring regimes; 2) modify established goals on the basis of plant or equipment performance; and 3) determine whether to rely on preventive maintenance in lieu of establishing goals and performance or condition monitoring. The programmatic aspects of the Maintenance Rule include the structures, systems, and components (SSCs) scoping criteria and the requirement to perform a periodic evaluation each refueling cycle.

Paragraph (b) of 10 CFR 50.65 establishes the scoping criteria for the Maintenance Rule. The scope of the Maintenance Rule includes all the SSCs that are safety related, and those nonsafety related SSCs that are: 1) relied upon to mitigate accidents or transients or are used in emergency operating procedures, 2) whose failure could prevent safety related SSCs from fulfilling their safety function, or 3) whose failure could cause a reactor scram or an actuation of a safety related system.

Paragraph (a)(1) of the Maintenance Rule requires that the performance or condition of SSCs within the scope of the rule be monitored against licensee-established goals to provide reasonable assurance that these SSCs are capable of fulfilling their intended functions. These goals should be commensurate with safety, and should take into account industry-wide operating experience where practical. Paragraph (a)(1) also requires that appropriate corrective actions be taken when the performance of an SSC does not meet established goals. The corrective action

can include modifying the goals if the licensee determines that the original goal was too restrictive.

Paragraph (a)(2) of 10 CFR 50.65 allows licensees to eliminate the (a)(1) goal setting and monitoring activities where it has been demonstrated that the performance of SSCs is effectively controlled through preventive maintenance.

Paragraph (a)(3) of the Maintenance Rule has two distinct parts; first it requires that licensees periodically evaluate their performance and condition monitoring activities and associated goals, as well as preventive maintenance activities, at least once each refueling cycle, not to exceed 24 months between evaluations. The evaluations are required to take into account, where practical, industry-wide operating experience. Licensees are to make adjustments in their programs where necessary to ensure that the objective of preventing failures of SSCs through maintenance is appropriately balanced against the objective of minimizing unavailability of SSCs due to monitoring or preventive maintenance. The second part of Paragraph (a)(3) states that licensees should take into account the total plant equipment that is out of service in order to determine the overall effect on performance of safety functions when performing monitoring and preventive maintenance activities. This part of (a)(3) is for both on-line and shut down maintenance activities.

Implementation and Inspection Guidance Document Development

The NRC staff and the Nuclear Management and Resources Council (NUMARC, now the Nuclear Energy Institute (NEI)) began to develop concurrent implementation guidance soon after the rule was issued. After it became apparent that NUMARC's proposed implementation guidance would be an acceptable method for implementing the rule, the NRC staff commented on NUMARC's guidance document and if possible, planned to endorse it in a regulatory guide. Seventeen public meetings were held between August 1991 and July 1992 as part of this development effort. NUMARC released the industry guidance document, NUMARC 93-01, Rev. 2A, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," on July 10, 1992.

The industry conducted a verification and validation effort in late 1992. The effort involved application of NUMARC 93-01 by nine selected plants and observation by NRC staff. On the basis of lessons learned during this effort, NUMARC revised the guidance document.

In June 1993, the NRC staff issued Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," endorsing NUMARC 93-01. The NRC acknowledged that monitoring would vary according to risk, recommended that use of

existing programs be maximized, encouraged the use of reliability-based methods, recommended licensees consider whether parts of the switchyard should be within scope of the Maintenance Rule, and noted that the nonsafety related SSCs within the scope of the Maintenance Rule are not brought under the scope of 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." Regulatory Guide 1.160 was revised in January 1995, in accordance with COMSECY-94-01, which instructed the staff to delete all language pertaining to emergency diesel generator (EDG) "trigger values."

In December 1993, the NRC staff developed the first draft Maintenance Rule Inspection Procedure. That draft had two objectives: 1) to verify implementation of the Maintenance Rule and 2) to evaluate the effectiveness of EDG maintenance activities associated with commitments made in response to the station blackout rule, 10 CFR 50.63, "Loss of all alternating current power." Consistent with the NRC staff's approach for the Maintenance Rule, a public workshop on the draft Maintenance Rule Inspection Procedure was held on March 31, 1994. On the basis of comments received during and after the workshop the NRC staff revised the draft procedure.

The NRC staff determined that a pilot program would be useful for evaluating the usability and adequacy of the revised draft Maintenance Rule Inspection Procedure. The draft Maintenance Rule Inspection Procedure was verified and validated during the pilot program, which included nine voluntary sites. The sites involved were Byron, Crystal River, Grand Gulf, Hatch, Maine Yankee, Pilgrim, Shearon Harris, South Texas, and Vogtle. The first site visit was conducted in September 1994, the last in March 1995. The NRC staff held a public workshop on June 27, 1995, to discuss and solicit comments on the results and lessons learned from the pilot program and on the NRC staff's proposed clarifications to the Maintenance Rule Inspection Procedure.

DISCUSSION:

Results and Lessons Learned from the Pilot Program

The detailed results and lessons learned from the Maintenance Rule Pilot Program are in Attachment 1, which is NUREG-1526, "Lessons Learned From Early Implementation of the Maintenance Rule at Nine Nuclear Power Plants." The results are summarized here.

On the basis of the reviews performed during the pilot site visits, the NRC staff concluded that the Maintenance Rule can be implemented using Regulatory Guide 1.160. The NRC staff also concluded that the draft Maintenance Rule Inspection Procedure

can be used to adequately monitor the effectiveness of licensees' implementation of the Maintenance Rule.

Overall, implementation of the Maintenance Rule at the nine pilot sites was found to be acceptable. Licensees generally followed the guidance in Regulatory Guide 1.160. For the most part, the licensees' identification of structures, systems, or components within the scope of the Maintenance Rule at each site was thorough. The use of an expert panel appears to be an appropriate and practical method of determining which SSCs are risk significant. When setting goals, all licensees had adequately considered safety, but many licensees did not appropriately factor in industry-wide operating experience. The performance or the condition of some non-risk significant systems used in standby service was not being monitored at the train level as required. Additionally, most licensees had not established adequate monitoring of structures under the rule. Licensee plans for performing periodic evaluations, balancing unavailability and reliability, and assessing the impact of taking equipment out of service for maintenance all appeared to be reasonable. However, the effectiveness of these plans was not evaluated because they had not been fully implemented at the time of the site visits.

Revision to the Maintenance Rule Inspection Procedure

After considering the results of the pilot program, the staff added clarifications to the guidance in the Maintenance Rule Inspection Procedure. A copy of this revised procedure is Attachment 2.¹ In general, the changes to the inspection procedure noted the degree of variability in implementation identified during the pilot program, included expanded discussion of areas of weakness observed during the pilot program, or clarified the requirements of the Maintenance Rule and the guidance in the inspection procedure.

Revision to the Industry Implementation Guidance Document

¹Attachment 2 is a copy of the draft Maintenance Rule Inspection Procedure that was distributed at the June 27, 1995, public workshop. The Commission directed the NRC staff to issue the final inspection procedure by January 1996. The NRC staff is accepting comments on the draft inspection procedure until July 31, 1995. As of July 13, 1995, no comments had been received. Assuming that no substantive comments are received, the NRC staff expects to issue Attachment 2 as the final Maintenance Rule Inspection Procedure by August 31, 1995, and to commence inspector training on the final inspection procedure in September 1995. If this schedule changes, the NRC staff will inform the Commission.

As a result of the pilot program, NEI suggested clarification to NUMARC 93-01, and requested NRC staff comment on the proposed changes. The NRC staff position is that NUMARC 93-01 as currently endorsed by Regulatory Guide 1.160 is acceptable and that implementation of the Maintenance Rule as currently scheduled should proceed. However, clarification of certain parts of NUMARC 93-01 may result in a more consistent implementation of the guidance by licensees. The NRC staff and NEI have had three working level public meetings since completion of the pilot program to discuss the clarifications proposed by NEI. The NRC staff is continuing discussions with NEI to understand their proposed changes. Three of the more significant changes are summarized below.

1. Component Failures: This concern involves whether failures at the component level must be evaluated and tracked, and whether repetitive component failures should be considered in re-categorizing the component from paragraph (a)(2) to Paragraph (a)(1) of the Maintenance Rule. The NRC staff believes that the intent of the rule and NUMARC 93-01 are clear: when the cause of the failure is ineffective maintenance, the component failure should be evaluated and tracked, and repetitive component failures should be considered for treatment under paragraph (a)(1). The industry position is that only those repetitive failures that cause loss of function at the system or train level need to be considered for categorization under paragraph (a)(1).
2. Masking of SSC Performance: This concern involves systems with redundant trains where a highly-reliable train could mask the performance of less-reliable train(s). NEI and the NRC staff agree that all risk significant and standby non-risk significant systems with redundant trains should be monitored at the train level. However, there is a difference of interpretation regarding what constitutes a "train." The NRC staff believes that any redundant loop within a train that performs the same function as a train (e.g., multiple pumps within a train of a cooling water system) should be considered a train for monitoring purposes. NEI desires to clarify NUMARC 93-01 to use an interpretation of train similar to what has traditionally been used in safety related systems.
3. "Could Cause" as a Scoping Criteria: The Maintenance Rule includes within scope those nonsafety related SSCs whose failure "could cause" a reactor scram or safety system actuation. NUMARC 93-01, as currently endorsed by Regulatory Guide 1.160, is consistent with the rule. However, industry believes that this wording is too

broad, and that it should be restricted to those nonsafety related SSCs whose failure "did cause" a reactor scram or safety system actuation. Some utility representatives indicated that they desired to petition the NRC to revise Paragraph (b)(2) of the Maintenance Rule to state "did cause." The NRC staff does not believe such a change is necessary or warranted, considering that this was not observed to be a significant problem during the pilot program.

June 27, 1995, Public Workshop

The NRC staff held a public workshop on June 27, 1995. The workshop was a forum for discussion between the NRC staff, the industry, and the public on the results and lessons learned from the pilot program and the revised Maintenance Rule Inspection Procedure. Utility representatives expressed concerns similar to the clarifications which the staff is addressing with NEI as discussed above.

Revision to Regulatory Guide 1.160

When NEI submits a revised NUMARC 93-01, the staff will review the proposed changes and will follow the agency process for a revision of Regulatory Guide 1.160.² If the changes are only clarifications and do not change regulatory positions or guidance, the staff would expedite the regulatory guide revision process.

Training for NRC Inspectors and Initial Inspections

The NRC staff is developing a Maintenance Rule training program for inspectors. The training will explain how to review and evaluate implementation of a performance-based regulation like the Maintenance Rule, and how to use the final Maintenance Rule Inspection Procedure. Development of the training program is expected to be completed by September 1995. At least one training session will be held in each region, with training beginning in Fall 1995 and completed in Spring 1996.

Beginning in July 1996, after the Maintenance Rule takes effect, the NRC staff will conduct baseline Maintenance Rule inspections at all sites. The baseline inspections will be performed by the regions, with headquarters support. The NRC staff's goal is to have the baseline inspections completed within two years of the

²When NEI submits a revision of NUMARC 93-01, the NRC staff will advise the Commission of the results of its review and the schedule for revision of Regulatory Guide 1.160.

effective date of the Maintenance Rule with the schedule taking into account plant-specific performance.

As a performance-based rule, the Maintenance Rule will pose a challenge for inspection and enforcement. In order to ensure uniformity, NRC headquarters staff and management will be involved in the inspection and enforcement process.

CONCLUSION:

The Maintenance Rule Pilot Program has demonstrated that the Maintenance Rule can be effectively implemented using Regulatory Guide 1.160, and inspected using the draft Maintenance Rule Inspection Procedure. Although clarification of NUMARC 93-01 may be desirable, implementation of the Maintenance Rule as currently scheduled should proceed. The NRC staff has identified the remaining activities that it needs to accomplish to ensure the effective inspection of the Maintenance Rule, and has established a schedule to ensure their completion in a manner that supports the effective date of the Maintenance Rule.

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Executive Director
for Operations

Attachments: 1. NUREG-1526
2. Maintenance Rule Inspection Procedure (Draft)

1 December 13, 1999
2 (file 50_65_IP.021, highlighted copy)

3
4 DRAFT

TQMB

5
6 MAINTENANCE RULE INSPECTION PROCEDURE 627XX
7

8
9 PROGRAM APPLICABILITY: 2515
10

11
12 XXXXX-01 INSPECTION OBJECTIVES:

13
14 To verify the implementation of 10 CFR 50.65 "the maintenance
15 rule" (ref. 1) after the effective date, July 10, 1996.
16

17 XXXXX-02 INSPECTION REQUIREMENTS³:

18
19 Verify Implementation of the Maintenance Rule. Perform the
20 following reviews to verify the licensee's implementation of the
21 maintenance rule (i.e., the rule), certain requirements of the
22 station blackout rule (ref. 2) and Generic Letter 94-01 (ref. 3),
23 following the guidance in Regulatory Guide 1.160 (ref. 4) and
24 NUMARC 93-01 (ref. 5).
25

26 02.01 Goal Setting and Monitoring, 50.65(a)(1). Verify that the
27 licensee has implemented goal setting and monitoring as required

³All inspection items listed in this section do not have to be performed during each inspection. If NRC management decides that a complete review of the implementation of the maintenance rule is required, then all inspection items in the inspection requirements section should be performed. However NRC management may also decide that only selected inspection items need be performed. The items selected for review will depend on the intended scope of the inspection and the resources allotted for the inspection. In addition, inspectors should also note that despite the fact that they are listed under the inspection requirements section of the rule, some of the items may not be regulatory requirements, i.e., they may not be explicitly stated in the maintenance rule. Rather these items may be derived from Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" or NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" which are optional and therefore would not apply to those licensees who implement the rule using other methods.

1 by paragraph (a)(1) of the rule. The licensee is required by the
2 rule to perform the following:

3
4 a. Monitor the performance or condition of structures,
5 systems or components (SSCs), against licensee established
6 goals, in a manner sufficient to provide reasonable assurance
7 that such SSCs, defined in 10 CFR 50.65(b), are capable of
8 fulfilling their intended functions.

9
10 b. Establish goals commensurate with safety and, where
11 practical, take into account industry-wide operating
12 experience.

13
14 c. Take appropriate corrective action when the performance or
15 condition of an SSC does not meet established goals.

16
17 02.02 Preventive Maintenance, 50.65(a)(2). For those SSCs that
18 are within the scope of the rule but are not monitored under
19 paragraph (a)(1) of the rule, verify that the licensee has
20 demonstrated the following:

21
22 a. Performance or condition of an SSC is being effectively
23 controlled through the performance of appropriate preventive
24 maintenance such that the SSC remains capable of performing
25 its intended function; or,

26
27 b. The SSC is inherently reliable, non-risk significant and,
28 therefore, preventive maintenance may not be required (i.e.,
29 perform corrective maintenance only).

30
31 02.03 Periodic Evaluation, 50.65(a)(3). Verify that the
32 licensee is performing the evaluations and assessments required
33 by paragraph (a)(3) of the maintenance rule. **The licensee:**

34
35 a. **Shall** evaluate performance and condition monitoring
36 activities and associated goals and preventive maintenance
37 activities at least every refueling cycle, provided the
38 interval between evaluations does not exceed 24 months. The
39 evaluations shall be conducted, taking into account where
40 practical, industry-wide operating experience.

41
42 b. **Shall** make adjustments where necessary to ensure that the
43 objective of preventing failures of SSCs through maintenance
44 is appropriately balanced against the objective of minimizing
45 unavailability of SSCs due to monitoring or preventive
46 maintenance activities.

47
48 c. **Should** assess the total plant equipment that is out of
49 service and determine the overall effect on the performance of
50 safety functions of performing monitoring and preventive
51 maintenance activities.

52
53 02.04 Scope of the Rule, 50.65(b). Verify that the licensee has
54 identified those SSCs that are required to be within the scope of

1 the maintenance rule as defined in paragraph 50.65(b) of the
2 rule.

3
4 02.05 Effectiveness of Emergency Diesel Generator Maintenance
5 Activities. Verify that the maintenance program for emergency
6 diesel generators satisfies the commitments made by licensees in
7 response to:

8
9 a. 10 CFR 50.63, "Loss of All Alternating Current Power,"
10 (ref. 2) and, if applicable,

11
12 b. Generic Letter 94-01, "Removal of Accelerated Testing and
13 Special Reporting Requirements for Emergency Diesel Generators
14 (ref. 3).

15
16 XXXXX-03 INSPECTION GUIDANCE

17
18 General Guidance

19
20 Applicability: This inspection procedure is applicable to SSCs
21 that are within the scope of the rule as defined in 10 CFR
22 50.65(b); those SSCs that are outside this scope are excluded.

23
24 Implementation Guidance: Except when the licensee proposes an
25 alternate method for complying with specified portions of the
26 maintenance rule, the methods described in Regulatory Guide
27 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear
28 Power Plants," (Ref. 4), will be used to evaluate the
29 effectiveness of maintenance activities of licensees who are
30 required to comply with the maintenance rule. The Regulatory
31 Guide 1.160 will also be used to evaluate the effectiveness of
32 emergency diesel generator maintenance activities associated with
33 compliance with 10 CFR 50.63 (more information on emergency
34 diesel generator testing is contained in Generic Letter 94-01).
35 This regulatory guide endorses NUMARC 93-01, "Industry Guideline
36 for Monitoring the Effectiveness of Maintenance at Nuclear Power
37 Plants," (Ref. 5), and provides methods acceptable to the NRC for
38 complying with the maintenance rule. The inspector should become
39 familiar with Regulatory Guide 1.160 and NUMARC 93-01 before
40 initiating this inspection. The inspector should also be aware
41 that licensees may use methods other than those described in
42 Regulatory Guide 1.160 and NUMARC 93-01 to satisfy the
43 requirements of the maintenance rule. Where methods other than
44 those described in Regulatory Guide 1.160 and NUMARC 93-01 are
45 used, the licensee must demonstrate that those methods satisfy
46 the requirements of the rule. Where a licensee implements the
47 rule partly in accordance with Regulatory Guide 1.160 and NUMARC
48 93-01, and partly in accordance with other methods, the licensee
49 must demonstrate that those other methods meet the applicable
50 parts of the rule.

51
52 During the pilot maintenance inspections the inspectors noted
53 that the guidance contained in NUMARC 93-01 was used by the
54 licensees at all nine sites. Eight licensees took some minor

1 exceptions which the NRC review team reviewed and found
2 acceptable. One licensee took major exceptions to NUMARC 93-01
3 which the team reviewed and also found acceptable. The lessons
4 learned from these pilot maintenance inspections are provided in
5 NUREG 1526 (ref. 6).
6

7 Differences Between Plants: Differences in plant design (i.e.,
8 system boundaries), even among plants that have the same nuclear
9 steam supply system (NSSS), can result in significant differences
10 in the number and types of SSCs included under the scope of the
11 rule. For example, the results of the site visits to review the
12 early implementation of the maintenance rule at nine plants
13 indicated that the number of SSCs at each plant varied from 102
14 to 341 and that the number of SSCs within the scope of the rule
15 varied from 67 to 127. The number of SSCs within the scope of
16 the rule that the licensee determined to be risk significant
17 varied from 17 to 44. Further details are provided in NUREG 1526
18 (ref. 6). The types of goals and monitoring established at
19 different plants may also differ significantly between similar
20 plants. Therefore the inspector should not put too much emphasis
21 on comparing one plant to another when evaluating maintenance
22 activities under the rule.
23

24 Requirements vs. Acceptable Methods: The specific guidance that
25 follows was derived from information contained in the maintenance
26 rule (ref. 1), the statements of consideration (SOC) for the rule
27 (ref. 7 and 8), Regulatory Guide 1.160 (ref. 4), and the industry
28 guideline, NUMARC 93-01, (Ref. 5). Reference was made to the
29 source document, where possible, in order to help the inspector
30 differentiate between the regulatory requirements and
31 recommendations. In general, anything that is stated in the rule
32 itself is a requirement. The SOC does not in itself contain
33 requirements but does contain information that could be used to
34 clarify the intent of the requirements in the rule. Information
35 derived from the regulatory guide and the referenced industry
36 guideline provide acceptable methods for complying with the rule
37 but they are not regulatory requirements. If the licensee
38 chooses not to implement the maintenance rule in accordance with
39 the regulatory guide and the industry guideline, then the
40 licensee must demonstrate that the alternate methods satisfy the
41 requirements of the rule.
42

43 Risk Determination: The rule requires that goals be established
44 commensurate with safety. Implementation of the rule in
45 accordance with NUMARC 93-01 requires that a risk (or safety)
46 determination be performed for all SSCs within the scope of the
47 rule. This risk determination would then be taken into account
48 when setting goals and monitoring under (a)(1) of the rule and
49 when establishing performance criteria under (a)(2). The risk
50 determination method recommended in NUMARC 93-01 involves the use
51 of an expert panel utilizing the Delphi method of NUREG/CR-5424,
52 supplemented by Probabilistic Risk (or Safety) Assessment (PRA)
53 or Individual Plant Evaluation (IPE) insights, to identify risk-
54 significant SSCs. These PRA/IPE insights can include risk

1 reduction worth (RRW), risk achievement worth (RAW), core damage
2 frequency contribution (CDF), Fussell-Vesely (F/V) and others.
3

4 During the pilot maintenance inspections (ref. 6) the NRC review
5 team found that all licensees used an expert panel (or a working
6 group) to make the risk significance determinations. These
7 expert panels took PRA or IPE insights into consideration using
8 the methods described in NUMARC 93-01 although there were some
9 variations. Not all licensees took RRW, RAW and CDF into
10 consideration. One licensee considered only CDF and not RRW or
11 RAW. Another licensee considered CDF and RAW but not RRW.
12 Several licensees considered the Fussell-Vesely (F/V) importance
13 measure in addition to CDF, RAW, and RRW.
14

15 The team also found that licensees' PRA experts were very
16 knowledgeable and were aware of the limitations of the use of PRA
17 insights. One of these limitations is that all risk-important
18 systems are not necessarily modeled in a PRA. Improvements can
19 also be made in data bases, success criteria (which affect
20 accident sequence emphasis), and human reliability analyses. The
21 team found that the use of an expert panel was necessary to
22 compensate for the limitations and assumptions inherent in a PRA
23 and provided a needed experience-based perspective during the
24 risk determination process. The team also found that although
25 CDF, RRW, RAW and F/V all provided useful insights, none was
26 indispensable as long as the results were reviewed and evaluated
27 by a qualified expert panel.
28

29 During routine inspections to verify the implementation of the
30 maintenance rule, the inspectors should be familiar with the
31 methods used the pilot plants since those methods appear to meet
32 the intent of the rule and the guidance provided in NUMARC 93-01.
33 In addition, the inspectors should be aware that the results
34 obtained from any PRA can be highly dependent on the plant
35 configuration and the system reliability and availability data
36 used to perform the calculations. Therefore the licensees may
37 need to reconsider risk significance determinations whenever the
38 plant design is modified, the PRA is updated, new insights become
39 available from configuration management reviews, or new
40 reliability and availability data become available.
41

42 Assignment of SSCs to (a)(1) or (a)(2): Paragraph (a)(1) of the
43 maintenance rule requires that goal setting and monitoring be
44 established for all SSCs within the scope of the rule except for
45 those SSCs whose performance or condition is adequately
46 controlled through the performance of appropriate preventive
47 maintenance as described in paragraph (a)(2) of the rule. The
48 industry guideline for implementing the rule, NUMARC 93-01, has
49 taken the approach that all SSCs are initially placed under
50 paragraph (a)(2) and are only moved under paragraph (a)(1) if
51 experience indicates that the performance or condition is not
52 adequately controlled through preventive maintenance. Therefore,
53 category (a)(1) could be used as a tool to focus attention on
54 those SSCs that needed to be monitored more closely. It is

1 possible that none (or very few) SSCs would be handled under the
2 requirements of (a)(1). However the rule does not require this
3 approach. Licensees could also take the approach that all (or
4 most) SSCs would be handled under paragraph (a)(1) of the rule
5 and none (or very few) would be handled under paragraph (a)(2) of
6 the rule. Licensees have the option of taking either approach.
7

8 During the pilot maintenance inspections the licensees questioned
9 whether the existence of SSCs in the (a)(1) category would be
10 used by the NRC as an indicator of a poor maintenance
11 performance. The team assured the licensees' representatives
12 that the NRC staff would not consider the existence of SSCs in
13 the (a)(1) category as an indicator of a poor maintenance program
14 nor would it be used in determining the SALP grade in the
15 maintenance area. The team also cautioned licensee managers that
16 they should not view the number of SSCs in the (a)(1) category as
17 an indicator of performance since it might inhibit their staff
18 members from placing an SSC under paragraph (a)(1) when a
19 performance criteria was exceeded or a repetitive maintenance
20 preventable functional failure had occurred. In instances where
21 a licensee believes that there is some doubt whether or not a
22 particular SSC should be categorized in (a)(1) or (a)(2), the
23 team believes that the conservative approach would be to place
24 the SSC in the (a)(1) category. Failure to place the SSC under
25 (a)(1) when preventive maintenance has shown to be ineffective
26 would be a violation of the rule.
27

28 Appendix B Not Applicable to Non-Safety-Related SSCs: The scope
29 of the maintenance rule (10 CFR 50.65(b)), includes both safety-
30 related SSCs and non-safety-related or balance-of-plant (BOP)
31 SSCs. As stated in Regulatory Guide 1.160 (Ref. 4), BOP SSCs may
32 have been designed and built with normal industrial practices
33 that may not have met the criteria in Appendix B to 10 CFR
34 Part 50. The inspector should understand that it is not the
35 intent of the maintenance rule to require licensees to
36 retroactively apply all Appendix B requirements to BOP equipment.
37 However, all requirements of Appendix B remain in effect for
38 safety-related SSCs that are within the scope of the rule.
39 Documentation developed for the implementation of this guideline
40 is not subject to the utility quality assurance program unless
41 the documentation used has been previously defined as within the
42 scope of the quality assurance program.
43

44 Non-risk significant and less-risk significant: The rule
45 requires that goals be established commensurate with safety. In
46 order to implement this requirement, NUMARC 93-01 established two
47 safety categories: risk significant and non-risk significant.
48 Criteria for placing SSCs in either of these two categories are
49 described in section 9.0 of NUMARC 93-01. However, both the SOC
50 (Ref. 7) and Regulatory Guide 1.160 (Ref. 4) use the term low-
51 risk significant. The term non-risk significant used in NUMARC
52 93-01 means the same as low-risk significant used in the SOC and
53 the Regulatory Guide, i.e., they both refer to those SSCs that
54 are less risk significant than those SSCs in the risk significant

1 category. In order to avoid confusion, the term non-risk
2 significant is used in lieu of less-risk significant in this
3 inspection procedure. Some licensees may elect to define other
4 risk significant categories or may elect to define more than two
5 categories. The inspector should verify that whatever categories
6 are selected by the licensee are defined in their procedures and
7 implemented in a consistent manner.

8
9 Definitions of Structures, Systems, Components and Trains: The
10 maintenance rule refers to structures, systems, components... .
11 The regulatory guide refers to structures, systems and components
12 and also to structures, systems or components. For purposes of
13 the maintenance rule and this inspection procedure SSC can mean
14 structures and/or systems and/or components. The term SSC is
15 intended to be inclusive rather than restrictive and is intended
16 to include anything that could be called structure, system or
17 component including; walls, floors, roofs, tanks, sub-systems,
18 trains, sub-components, parts, pumps, valves, motors, pipes,
19 hangers, snubbers, nuts, bolts, washers, gaskets, and anything
20 else that meets the definition in 10 CFR 50.65 (b). For purposes
21 of the maintenance rule, a pump could be called a component or a
22 system. Likewise a single train of an ECCS system is called a
23 system, sub-system, or a train.

24
25 Enforcement: General guidance on enforcement issues is provided
26 in Appendix A to this procedure. This guidance can be used by
27 the inspector to make a preliminary determination as to whether
28 or not an activity or plant condition observed by the inspector
29 should be considered a violation of the maintenance rule.
30 However, the inspector should be aware that the guidance
31 contained in Appendix A does not constitute regulatory policy.
32 All final decisions regarding violations are made by NRC
33 management.

34
35 Specific Guidance⁴ (deleted guidance for evaluating maintenance
36 effectiveness)

37
38 03.01 Goal Setting and Monitoring 10 CFR 50.65(a)(1). The
39 licensee is required to set goals and monitor the performance or
40 condition for those SSCs under paragraph (a)(1) of the rule.

41
42 a. Monitoring: The rule requires that licensees monitor
43 performance or condition of SSCs in a manner sufficient to
44 provide reasonable assurance that SSCs are capable of

⁴The specific guidance adds information intended to clarify the inspection requirements listed in the Inspection Requirements section (XXXXX-02). To correlate the guidance with its associated requirement, the numbered designations used in the Specific Guidance section correspond to the numbers used in the Inspection Requirements section. For example, specific guidance for Inspection Requirement 02.02.a is provided in section 03.02.a of the inspection procedure.

(specific guidance 03.02.a. conf4)

1 fulfilling their intended functions. It is intended that
2 licensees be allowed considerable flexibility in the methods
3 used to monitor SSC performance or condition.
4

5 1. Risk Consideration in Monitoring: The statements of
6 consideration (Ref. 7) and regulatory guide 1.160 (Ref. 4)
7 state that the extent of monitoring may vary from system to
8 system depending on the system's importance to risk (or
9 safety). This determination may be quantitative or
10 qualitative. Section 9.0 of NUMARC 93-01 (Ref. 5) provides
11 guidance on various methods for establishing which SSCs are
12 risk significant. These methods include the use of
13 individual plant examination (IPE) results, plant-specific
14 probabilistic risk assessment (PRA), maintenance program
15 results, and others. Guidance is also provided on the use
16 of risk importance measures such as risk reduction worth,
17 core damage frequency contribution, and risk achievement
18 worth. The licensee may use other methods to determine the
19 risk significance of SSCs. **Additional guidance is provided
20 under "risk determination" in the general guidance section
21 of this inspection procedure.**
22

23 The inspector should verify that the licensee has
24 considered risk when determining the extent of monitoring
25 required. To accomplish this, the inspector should select
26 a sample of SSCs, evaluate the methodology used, review the
27 resultant risk significant SSCs, and verify that the
28 licensee's methodology was properly implemented. The
29 inspector should verify that the monitoring for risk
30 significant and non-risk significant SSCs is commensurate
31 with their risk.
32

33 2. Monitoring at the Plant, System, Train or Component
34 Level: It is expected that most monitoring should be done
35 at the plant, system, or train level **rather than at the
36 component level since it might be impractical to establish
37 goals and monitor the performance of the many thousands of
38 components in each plant. However, in some cases,
39 especially where a specific component has been identified
40 as the cause of many system failures, licensees may
41 determine that it is desirable to monitor at the component
42 level.**
43

44 **For risk significant systems and non-risk significant
45 systems used in standby service, monitoring would generally
46 be performed at the system or train level. This monitoring
47 could include parameter (i.e., temperature, pressure, flow,
48 voltage, current, vibration) trending as well as monitoring
49 indicators of system reliability and availability. For
50 systems with multiple trains, monitoring (and goal setting)
51 should be performed at the train level since monitoring at
52 the system level could "mask" or "shadow" single train
53 failures. Because of plant-specific redundancy and
54 diversity, an SSC failure does not necessarily cause a loss**

(specific guidance 03.02.a. con#15)

1 of safety function but could result in unacceptable system
2 or train performance. Train level monitoring provides a
3 method of addressing degraded performance of a single train
4 even though the system function is still available. For
5 purposes of monitoring under the maintenance rule, any
6 redundant or parallel loop of plant equipment (i.e., pump,
7 motor, fan, compressor, piping and valves) that provides an
8 alternate path for system function should be considered a
9 train. This would include redundant safety system trains,
10 installed standby spare pumps, compressors or fans. It
11 would not include redundant circuits in electrical systems
12 or test or sampling loops in mechanical systems.

13
14 For non-risk significant normally operating systems (i.e.,
15 those not used in standby service) monitoring indicators of
16 system reliability and availability alone may be
17 sufficient. Non-risk significant normally operating
18 systems could also be monitored using plant level
19 performance criteria. For example the licensee may choose
20 to monitor unplanned scrams or plant capacity factor as an
21 indirect means of monitoring performance of non-risk
22 significant normally operating SSCs.

23 Additional guidance on acceptable methods of performing
24 monitoring is described in Section 9.4.2. of NUMARC 93-01
25 (Ref. 5).

26
27 The inspector should verify that the licensee has
28 established and implemented adequate performance or
29 condition monitoring for SSCs within the scope of the rule.

30
31
32 3. Trending of Systems and Components: The statements of
33 consideration for the rule states that where failures are
34 likely to cause loss of an intended function, monitoring
35 under (a)(1) should be predictive in nature providing early
36 warning of degradation. NUMARC 93-01 provides guidance for
37 utilizing predictive maintenance, inspection, testing and
38 performance trending for monitoring performance or
39 condition under (a)(2) of the rule.

40
41 During the pilot maintenance inspections the team reviewed
42 the monitoring and trending that was being performed for
43 systems and components at each site and found that there
44 was a great degree of variability among the licensees in
45 the quality and quantity of trending that was being
46 performed. Some licensees had established trending
47 programs which were well integrated into their rule
48 programs, others were doing very little trending of SSCs
49 performance or condition. In some cases, licensees had
50 existing trending programs which generated equipment
51 performance data that would be very useful when
52 establishing goals and performance criteria under the rule,
53 however, this data was not always taken into consideration
54 when selecting goals and performance criteria and

1 establishing a monitoring program under the rule. Goals
2 should make use of existing trending activities where
3 appropriate and consideration should be given to
4 establishing new monitoring and trending activities which
5 directly address the problem whenever new goals are
6 established. Goal setting and trending activities should
7 be coordinated and integrated as much as possible so that
8 the improvements in performance can be monitored against
9 the goals that had been established. Although trending
10 should always be considered, it is not required by the rule
11 and should only be used where it is practical and
12 appropriate.

13
14 The inspector should review equipment trending to ensure
15 that it is coordinated and integrated with the goals and
16 performance criteria wherever possible.

17
18 4. Monitoring Structures: The rule requires that the
19 performance or condition of structures be monitored in a
20 manner sufficient to provide reasonable assurance that
21 those structures are capable of fulfilling their intended
22 function. The statements of consideration for the rule
23 states monitoring should be predictive in nature, providing
24 early warning of degradation. NUMARC 93-01, paragraph
25 9.4.2.4 provides examples of structural monitoring
26 activities including: non-destructive examination, visual
27 inspection, vibration, deflection, thickness and corrosion.

28
29 During the pilot maintenance inspections the NRC review
30 team found that many licensees had not established goals or
31 performance criteria for monitoring most structures at
32 their sites. Many licensees assumed that most structures
33 to be inherently reliable and therefore did not require
34 monitoring under the maintenance rule despite the fact that
35 there were existing monitoring and preventive maintenance
36 activities for structures going on at the site. Many of
37 these structures are monitored during the normal course of
38 operator rounds, management walkarounds, and inspection by
39 other plant departments in their course of normal work
40 activities. The team concluded that the existence of these
41 longstanding monitoring activities contradicts the
42 licensee's position that no monitoring is needed.

43
44 Licensees should establish performance criteria and goals
45 under the rule which take credit for, and build upon, the
46 existing monitoring activities. Certain structures such as
47 the primary containment can be monitored through the
48 performance of established testing requirements such as
49 those contained in 10 CFR 50, Appendix J. However, other
50 structures such as reactor buildings, auxiliary buildings,
51 and cooling towers, may be more amenable to condition
52 monitoring. Some licensees are in the process of
53 developing a program for monitoring structures that will
54 include the performance of plant walkdowns and engineering

1 evaluations to establish condition monitoring criteria.
2 This program should include the establishment of specific
3 criteria for monitoring.
4

5 The inspector should review the licensee's program for
6 monitoring structures to ensure appropriate performance or
7 condition monitoring activities are established. Where
8 practical, these monitoring activities should be predictive
9 in nature and provide early warning of failure.
10

11 5. Use of Existing Programs for Monitoring: Regulatory
12 guide 1.160 (Ref. 4) states that it is intended that most
13 activities currently being conducted by licensees, such as
14 technical specifications surveillance testing, can be used
15 to satisfy many of the monitoring requirements. Consistent
16 with the rule, the inspector should allow licensees maximum
17 flexibility in establishing and modifying their monitoring
18 activities. However, where existing programs are
19 inadequate, new programs may need to be established by the
20 licensee. Additional guidance on the use of existing
21 programs for monitoring is described in Section 9.4.2 of
22 NUMARC 93-01 (Ref. 5).
23

24 b. Goal Setting: Paragraph (a)(1) of the rule requires
25 licensees to establish goals commensurate with safety and,
26 where practical, to take into account industrywide operating
27 experience. Licensees have a great deal of flexibility in
28 choosing goals and may elect to choose component, train,
29 system, or plant level goals. These goals may be performance
30 oriented (reliability, availability) or condition oriented
31 (such parameters as pump flow, pressure, vibration, valve
32 stroke time, current, electrical resistance). Licensees
33 should document the bases for the goals and any subsequent
34 changes made to those goals. Guidance on documentation is
35 provided in section 13.0 of NUMARC 93-01 (Ref. 5). The rule
36 specifically states that the goals are to be "licensee
37 established." Therefore, the inspector should allow licensees
38 maximum flexibility in establishing and modifying their goals.
39 However, the goals must represent reasonable attempts to
40 establish targets for monitoring SSC's performance or
41 condition within the scope of the rule. Licensees should
42 consider the following when setting goals:
43

44 1. Risk Consideration for Goal Setting: The rule requires
45 licensees to establish goals commensurate with safety (or
46 risk). Information on an SSC's contribution to plant
47 safety can be obtained from various sources including the
48 Individual Plant examination (IPE) or probabilistic risk
49 assessment (PRA) results (if available). Section 9.0 of
50 NUMARC 93-01 (Ref. 5) provides guidance on acceptable
51 methods for establishing risk significant criteria. This
52 risk determination would then be taken into account when
53 setting goals and monitoring under (a)(1) of the rule. The
54 risk determination method recommended in NUMARC 93-01

1 involves the use of an expert panel utilizing the Delphi
2 method of NUREG/CR-5424, supplemented by Probabilistic Risk
3 (or Safety) Assessment (PRA) or Individual Plant Evaluation
4 (IPE) insights, to identify risk-significant SSCs. These
5 PRA/IPE insights can include risk reduction worth (RRW),
6 risk achievement worth (RAW), and core damage frequency
7 contribution (CDF). Licensees may also use other methods
8 to determine risk significance. Additional guidance is
9 provided under "risk determination" in the general guidance
10 section of this inspection procedure.
11

12 The inspector should select a sample of SSCs for which the
13 licensee has established goals and verify, by reviewing
14 licensee records and speaking with responsible personnel,
15 that risk or safety was taken into account when
16 establishing goals.
17

18 2. Industrywide Operating Experience for Goal Setting:

19 The licensee should also, where practical, take into
20 account industrywide operating experience when establishing
21 goals. Industrywide operating experience includes
22 information from NRC, industry, and vendor sources that is
23 generally available to the nuclear industry. Sources of
24 such information could include: NRC bulletins, information
25 notices, generic letters, 10 CFR Part 21 reports; the INPO
26 NPRDS system, vendor service information letters (SILs),
27 technical information letters (TILs), significant event
28 reports (SERs), significant operating experience reports
29 (SOERs) and others. Licensees should also take into
30 account the reliability and availability data available
31 from the Safety System Performance Indicator database which
32 is maintained by the Institute of Nuclear Power Operation
33 (INPO). It is intended that licensees make use of these
34 types of information, where practical, when setting goals
35 under (a)(1) of the rule and when performing the periodic
36 evaluations required by (a)(3) of the rule.
37

38 During the pilot maintenance inspections (ref. 6) the NRC
39 review team noted that most licensees had taken OE into
40 consideration in varying degrees when setting goals. Many
41 licensees' procedures did not have adequate guidance for
42 ensuring that OE is taken into consideration, where
43 practical, when establishing goals. The persons
44 responsible for establishing goals at some sites had easy
45 access to the OE database; at other sites the access was
46 limited or cumbersome and could inhibit the use of the data
47 base. The team also noted that licensees had not
48 established a systematic and consistent method of
49 collecting and using SSC reliability and availability data
50 from other licensees when setting goals.
51

52 The inspector should review the licensee's procedures to
53 ensure that the guidance for taking OE into account when
54 establishing goals is adequate, that OE data is readily

1 accessible to plant staff, and that OE is collected and
2 factored into goal setting activities in a systematic and
3 consistent manner.
4

5 c. Corrective Action: Licensees are required to monitor the
6 performance or condition of SSCs against the established goals
7 and take appropriate corrective action where the goals are not
8 met. The SOC (ref. 7 and 8) clarify that corrective action
9 must also be taken where a clearly declining trend in SSC
10 performance or condition indicates the goals would not be met
11 before the next cycle of monitoring is scheduled to be
12 performed. Where analysis determines that the performance or
13 condition of the SSC is acceptable, the licensee may elect to
14 modify the original goals and continue monitoring.
15

16 The inspector should select a sample of maintenance monitoring
17 records and compare them to the established goals. Where
18 goals were not met, or where a clearly declining trend in SSC
19 performance or condition is indicated, the inspector should
20 examine the licensee's corrective actions to determine if the
21 root cause was identified, if reasonable corrective action was
22 taken, and if an evaluation of the effectiveness of the
23 corrective action was performed. The extent of the root cause
24 determination should be commensurate with the safety or risk
25 significance of the SSC or the consequences of the failure.
26 Licensee activities such as root cause analysis and corrective
27 actions should be documented by the licensee.
28

29 03.02. Preventive Maintenance, 50.65(a)(2). The maintenance
30 rule states that monitoring as specified in paragraph (a)(1) is
31 not required if it has been demonstrated that the performance or
32 condition of an SSC is being effectively controlled through the
33 performance of appropriate preventive maintenance so that the SSC
34 remains capable of performing its intended function. The
35 statements of consideration (SOC) (Ref. 7 and 8) clarify that
36 licensees are not required to monitor under paragraph (a)(1) of
37 the rule if they have demonstrated that preventive maintenance
38 has been effective or if an SSC has inherently high reliability
39 and availability as discussed below.
40

41 a. Demonstrated Effective Maintenance: As stated in the SOC,
42 under the terms of paragraph (a)(2), preventive maintenance
43 must be demonstrated to be effective in controlling the
44 performance or condition of an SSC so that the SSC remains
45 capable of performing its intended function. In order to
46 assure that preventive maintenance is effective, some
47 evaluation or monitoring process needs to be established under
48 paragraph (a)(2).
49

50 1. Performance Criteria: NUMARC 93-01 (Ref. 5) uses
51 performance criteria as a method of demonstrating
52 satisfactory performance or condition under paragraph
53 (a)(2) of the rule. Where the performance or condition is
54 not adequately controlled, the SSC would generally be

(specific guidance 03.02.b. con#20)

1 dispositioned to paragraph (a)(1). Section 9.3.2 of NUMARC
2 93-01 recommends that performance criteria should be
3 availability, reliability, or condition. However, since
4 paragraph (a)(3) of the rule requires that adjustments be
5 made to balance availability and reliability, it would be
6 necessary, at a minimum, to establish both reliability and
7 availability performance criteria. NUMARC 93-01 also
8 recommends that specific performance criteria be
9 established for all risk significant SSCs and for non-risk
10 significant SSCs that are in a standby (not normally
11 operating) mode. Plant-level performance criteria could be
12 established for all remaining non-risk significant,
13 normally operating SSCs. Performance criteria would not be
14 required for SSCs determined to be inherently reliable³ or
15 for those SSCs that contribute little or nothing to safety
16 function and that could be allowed to run to failure (i.e.,
17 perform corrective maintenance rather than preventive
18 maintenance).

19
20 2. Maintenance-Preventable (Functional) Failure: Section
21 9.4.5 of NUMARC 93-01 (Ref. 5) recommends the use of the
22 term "maintenance preventable functional failures (MPFFs)"
23 rather than "maintenance preventable failures (MPFs)" as
24 described in the SOC, in order to differentiate between
25 failures that cause an SSC to be incapable of performing
26 its intended function and failures that do not affect an
27 SSC's function. There are many possible failures of some
28 SSCs that would not affect the intended safety function of
29 the system. For purposes of this inspection procedure the
30 term MPFF will be used in lieu of MPF. A definition of
31 MPFF is provided in Appendix B to NUMARC 93-01 (Ref. 5).

32
33 3. Dispositioning from paragraph (a)(2) to paragraph
34 (a)(1): Section 9.4.4 of NUMARC 93-01 (Ref. 5) provides
35 guidance on determining when dispositioning SSCs from
36 paragraph (a)(2) to paragraph (a)(1) is required.⁴ This

³The statements of consideration (Ref. 4) describe the purpose of (a)(2) of the maintenance rule as to provide an alternate approach for those SSCs where it is not necessary to establish the monitoring regime required by paragraph (a)(1). This provision might be used where an SSC, without preventive maintenance, has inherent reliability and availability (e.g., electrical cabling) or where the preventive maintenance necessary to achieve high reliability does not itself contribute significantly to unavailability (e.g., moisture drainage from an air system accumulator). NUMARC 93-01, sections 9.3.3 and 10.2 (Ref.2), describe an inherently reliable SSC as one that, without preventive maintenance, has high reliability (e.g., jet shields, raceways).

⁴ The SOC (Ref. 4) states that it is expected that where one or more maintenance preventable failures (or MPFFs) occur on SSCs

1 would generally be required if a performance criterion were
2 not met or if a repetitive MPFF occurred. An SSC could
3 continue to be treated under paragraph (a)(2) after
4 experiencing a single MPFF if the root cause evaluation
5 determined the cause of the failure and if the corrective
6 action that was taken prevented recurrence. However if a
7 repetitive MPFF occurred, then the SSCs would have to be
8 dispositioned to paragraph (a)(1). **Note that this**
9 **requirement applies whether the failure occurs to a**
10 **structures, systems, or a train or component in a system.**
11 **Any repetitive failure of a structure, system, train, or**
12 **component would require that the structure, system or**
13 **component be placed under the (a)(1) category and subjected**
14 **to goal setting and monitoring. Note this requirement**
15 **exists irrespective of whether the performance criteria are**
16 **monitored at the plant, system, train or component level.**

17
18 Once an SSC's preventive maintenance has been demonstrated
19 effective again, it would be acceptable to return to
20 treating the SSC under paragraph (a)(2). Section 9.4.3 of
21 NUMARC 93-01 (Ref. 5) provides guidance for dispositioning
22 SSCs from paragraph (a)(1) to paragraph (a)(2).

23
24 The inspector should verify that the licensee has established
25 and implemented some monitoring or assessment process for
26 determining if the preventive maintenance program is
27 effectively maintaining the reliability of those SSCs (except
28 for inherently reliable SSCs described below) that are
29 maintained exclusively under paragraph (a)(2) of the
30 maintenance rule. The inspector should review the maintenance
31 history for a sample of SSCs maintained under paragraph (a)(2)
32 to verify that the monitoring or assessment process ensures
33 that acceptable performance or condition of the SSCs is
34 maintained and, where that performance or condition degrades
35 to an unacceptable level or experiences a second maintenance
36 preventable functional failure, the SSC is treated under
37 paragraph (a)(1) until such time as the performance or
38 condition improves to an acceptable level. The inspector
39 should select a sample of SSCs that experienced maintenance
40 preventable functional failures and review the licensee's
41 actions to determine if they were dispositioned properly.
42

treated under paragraph (a)(2)...the SSC would be required to be treated under the requirements of paragraph (a)(1) until such time as a performance history is established to demonstrate that performance or condition are once again effectively controlled by an established preventive maintenance regimen. However the SOC is not clear on whether an SSCs must be moved to (a)(2) after the first or second MPFF. This issue was subsequently clarified in section 9.4.4 of NUMARC 93-01 (Ref. 2) which provides guidance on determining when dispositioning SSCs from paragraph (a)(2) to paragraph (a)(1) is required.

1 b. Preventive Maintenance Not Required: As indicated in the
2 SOC (Ref. 7), the purpose of paragraph (a)(2) of the rule is
3 to provide an alternate approach for those SSCs where it is
4 not necessary to establish the monitoring regimen required by
5 paragraph (a)(1). This includes those SSCs that are
6 adequately controlled by preventive maintenance (described
7 above) and those SSCs that are inherently reliable without
8 maintenance (described below), or those SSCs that are non-risk
9 significant (described below):

10
11 1. Inherently Reliable: This provision might be used
12 where an SSC, without preventive maintenance, has inherent
13 reliability and availability (e.g., electrical cabling).
14 It is expected that some structures, such as cable
15 raceways, water storage tanks, and buildings, could be
16 considered inherently reliable. However, it should be
17 noted that such activities as inspections, surveys, and
18 walkdowns could be considered maintenance activities and,
19 therefore, most SSCs would be subject to some maintenance.
20 Licensees should document their reasons for concluding that
21 individual or groups of SSCs are inherently reliable.
22 During the pilot site visits (see NUREG 1526, ref. 6), the
23 inspectors noted that some licensees had made inappropriate
24 use of this category by assuming that many structures were
25 inherently reliable when in fact the licensees had many
26 longstanding inspection and preventive maintenance
27 activities already in place. These licensees made the
28 assumption that most structures were inherently reliable
29 without considering that these existing preventive
30 maintenance activities contradicted their assumption.

31
32 The inspector should review a sample of SSCs that have been
33 determined to be inherently reliable, verify that the
34 licensee's methodology appears reasonable, and that the
35 SSC's condition or performance is acceptable without
36 maintenance.

37
38 2. Run to Failure: Methods for determining risk (or
39 safety) significance are described in NUMARC 93-01, section
40 9.3.3. SSCs that provide little or no contribution to
41 system safety function could be allowed to run to failure
42 (i.e., perform corrective maintenance rather than
43 preventive maintenance). Licensees should establish
44 appropriate methodology for determining risk significance
45 and should use these criteria to identify SSCs that could
46 be allowed to run to failure. Licensees should document
47 these criteria and their reasons for deciding that
48 individual SSCs could be allowed to run to failure.

49
50 The inspector should select a sample of these SSCs and
51 evaluate them to verify that the licensee has followed
52 their own methodology for determining risk significance and
53 that these evaluations are reasonable.
54

1 03.03. Periodic Evaluations, 50.65 (a)(3). The licensee is
2 required by paragraph (a)(3) of the maintenance rule to perform
3 the following periodic assessments and evaluations:
4

5 a. Refueling Cycle Evaluation: The rule requires that
6 licensees evaluate performance and condition monitoring
7 activities and associated goals and preventive maintenance
8 activities at least every refueling cycle, provided the
9 interval between evaluations does not exceed 24 months. The
10 SOC (Ref. 7 and 8) state that these activities are to be
11 evaluated in light of SSC reliabilities and availabilities as
12 well as the following:
13

14 1. Goals and Monitoring: For SSCs under paragraph (a)(1),
15 adjustments are to be made to goals, monitoring, or
16 preventive maintenance activities when equipment or
17 performance has not met established goals. Conversely, the
18 licensee may, at any time, eliminate the monitoring
19 activities initiated in response to problematic equipment
20 performance or industry experience once the root cause of
21 the problem has been corrected and the adequacy of the
22 equipment performance has been confirmed.
23

24 On the basis of a review of records and discussions with
25 responsible personnel, the inspector should verify that the
26 licensee has reviewed goals, monitoring, and preventive
27 maintenance activities and made adjustments, where
28 necessary.
29

30 2. Preventive Maintenance: For SSCs under paragraph
31 (a)(2), adjustment of preventive maintenance activities may
32 be warranted where SSC performance does not meet
33 performance criteria (for those licensees that have
34 implemented the rule using NUMARC 93-01) or is otherwise
35 determined to be unacceptable. SSCs treated under
36 paragraph (a)(2) which experience repetitive maintenance-
37 preventable functional failures (MPFFs), become subject to
38 the requirements of paragraph (a)(1) or, where this is not
39 feasible, may require other remedial action (e.g.,
40 modification or replacement).
41

42 On the basis of a review of records and discussions with
43 responsible personnel, the inspector should verify that the
44 licensee has adjusted preventive maintenance activities
45 where necessary and dispositioned SSCs that experienced
46 repetitive MPFFs to the requirements of paragraph (a)(1).
47

48 3. Industrywide Operating Experience: The maintenance
49 rule also requires that the evaluations shall take into
50 account, where practical, industrywide operating
51 experience. This type of information may be available from
52 the licensee's existing operating experience program.
53 However the licensee is responsible for assuring that the

1 information obtained from the existing operating experience
2 program is adequate for purposes of the maintenance rule.

3
4 Applicable industrywide operating experience should be
5 incorporated as soon as it is available. Sources like NRC
6 bulletins, Generic Letters, and information notices, TILs,
7 SILs, SERs, SOERs, should be evaluated when received by the
8 plant and then incorporated into the preventive maintenance
9 program, or training program, as appropriate.

10
11 The inspector should verify that the licensee had taken
12 appropriate action to address industrywide operating
13 experience.

14
15 4. Schedule for Periodic Evaluation: During the pilot
16 maintenance inspections the NRC review team reviewed each
17 licensees planned schedule for performing the periodic
18 evaluation. The team concluded that the periodic
19 evaluation does not have to be performed at any particular
20 time during the refueling cycle as long it is performed at
21 least one time during the cycle, and the interval between
22 evaluations does not exceed 24 months. For example, one
23 licensee's plans to perform the periodic evaluation on an
24 annual basis would meet the intent of the rule (assuming
25 that the refueling cycle is longer than one year). Another
26 licensee's plans to perform the evaluation at the same time
27 for both units at a two units site, even though the
28 refueling cycles for the units are staggered, would also
29 meet the intent of the rule. A third licensee's plans to
30 use ongoing evaluations combined with a higher level
31 summary evaluation performed at least once per refueling
32 cycle would also meet the intent of the rule.

33
34 The inspector should verify that the licensee performed the
35 periodic evaluation at least one time each refueling cycle,
36 not to exceed 24 months between evaluations.

37
38 b. Balancing Unavailability and Reliability: The maintenance
39 rule requires that licensees make adjustments where necessary
40 to ensure that the objective of preventing failures of SSCs
41 through maintenance is appropriately balanced against the
42 objective of minimizing unavailability of SSCs due to
43 monitoring or preventive maintenance activities. The intent
44 of this requirement is to ensure; that monitoring or
45 preventive maintenance activities do not result in excessive
46 unavailability that would negate any improvement in
47 reliability achieved as a result of the monitoring or
48 maintenance activity or, that deferring monitoring or
49 preventive maintenance to achieve a high availability does not
50 result in low reliability.

51
52 Due the fact that it might be impractical to perform this
53 balancing on a continuous (day to day) basis, licensees may
54 establish their own schedule for performing these reviews and

1 make any needed adjustments to their preventive maintenance
2 activities. However, at a minimum the licensee must perform
3 this balancing at least every refueling cycle and include an
4 evaluation of this activity as part of the refueling cycle
5 evaluation process described above. This process can be
6 qualitative, but it should be documented.
7

8 During the pilot maintenance inspections the team reviewed the
9 plans and procedures licensees had developed for accomplishing
10 this activity. Two licensees plan to balance unavailability
11 and reliability on an ongoing basis as an integral part of
12 monitoring against performance criteria under the rule. Since
13 performance history, preventive maintenance activities, and
14 out-of-service time are taken into consideration when
15 developing the performance criteria, the licensee believes
16 that meeting these performance criteria will assure that a
17 satisfactory balance of reliability and unavailability has
18 been achieved. At another site, the licensee plans to
19 accomplish this balancing by calculating the risk contribution
20 associated with unavailability of the system due to preventive
21 maintenance activities and the risk contribution due to the
22 reliability of the SSC. The licensee would then compare and
23 attempt to balance the contribution to risk from each source
24 to assure consistency with PRA/IPE evaluations. The NRC
25 review team concluded that either of these methods could be a
26 reasonable approach to satisfying this requirement of the
27 rule. However, neither approach had been fully implemented at
28 time of the site visit and therefore could not be evaluated.
29

30 Additional guidance is provided in NUMARC 93-01 (Ref. 5),
31 section 12.2.4, "Optimizing Availability and Reliability for
32 SSCs." The inspector should note that this section limits the
33 need to make adjustments to balance availability and
34 reliability to risk significant SSCs.
35

36 The inspector should verify that the licensee has implemented
37 a method or process for evaluating maintenance activities and
38 making adjustments where necessary at least every refueling
39 cycle. The inspector should select a sample of risk
40 significant SSCs that were subjected to this process and
41 verify that the adjustments made to balance availability and
42 reliability appear to be reasonable.
43

44 c. Assessment of Equipment Out of Service: In performing
45 monitoring and preventive maintenance activities, an
46 assessment of the total plant equipment that is out of service
47 should be taken into account by the licensee to determine the
48 overall effect on the performance of safety functions. This
49 assessment is to be performed on an ongoing basis, not just
50 during the periodic assessment performed at the end of every
51 refueling cycle. This ongoing assessment should be performed
52 regardless of plant mode; i.e., whether the plant is operating
53 or shutdown. As stated in the SOC (ref. 7 and 8), assessing
54 the cumulative impact of out-of-service equipment on the

1 performance of safety functions is intended to ensure that the
2 plant is not placed in risk significant configurations. These
3 assessments do not necessarily require that a quantitative
4 assessment of probabilistic risk be performed. However the
5 PRA or IPE may provide useful information on risk significance
6 of various SSCs. The level of sophistication with which such
7 assessments are performed is expected to vary, according to
8 the assessments performed. These assessments may range
9 anywhere from simple deterministic judgments to the use of an
10 on-line living PRA. It is expected that, over time,
11 assessments of this type will be refined as the technology
12 improves and experience is gained. In order to accomplish
13 these assessments licensees must keep track of the status (in
14 or out of service) of plant equipment. This status may be
15 kept as a manual list or on a database but must be easily
16 accessible and kept up to date. In order to be useful and
17 accessible the information should be kept in one location and
18 not scattered among several documents (shift logs, status
19 boards, tag out status boards) in various locations.
20 Additional guidance is provided in section 11.0 of NUMARC
21 93-01 (ref. 5).
22

23 During the pilot maintenance inspections, the NRC review team
24 found that licensees planned to use, or had used, a variety of
25 approaches for assessing the overall effect on the performance
26 of safety functions of taking plant equipment out of service
27 for monitoring or preventive maintenance. Many licensees
28 approached the problem by developing a matrix which defines
29 which system combinations could be allowed out of service at
30 the same time. An advantage to using the matrix is that it is
31 simple. However, a disadvantage is that the matrix defines a
32 limited number of combinations that may not address all
33 operational situations and may unnecessarily limit operational
34 flexibility. Several licensees are planning to use real time
35 (or near-real time) risk monitors that can calculate the risk
36 changes associated with the planned maintenance activities.
37 An advantage is that risk monitors can be used to analyze a
38 greater number of possible combinations of out of service
39 systems. A disadvantage is that it may require specially
40 trained personnel to operate the risk monitor or to interpret
41 the results. Both the matrix approach and the risk monitor
42 approach appeared to be reasonable ways of assessing the
43 impact on plant safety when taking equipment out of service
44 for monitoring or preventive maintenance. However, the
45 effectiveness of either of these methods could not be
46 evaluated by the team because they had not been fully
47 implemented at the time of the site visits.
48

49 The inspector should verify, based on a review of licensee
50 records and discussions with appropriate personnel, that the
51 licensee has established and implemented an ongoing,
52 documented process for assessing the overall effect on the
53 performance of safety functions before SSCs are taken out of
54 service for monitoring or preventive maintenance. The

1 inspector should verify that the licensee maintains a current
2 status of all SSCs within the scope of the maintenance rule
3 and that the licensee updates this status to indicate when
4 SSCs are in or out of service. The inspector should select a
5 sample of SSCs from the licensee's list of SSCs that have been
6 taken out of service and review the adequacy of the
7 evaluations made by the licensee before taking the SSCs out of
8 service.
9

10 03.04 Scope of the Rule, 50.65(b). The scope of SSCs that are
11 required to be included within the rule is defined in 10 CFR
12 50.65(b). Section 8.0 of NUMARC 93-01 (Ref. 5) provides
13 additional guidance on methods for selecting SSCs to be included
14 in the scope of the maintenance rule. In order to verify that
15 the licensee has correctly identified and documented SSCs at its
16 facility the inspector should perform the following reviews.
17

18 a. Safety-Related SSCs per 50.65(b)(1): The scope of the
19 rule includes safety related SSCs that are relied upon to
20 remain functional during and following a design basis events
21 to assure the integrity of the reactor coolant pressure
22 boundary, the capability to shut down the reactor and
23 maintaining it in a safe shutdown condition, and the
24 capability to prevent or mitigate the consequences of
25 accidents that could result in potential offsite exposure
26 comparable to the 10 CFR 100 guidelines. All licensees should
27 have a well-defined list of safety-related SSCs in their final
28 safety analysis report (FSAR), Q-lists or master equipment
29 lists (MEL). In general all SSCs on these lists are safety
30 related and would be included within the scope of the
31 maintenance rule. However, for convenience, some licensees
32 may have categorized some SSCs as safety related on their Q-
33 list even though they do not meet the definition of safety
34 related. These SSCs could be excluded from the scope of the
35 rule if the licensee can show that these SSCs are truly not
36 safety related.
37

38 The inspector should independently review the FSAR, Q-list, or
39 MEL to select a sample of SSCs and then verify that the
40 licensee has included these safety-related SSCs within the
41 scope of the maintenance rule.
42

43 b. Non-Safety-Related SSCs That are Relied Upon to Mitigate
44 Accidents or Transients per 50.65(b)(2)(i): The FSAR, the
45 emergency operating procedures (EOPs), and the IPE insights
46 describe non-safety-related SSCs needed to mitigate accidents
47 and transients. Examples of non-safety-related SSCs that are
48 sometimes used in the FSAR analysis to mitigate accidents
49 include: the condensate storage tank (supply to auxiliary
50 feedwater), the fire-suppression system, and the boric acid
51 transfer system used for emergency boration and makeup water
52 to the refueling water storage tank.
53

1 Inspectors may find that some utilities have made design
2 changes that add an SSC which is classified as non safety
3 related but provides an accident mitigating function. Such
4 SSCs should be included within the scope of the rule. The
5 inspector may find such information from IPE insights and the
6 EOPs. The IPE insights and the licensee's scheduling and
7 planning group may also provide information on when the design
8 change is scheduled to be completed. For example, at one
9 utility a design change was made which utilized an existing
10 non safety related diesel generator to provide emergency power
11 to a charging pump that provides water flow to reactor coolant
12 pump seals (i.e., to mitigate seal loss of coolant accident
13 (LOCA) events) under station blackout conditions. At other
14 utilities, design changes were made which added a non-safety
15 related diesel generator and an additional offsite power
16 source to address station blackout concerns. In all three
17 cases, SSCs involved in the design change provided an accident
18 mitigating function and therefore were required to be added to
19 the scope of the rule.

20
21 During one of the pilot maintenance rule inspections the team
22 noted that the licensee had excluded the control room
23 annunciators from the scope of the rule. The licensee
24 explained that these control room annunciators were not
25 required for operation of systems required for mitigating
26 accidents because they only served as backups for other plant
27 instruments and controls. The NRC inspectors questioned
28 licensed control room operators at the plant who confirmed
29 that these annunciators often gave the first indication of an
30 evolving transient or accident. Based on this the inspectors
31 concluded that these annunciators were required for mitigating
32 accidents or transients and therefore should be included
33 within the scope of the rule at that site.

34
35 The inspector should independently review the FSAR, IPE
36 insights, and emergency operating procedures (EOPs) to
37 identify a sample of nonsafety-related SSCs relied upon to
38 mitigate accidents or transients. The inspector should then
39 compare this list of SSCs with the list of nonsafety-related
40 SSCs identified by the licensee. The inspector should review
41 the licensee's determinations and verify that they appear to be
42 reasonable. The inspector should ask the licensee to justify
43 any SSCs that were excluded from the scope of their program.

44
45
46 c. Non-Safety-Related SSCs That Are Used in Emergency
47 Operating Procedures (EOPs) per 50.65(b)(2)(i): Paragraph
48 (b)(2)(i) of the maintenance rule states that SSCs used in
49 EOPs are required to be included within the scope of the rule.
50 However, many utilities have included more SSCs in their EOPs
51 than are required by the Emergency Procedure Guidelines. Some
52 of these SSCs were included because they could possibly
53 protect other equipment from being damaged or contaminated in
54 the event of an emergency, not because they are relied upon in

1 the licensee's accident analysis. Subsequently, the NRC staff
2 endorsed the guidance contained in section 8.2.1.3 of NUMARC
3 93-01 (ref. 5) which allows the exclusion from the rule of
4 those non-safety-related SSCs that do not add significant
5 value to the mitigation function of an EOP by providing a
6 significant fraction of the total functional ability required
7 to mitigate core damage or radioactive release. Some examples
8 of SSCs that might be excluded on this basis are
9 instrumentation that provides redundant local information and
10 does not provide a control function, fire-protection system
11 capacity capable of supplying only a small fraction of what is
12 required to mitigate the accident, and portable emergency
13 equipment that is available from offsite sources and is not
14 under utility control. Conversely, if a fire-protection
15 system provides a large fraction of the cooling water supply
16 that is required to mitigate the accident, it should be under
17 the scope of the rule.
18

19 The inspector should independently review the EOPs to identify
20 a sample of non-safety-related SSCs and verify that they are
21 included within the scope of the rule or were excluded based
22 on the criteria described above. The inspector should select
23 a sample of SSCs from the EOPs that were excluded from the
24 rule and verify that the licensee had followed their own
25 methodology for excluding the SSC from the rule appear to be
26 reasonable.
27

28 The inspector should note that some EOPs reference Abnormal
29 Operating Procedures (AOP) which perform accident mitigating
30 functions. SSCs in AOPs which perform accident mitigating
31 functions should be included under the scope of the
32 maintenance rule; SSCs referenced in AOPs which do not provide
33 accident mitigating functions should not fall under the scope
34 of the rule.
35

36 d. Non-Safety-Related SSCs Whose Failure Could Prevent
37 Safety-Related SSCs From Fulfilling Their Intended Function as
38 per 50.65(b)(2)(ii): To identify failure modes of non-safety-
39 related SSCs that will directly affect safety-related
40 functions, the licensee should investigate the systems and
41 their interdependencies. A utility should rely on actual
42 plant-specific and industrywide operating experience, prior
43 engineering evaluations such as PRA, IPE, environmental
44 qualification (EQ), and 10 CFR Part 50 (Appendix R) analyses.
45 Industrywide operating experience should be used to the extent
46 practical to preclude unacceptable performance experienced at
47 a similar plant from being repeated. Examples of such non-
48 safety-related SSCs could include instrument air system that
49 opens containment isolation vent and purge valves, a fire
50 damper in the standby gas treatment system whose failure would
51 impair air flow, ventilation systems which can provide cooling
52 to safety related systems, or a condensate storage water tank
53 that is a source of water for emergency core cooling systems
54 (ECCS). However, it is not intended that licensees attempt to

1 determine hypothetical failures that could result from system
2 interdependencies that have not previously been experienced or
3 analyzed. NUMARC 93-01, section 8.2.1.4 (ref. 5) provides
4 additional guidance. See paragraph 03.04 step f below for
5 exceptions.
6

7 The inspector should review records of failures of non-safety-
8 related systems and attempt to identify a sample of SSCs that
9 could have prevented a safety-related SSC from fulfilling its
10 intended function. The inspector should verify that the
11 licensee has included these SSCs within the scope of the
12 maintenance rule. If it is not feasible to select an
13 independent sample in this manner, the inspector should
14 perform a review of the non-safety related SSCs that were
15 identified by the licensee as likely to prevent safety related
16 SSCs from fulfilling their intended function. The inspector
17 should review the licensees determinations and verify that
18 they appear to be reasonable.
19

20 e. Non-Safety-Related SSCs Whose Failure Could Cause a Scram
21 or Actuation of a Safety System as per 50.65(b)(2)(iii):

22 Licensees are required to identify, on the basis of utility-
23 specific and industrywide operating experience, those non-
24 safety-related SSCs whose failure has caused or could cause a
25 reactor scram or safety system actuation. The licensee should
26 consider other engineering evaluations, such as PRA, IPE,
27 environmental qualification (EQ), and 10 CFR Part 50, Appendix
28 R, analyses. The licensee should also consider industrywide
29 operating experience and any event that has occurred at a
30 similarly configured plant. However, the licensee is not
31 required to determine hypothetical failures that could result
32 from system interdependencies that have not previously been
33 experienced or analyzed. Examples of transient initiators
34 from the FSAR that are analyzed include turbine trips, loss of
35 feedwater, and loss of instrument air.
36

37 During the pilot maintenance rule inspections the inspectors
38 noted several examples of non-safety-related SSCs whose
39 failure had, or could have caused plant trips. Some of these
40 systems were; circulating water, condenser vacuum, extraction
41 steam, non-ESF buses that power reactor coolant pumps,
42 radiation monitoring, site grounding system, shield walls that
43 separate the station startup transformers, the plant computer,
44 heat tracing and freeze protection, reactor coolant pump
45 vibration monitoring, cathodic protection systems, screen wash
46 water, gland steam, gland seal water, generator gas, turbine
47 lube oil, and turbine generator seal oil. NUMARC 93-01,
48 section 8.2.1.5 (ref. 5), provides additional guidance.
49

50 The inspector should review licensee event reports, available
51 operating history information, PRA insights, and other
52 engineering evaluations to identify SSCs that have actually
53 caused, or could cause a scram or safety system actuation and
54 should verify that those SSCs had been included in the

1 licensee's maintenance program. The inspector should note
2 that because a system is very reliable, or contains redundant
3 trains, or because operator action could prevent a scram are
4 not reasons for excluding SSCs from the scope of the rule.
5 These considerations are not included in paragraph (b)(2)(iii)
6 of the rule and therefore should not be considered when making
7 scoping determinations.
8

9 f. SSCs Outside the Scope of the Maintenance Rule: Unless
10 they meet the criteria described above, the following
11 categories of SSCs are generally outside the scope of the
12 maintenance rule: fire protection systems; seismic class II
13 SSCs installed in proximity to seismic class I SSCs; security
14 systems; and, emergency facilities described in the emergency
15 plan. Further guidance is provided in section 8.2.1.6 of
16 NUMARC 93-01 (ref. 5).
17

18 The inspector should not expect that these SSCs would be
19 included within the scope of the maintenance rule because
20 maintenance requirements for these categories of SSCs are
21 covered in other regulations.
22

23 g. Switchyard Activities: Regulatory Guide 1.160 states that
24 the scope of monitoring efforts under the maintenance rule, as
25 defined in 10 CFR 50.65(b), encompasses those SSCs that
26 directly and significantly affect plant operations, regardless
27 of which organization actually performs the maintenance
28 activities. Just because a maintenance activity is performed
29 by corporate maintenance or contractor personnel (rather than
30 plant personnel) does not mean that activity is outside the
31 scope of the rule. Since maintenance activities that are
32 performed on SSCs in the switchyard can directly affect plant
33 operations, electrical distribution equipment out to the first
34 inter-tie with the off-site distribution system (i.e.,
35 equipment in the switchyard) should be considered for
36 inclusion under the scope of the maintenance rule. Plant
37 management should be aware of, and should have the ability to
38 control, these activities even if the switchyard is offsite.
39

40 The inspector should verify that the appropriate SSCs in the
41 switchyard are included within the scope of the maintenance
42 rule.
43

44 h. Safety Systems with Non-safety Functions: Examples
45 provided in section 8.2.1 of NUMARC 93-01 (ref. 5) illustrate
46 that some safety-related systems may perform safety-related as
47 well as non-safety-related functions. In such cases, the
48 components that perform only a non-safety-related function may
49 not necessarily come under the scope of the rule. For
50 example, the non-safety-related function of an ECCS could be
51 to fill the safety injection accumulators.
52

1 The inspector should not expect that these SSCs with non-
2 safety-related functions necessarily come within the scope of
3 the maintenance rule.

4
5 i. Documentation. The licensee's process for reviewing and
6 selecting SSCs shall be documented. The licensee shall also
7 develop and maintain an up to date status that identifies all
8 those SSCs selected for inclusion within the scope of the
9 rule. This status could be maintained using a manual list,
10 electronic database, or other methods. The licensee's process
11 must include provisions that take into account modifications
12 or changes to the plant that could result in SSCs being added
13 to or deleted from the scope of the maintenance rule. NUMARC
14 93-01, section 13.2 (ref. 5) provides additional guidance on
15 documenting the SSC selection process.

16
17 The inspector should verify that the licensee has established
18 adequate documentation and has established a process to
19 control this activity.

20
21 Summary for 03.04, Scope of the Rule 50.65(b), steps a through i :

22 If the inspector identifies one or more significant examples, or
23 several minor examples, of failures to identify SSCs required to
24 be within the scope of the rule, the inspector should examine the
25 licensee's process and procedures to determine why they were not
26 included. **The results of the pilot maintenance team inspections
27 demonstrated that licensees were able to identify most of the
28 SSCs that were within the scope of the rule. The number of
29 additional SSCs that the NRC team identified should have been
30 included within the scope of the rule were: zero at two sites,
31 one at four sites, three at one site, four at one site, and
32 fifteen at one site. Most of these were in the category of
33 nonsafety related SSCs whose failure could cause a reactor scram
34 or safety system actuation.**

35
36 03.05. Effectiveness of Emergency Diesel Generator Maintenance
37 Activities. The inspection requirements and guidance given in
38 preceding sections of this inspection procedure apply to all SSCs
39 within the scope of the maintenance rule, including the emergency
40 diesel generators. However, regulatory Guide 1.160 does provide
41 additional specific guidance for emergency diesel generators.

42
43 a. Target Reliability Values as Goals or Performance

44 Criteria: The station blackout rule (10 CFR 50.63) requires
45 each licensee to perform plant-specific coping analyses to
46 ensure that a plant can withstand a total loss of ac power for
47 a specified duration and to determine appropriate actions to
48 mitigate the effects of a total loss of ac power. Most
49 licensees endorsed the program embodied in NUMARC 87-00 (ref.
50 9) and subsequently docketed commitments to maintain a target
51 EDG reliability value of either 0.95 or 0.975. These target
52 values could be used as the basis for goals or as performance
53 criteria for EDG reliability under the maintenance rule (10
54 CFR 50.65). In addition, as part of their plant-specific

(specific guidance 03.03.b. con#3)

1 coping analyses, licensees were allowed to use plant-specific
2 data concerning unavailability due to maintenance. This
3 unavailability due to maintenance, assumed in a plant-specific
4 individual plant examination (IPE) analysis, could also be
5 used as the basis for goals or performance criteria for EDG
6 availability under the maintenance rule.

7
8 The inspector should verify that the licensee has either (1)
9 incorporated these commitments into its maintenance program as
10 goals or performance criteria or (2) established an alternate
11 method of meeting licensee commitments to the station blackout
12 rule and the requirements of the maintenance rule.

13
14 b. Early Implementation of the Maintenance Rule for Emergency
15 Diesel Generators: Generic Letter 94-01 allows licensees to
16 remove accelerated testing and special reporting requirements
17 for emergency diesel generators from the technical
18 specifications or other docketed commitments and still satisfy
19 commitments made in response to the station blackout rule (10
20 CFR 50.63) earlier than the effective date of the maintenance
21 rule, July 10, 1996. This is accomplished by electing to
22 implement the provisions of the maintenance rule and
23 associated regulatory guidance (RG 1.160) for the emergency
24 diesel generators, including all requisite support SSCs
25 (cooling water, instrument air, etc.) If the decision is made
26 to remove these commitments then the effectiveness of
27 maintenance of the emergency diesel generators would be
28 subject to inspection under the provisions of the maintenance
29 rule beginning within 90 days of the issuance of the license
30 amendment or granting relief from a docketed commitment or the
31 effective date of the rule, July 10, 1996, whichever occurs
32 first.

33
34 For licensees that have elected early implementation of the
35 maintenance rule as described in Generic Letter 94-01, the
36 inspector should verify the licensee has implemented all
37 requirements of the maintenance rule and the associated
38 regulatory guidance within the schedule described above.

39
40 XXXXX-04 RESOURCE ESTIMATE⁵

41
42 XXXXX-05 REFERENCES

43
44 1. 10 CFR 50.65, "Requirements for Monitoring the Effectiveness
45 of Maintenance at Nuclear Power Plants" (the maintenance rule).

⁵The resource estimate provides an estimate of the number of onsite inspection hours required to complete this inspection. This estimate is for broad resource planning and is not intended as a quota or standard for judging inspector or regional performance. The actual inspections performed at a specific plant may require substantially more or less time, depending on circumstances.

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2. 10 CFR 50.63, "Loss of All Alternating Current Power,"
(Station Blackout Rule).

3. Generic Letter 94-01, "Removal of Accelerated Testing and
Special Reporting Requirements for Emergency Diesel Generators."

4. U.S. Nuclear Regulatory Commission, Regulatory Guide
1.160, "Monitoring the Effectiveness of Maintenance at Nuclear
Power Plants," June 1993

5. Nuclear Management and Resources Council, NUMARC 93-01,
"Industry Guideline for Monitoring the Effectiveness of
Maintenance at Nuclear Power Plants," May 1993

6. NUREG 1526, "Lessons Learned From Early Implementation of the
Maintenance Rule at Nine Nuclear Power Plants," June 1995.

7. U.S. Nuclear Regulator Commission, "Statements of
Consideration (SOC) for Monitoring the Effectiveness of
Maintenance," Federal Register, Vol. 56, No. 132, Wednesday July
10, 1991, pages 31306 to 31324.

8. U.S. Nuclear Regulator Commission, "Statements of
Consideration (SOC) for Monitoring the Effectiveness of
Maintenance," Federal Register, Vol. 58, No. 53, Monday March 22,
1993, Pages 15303 to 15305.

9. Nuclear Management and Resources Council, NUMARC 87-00,
Revision 1, "Guidelines and Technical Bases for NUMARC
Initiatives Addressing Station Blackout at Light Water Reactors,
August 1991."

Appendix A

ENFORCEMENT GUIDANCE

1
2
3
4
5 The maintenance rule is broad-based and performance-oriented; its
6 goal is to ensure that licensees monitor and assess the
7 effectiveness of their maintenance activities in order to ensure
8 that SSCs will be capable of performing their intended functions.
9 One factor in the Commission's decision to promulgate the rule
10 was a belief that a need existed to broaden the Commission's
11 capability to take timely enforcement action when maintenance
12 activities fail to provide reasonable assurance that safety-
13 significant SSCs are capable of performing their intended
14 functions.

15
16 The form and philosophy of the rule allows (encourages) "maximum
17 flexibility" for licensees in establishing their programs to meet
18 the intent and requirements of the rule. Within these broad
19 requirements, enforcement action would be appropriate for
20 licensees who have inadequately implemented aspects of the rule
21 or whose performance demonstrates a continuing ineffectiveness of
22 maintenance activities.

23
24 Escalated enforcement would be appropriate where there was a
25 failure to deal in good faith to implement the requirements of
26 the rule or where significant failures of SSCs could have been
27 prevented through effective implementation of the maintenance
28 rule.

29
30 The inspector should be aware that the maintenance rule does not
31 supersede any existing requirements such as those contained in
32 10 CFR Part 50 (including Appendix B and other sections) or a
33 licensee's Technical Specifications. These requirements remain
34 in effect for maintenance activities. When preparing notices of
35 violation for maintenance activities, the inspector should
36 consider citing against the requirements of the maintenance rule
37 whenever a licensee has violated a specific requirement of the
38 maintenance rule, such as those described in the examples listed
39 above. However, where maintenance problems are caused by
40 licensee activities not specifically related to maintenance rule,
41 it may be preferable to cite against the requirements of
42 Appendix B or the plant Technical Specifications. Examples of
43 such violations could include failure to take corrective action
44 or failure to follow documented procedures or instructions.

45
46 Examples of Activities That Would Be Violations of the
47 Maintenance Rule:

- 48
49 1. Failure to include safety or non-safety related SSC (as
50 defined in 10 CFR.65 (b)(1) and (2)) within the scope of
51 the program would be a violation.
52
53 2. Failure to establish goals for SSCs in (a)(1) would be a
54 violation. Establishment of goals that are inconsistent

1 with safety significance or industry experience would be a
2 violation.

- 3
- 4 3. Failure to establish a monitoring program that adequately
5 supports the goals set under 10 CFR 50.65 (a)(1). The
6 monitoring program must be sufficient in scope and
7 frequency to adequately support a determination as to
8 whether SSCs are meeting their assigned goals. Lack of
9 such a monitoring program would be a violation.
- 10
- 11 4. Failure to evaluate the results of monitoring activities
12 such that a goal is exceeded without timely licensee
13 knowledge or appropriate corrective action being taken
14 would be a violation.
- 15
- 16 5. Failure to take timely or appropriate corrective action
17 when a goal is exceeded. Repetitive failures due to
18 inappropriate or ineffective corrective action could be
19 considered a violation under this rule for all SSCs within
20 the scope of this rule or a violation of 10 CFR 50 Appendix
21 B safety-related SSCs.
- 22
- 23 6. Failure to analyze maintenance preventable failures of SSCs
24 covered under (a)(2) would be a violation. Failure to
25 develop a rationale or justification for continuing to
26 cover an SSC under (a)(2) after it has experienced a
27 repetitive maintenance preventable failure would be a
28 violation.
- 29
- 30 7. Failure to perform the required periodic assessment for the
31 activities described under (a)(3) would be a violation.
- 32
- 33 8. Failure to reasonably balance reliability and
34 unavailability due to monitoring/maintenance activities
35 would also be a violation.
- 36

37 (deleted "Failure to perform assessments of the impact on
38 performance of safety functions of taking equipment out of
39 service for monitoring or preventive maintenance" as a because it
40 is a should in the rule, not a requirement) see 4 below.

41

- 42 9. A failure to implement or adhere to any of the procedures
43 developed by a licensee to implement the rule may be a
44 violation and could be assessed as a violation of Technical
45 Specifications or 10 CFR 50 Appendix B.
- 46

47 Examples of Activities That Would Not Necessarily Be Violations
48 of the Maintenance Rule:

49

- 50 1. A failure to meet a licensee developed goal under (a)(1)
51 would not be subject to enforcement action as long as
52 appropriate corrective action had been taken when the goal
53 was not met.
- 54

- 1 2. It is intended that licensees be allowed flexibility when
2 establishing goals and not be subject to enforcement on
3 goals selection as long as these goals are reasonably based
4 on safety significance and industry operating experience.
5 The NRC does not intend to second guess the details of
6 these goals. However, the NRC will review these goals to
7 ensure that they reasonably based on safety significance
8 and industry operating experience.
9
- 10 3. The details of the monitoring program would not be subject
11 to enforcement action as long as the monitoring was
12 sufficient to adequately support the goals and provided for
13 an evaluation whenever a goal was exceeded. (see example of
14 violations #3 and #4 above).
15
- 16 4. Since the rule states that in performing monitoring and
17 preventive maintenance activities, an assessment of the
18 total plant equipment that is out of service should (not
19 shall) be taken into account to determine the overall
20 effect on performance of safety functions, the failure to
21 perform this assessment would not be a violation. However,
22 where this failure to perform a safety assessment
23 contributed to the severity of another violation of the
24 regulations, or exacerbated the consequences of an
25 accident, the failure to perform a safety assessment could
26 be taken into account as a mitigating factor in any
27 escalated enforcement action.
28
- 29 5. Deficiencies in records and documentation would not in
30 themselves be subject to enforcement. However, if they
31 contribute to an inappropriate action or inaction to
32 correct the performance of an SSC, these record or
33 documentation deficiencies may be cited as contributing
34 factors in an enforcement action.
35