January 27, 1994

Mr. Thomas E. Tipton
Nuclear Management and Resources Council
1776 Eye Street, NW
Suite 300
Washington D.C.

Dear Mr. Tipton:

The United States Nuclear Regulatory Commission (NRC) will conduct a public workshop on March 31, 1994 to discuss a draft maintenance inspection procedure developed for use by NRC inspectors to verify the implementation of the Maintenance Rule requirements. The effective implementation date of the Maintenance Rule is July 10, 1996. The workshop will be held on March 31, 1994, at the Holiday Inn Crown Plaza, Rockville, Maryland.

I am enclosing a copy of the NRC press release announcing this workshop and a copy of the "Draft Maintenance Inspection Procedure XXXXX" for your information. Please disseminate these to your members to ensure proper notification. Notification of this workshop will also be published in the Federal Register of February 1994, Nuclear News magazine, and The Nuclear Plant Maintenance Newsletter.

Should you have any questions regarding this workshop, please call Richard Correia at (301) 504-1009.

(original signed by)

Charles E. Rossi, Director
Division of Reactor Inspection
and Licensee Performance
Office of Nuclear Reactor Regulation

Enclosure: As stated

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

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Division of Reactor Inspection
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Office of Nuclear Reactor Regulation

Enclosure: As stated

No. 94-15
Tel. 301-504-2240

FOR IMMEDIATE RELEASE
(Thursday, January 26, 1994)

NRC STAFF PLANS WORKSHOP ON MAINTENANCE RULE INSPECTION PROCEDURE

The Nuclear Regulatory Commission staff has scheduled a workshop for Thursday, March 31, to discuss a draft maintenance procedure which is being developed for use by NRC inspectors to verify implementation of NRC requirements governing maintenance at NRC-licensed nuclear power plants. The NRC's maintenance requirements are contained in Part 50 of the Commission's regulations and are to become effective on July 10, 1996.

The workshop will be held at the Holiday Inn Crowne Plaza, 1750 Rockville Pike in Rockville, Maryland 20852. It is scheduled to begin at 9 a.m. and run through 5 p.m.

Prior to finalizing the inspection procedure, the staff believes that it would be beneficial to obtain public comment on the document from all interested parties and the March 31 workshop is planned for that purpose. Participants will be encouraged to ask questions and provide written comments on the procedure during the workshop. In addition, other written comments from parties unable to attend the workshop will be accepted through April 14. The workshop will conclude with a summary of the major issues identified at the session as well as a discussion of the planned use of the procedure during pilot inspections.

In order to assure that adequate seating is available, persons planning to attend the workshop are requested to either to call or complete a registration form and forward it, by March 25, to Thomas Foley, Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission, Washington, D.C. 20555; telephone: 301.504-1036.

A group of rooms has been reserved at the Holiday Inn Crowne Plaza (1-800/638-5963) for the convenience of meeting attendees. These rooms will be available at a reduced group rate until March 9 and, when requesting rooms, attendees should mention the workshop and the number 4093 to assure the group rate. The hotel will collect a ten dollar fee at registration or the morning of the workshop to cover the costs of morning and afternoon refreshments.

A copy of a memorandum from Gary E. Zech to Elizabeth S. Yeates dated January 25, 1994, with the draft inspection procedure "Maintenance Inspection Procedure XXXXX" attached has been placed in the NRC's Public Document Room located on the lower level of the Gelman Building at 2120 L Street, N.W. in Washington, D.C. The telephone number is 202/634-3273.

(file 50_65_IP.008)

DRAFT RPEB

MAINTENANCE INSPECTION PROCEDURE XXXXX

PROGRAM APPLICABILITY: 2515

XXXXX-01 INSPECTION OBJECTIVES:

01-01 To verify the implementation of 10 CFR 50.65, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" (the maintenance rule or the rule), which will take effect on July 10, 1996.

01-02 To verify the effectiveness of emergency diesel generator (EDG) maintenance activities associated with commitments made in response to 10 CFR 50.63, "Loss of All Alternating Current Power" (the station blackout (SBO) rule).

XXXXX-02 INSPECTION REQUIREMENTS[1]:

There are three steps in the inspection requirements section. The inspector should perform steps 02.01 and 02.03 at each nuclear power site, and has the option of performing step 02.02 depending on the results of step 02.01. The inspector should perform step 02.02 if the results of the reviews and inspections performed in step 02.01 indicate that licensee maintenance activities may not be effective. If these reviews and inspections indicate that maintenance activities are effective, then step 02.02 need not be performed at that site. (However, step 02.02 will be performed at all plants inspected during the pilot inspection program).

02.01 Evaluate Maintenance Effectiveness. Perform onsite inspection of the condition of plant SSCs and review equipment history records and other available documentation in order to determine if the licensee's maintenance program is effectively controlling the performance and condition of SSCs at that plant.

02.02 Verify Implementation of the Maintenance Rule. Perform the following reviews to verify the licensee's implementation of the maintenance rule.

a. Goal Setting and Monitoring, 50.65(a)(1). Verify that the licensee has implemented goal setting and monitoring as required by paragraph (a)(1) of

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[1]The items listed in this section are not necessarily regulatory requirements unless explicitly stated. They are also not necessarily inspection requirements; the inspector may select some or all of the items listed for review, depending on the intended scope of the inspection and the resources the region has allotted for the inspection.

(inspection requirement 02.02 cont.)

the maintenance rule. The licensee is required by the rule to perform the following:

1. Monitor the performance or condition of SSCs against licensee established goals in a manner sufficient to provide reasonable assurance that such SSCs, as defined in 10 CFR 50.65(b), are capable of fulfilling their intended functions.

2. Establish goals commensurate with safety and, where practical, take into account industrywide operating experience.

3. Take appropriate corrective action when the performance or condition of an SSC does not meet established goals.

b. Preventive Maintenance, 50.65(a)(2). For those SSCs that are within the scope of the rule (see step 02.02.d below) but are not monitored under paragraph (a)(1) of the rule, verify that the licensee has demonstrated the following:

1. Performance or condition of an SSC is being effectively controlled through the performance of appropriate preventive maintenance so that the SSC remains capable of performing its intended function; or,

2. The SSC is inherently reliable or of low risk significance and, therefore, preventive maintenance is not required.

c. Periodic Evaluation, 50.65(a)(3). Verify that the licensee is performing the evaluations and assessments required by paragraph (a)(3) of the maintenance rule. The licensee is required by the rule to perform the following:

1. Evaluate performance and condition monitoring activities and associated goals and preventive maintenance activities at least every refueling cycle, provided the interval between evaluations does not exceed 24 months. The evaluations shall take into account, where practical, industrywide operating experience.

2. Make adjustments 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 because of monitoring or preventive maintenance activities.

3. Assess the total plant equipment that is out of service and determine the overall effect on the performance of safety functions of performing monitoring and preventive maintenance activities.

d. Scope of the Rule, 50.65(b). Verify that the licensee has identified those SSCs that are required to be within the scope of the maintenance rule as defined in paragraph 50.65(b) of the rule.

02.03 Effectiveness of Emergency Diesel Generator Maintenance Activities. Verify that the licensee, as part of its maintenance program, has evaluated the reliability of emergency diesel generators and that this maintenance program satisfies the commitments made by licensees in response to 10 CFR 50.63, the station blackout rule. In some instances, depending on the

commitments made by the licensee, the NRC may perform the inspections described under this section of the inspection procedure (02.03) before the implementation date (July 10, 1996) of the maintenance rule.

XXXXX-03 INSPECTION GUIDANCE

General Guidance

Implementation Guidance: Except when the licensee proposes an alternate method for complying with specified portions of the maintenance rule, the methods described in Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," May 1993 (Ref. 1), will be used to evaluate the effectiveness of maintenance activities of licensees who are required to comply with the maintenance rule. The regulatory guide will also be used to evaluate the effectiveness of emergency diesel generator maintenance activities associated with compliance with 10 CFR 50.63 (more information on emergency diesel generator testing is contained in Generic Letter [GL number to come later]. This regulatory guide endorses NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," May 1993 (Ref. 2), and provides methods acceptable to the NRC for complying with the maintenance rule. The inspector should become familiar with Regulatory Guide 1.160 and NUMARC 93-01 before initiating this inspection. The inspector should also be aware that licensees may use methods other than those described in NUMARC 93-01 to satisfy the requirements of the maintenance rule.

Differences Between Plants: Differences in plant design (i.e., system boundaries), even among plants that have the same nuclear steam supply system (NSSS), can result in significant differences in the number and types of SSCs included under the scope of the rule. The types of goals and monitoring established at different plants may also differ significantly between similar plants. Therefore the inspector should not put too much emphasis on comparing one plant to another when evaluating maintenance activities under the rule. The inspector should verify that licensees are evaluating maintenance and equipment problems at plants with similar NSSS designs to identify possible generic problems.

Requirements vs. Acceptable Methods: The specific guidance that follows was derived from information contained in the maintenance rule (10 CFR 50.65), the statements of consideration (SOC) for the rule, the regulatory guide, and the industry guideline (NUMARC 93-01 (Ref. 2)). Reference was made to the source document, where possible, in order to help the inspector differentiate between the guidance that represents regulatory requirements and guidance that is optional. In general, anything that is stated in the rule itself is a requirement. The SOC contains information that could be used to clarify the intent of the rule. Information derived from the regulatory guide and the referenced industry guideline provides optional, acceptable methods for complying with the rule and is not to be considered a regulatory requirement. If the licensee chooses not to implement the maintenance rule in accordance with the regulatory guide and the industry guideline, then the licensee must demonstrate that the alternate methods satisfy the requirements of the rule.

Assignment of SSCs to (a)(1) or (a)(2): Paragraph (a)(1) of the maintenance rule requires that goal setting and monitoring be established for all SSCs within the scope of the rule except for those SSCs whose performance or condition is adequately controlled through the performance of appropriate

(general guidance cont.)

preventive maintenance as described is paragraph (a)(2) of the rule. The industry guideline for implementing the rule, NUMARC 93-01, has taken the approach that all SSCs are initially placed under paragraph (a)(2) and are only moved under paragraph (a)(1) if experience indicates that the performance or condition is not adequately controlled through preventive maintenance. However the rule does not require this approach. Licensees could also take the approach that all (or most) SSCs would be handled under paragraph (a)(1) of the rule and none (or very few) would be handled under paragraph (a)(2) of the rule. Licensees have the option of taking either approach.

Appendix B Not Applicable to Non-Safety-Related SSCs: The scope of the maintenance rule (10 CFR 50.65(b)), includes both safety-related SSCs and non-safety-related or balance-of-plant (BOP) SSCs. As stated in Regulatory Guide 1.160 (Ref. 1), it is understood that BOP SSCs may have been designed and built with normal industrial practices that may not have met the criteria in Appendix B to 10 CFR Part 50. The inspector should understand that it is not the intent of the maintenance rule to require licensees to generate paper work to document the basis for the design, fabrication, and construction of BOP equipment. However, all requirements of Appendix B remain in effect for safety-related SSCs that are within the scope of the rule.

Specific Guidance[2]

03.01 Evaluate Maintenance Effectiveness. Sources of information that could provide insight on the effectiveness of a licensee's maintenance program include: SALP reports, licensee event reports, NRC inspection reports, equipment maintenance history records, plant performance reviews, reliability and unavailability data, equipment performance or condition trending data, and performance indicator data collected by licensees to meet the requirements for goal setting and monitoring contained in the maintenance rule.

The inspector shall review a sample of available documented information that could provide insight on the effectiveness of the licensee's maintenance activities. The inspector should select a balanced sample which includes: active and passive systems; mechanical, electrical, instrumentation and controls systems and components; and structures. The inspector shall also tour the plant and perform a walkdown inspection of the condition of SSCs at the licensee's facility. During these inspections the inspector should look for signs of leakage, corrosion, excess vibration, loose fasteners or other conditions that could indicate inadequate maintenance. The inspector should also discuss the plant operating history with licensee personnel responsible for operation and maintenance of the plant. If, based on these initial reviews, it appears there may be a need to perform further reviews of a licensee's implementation of the maintenance rule, the inspector should proceed by performing the inspection requirements in Section 02.02 of this procedure.

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[2]The 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, Section 03.01.a.1 provides specific inspection guidance for Inspection Requirement 02.01.a.1.

03.02.a. Goal Setting and Monitoring 10 CFR 50.65(a)(1). The licensee is required to set goals and monitor the performance or condition for all SSCs selected or required to fall under paragraph (a)(1) of the rule.

1. Monitoring: The rule requires that licensees monitor performance or condition of SSCs in a manner sufficient to provide reasonable assurance that SSCs are capable of fulfilling their intended functions. This wording is intentionally non-prescriptive and is intended to allow licensees considerable flexibility in the methods used to monitor SSC performance or condition.

(a) Risk Consideration in Monitoring: The statements of consideration (Ref. 4) and the regulatory guide (Ref. 1) state that the extent of monitoring may vary from system to system depending on the system's importance to risk (or safety). This determination may be quantitative or qualitative. Section 9.0 of NUMARC 93-01 (Ref. 2) provides guidance on various methods for establishing which SSCs are risk significant. These methods include the use of individual plant examination (IPE) results, plant-specific probabilistic risk assessment (PRA), preventive maintenance program results, and others. Guidance is also provided on the use of risk importance measures such as risk reduction worth, core damage frequency contribution, and risk achievement worth. The licensee may use other methods to determine the risk-significance of SSCs.

The inspector should verify that the licensee has considered risk when determining the extent of monitoring required. To accomplish this, the inspector should select a sample of SSCs that are within the scope of the maintenance rule and, using the licensee's own criteria, determine if the licensee has identified those SSCs that are risk-significant. The inspector should verify that the monitoring for these risk significant SSCs is commensurate with their importance to plant risk.

(b) Monitoring at the Plant, System, or Train Level: It is expected that most monitoring should be done at the plant, system, or train level, although some monitoring at the component level may be necessary. The three examples listed below are taken from the regulatory guide (Ref. 1):

(1) For less-risk-significant systems, indicators of system reliability (where sufficient performance data exist) and availability may be all the monitoring that is necessary (i.e., monitoring the reliability and availability of the overall system provides adequate indication of the performance of the individual components).

(2) For more-risk-significant systems, some parameter trending may also be required for critical components whose unavailability or failure could cause a system train to be unavailable, or whose failure is otherwise unacceptable.

(3) For other SSCs, rather than monitoring the many SSCs that could cause plant scrams, the licensee may choose to monitor unplanned scrams as an indirect means of monitoring performance.

Additional guidance on acceptable methods of performing monitoring is described in Section 9.4.2. of NUMARC 93-01 (Ref. 2).

(specific guidance 03.02.a. cont.)

Having reviewed records and spoken with personnel, the inspector should verify that the licensee has established and implemented adequate performance or conditioning monitoring for all SSCs within the scope of the rule.

(c) Use of Existing Programs for Monitoring: The regulatory guide (Ref. 1) states that it is intended that most activities currently being conducted by licensees, such as technical specifications surveillance testing, can be used to satisfy many of the monitoring requirements; and, consistent with the rule, the inspector should allow licensees maximum flexibility in establishing and modifying their monitoring activities. Additional guidance on the use of existing programs for monitoring is described in Section 9.4.2 of NUMARC 93-01 (Ref. 2). Although licensees are free to initiate any new activities they believe necessary to ensure that SSCs are adequately monitored, the inspector is cautioned not to expect licensees to establish many new activities to satisfy the requirements of the maintenance rule.

2. Goal Setting: Paragraph (a)(1) of the rule requires licensees to establish goals commensurate with safety and, where practical, to take into account industrywide operating experience. Licensees have a great deal of flexibility in choosing goals and may elect to choose component-, train-, system-, or plant-level goals. These goals may be performance oriented (reliability, availability) or condition oriented (such parameters as pump flow, pressure, vibration, valve stroke time, current, electrical resistance). Licensees should document the bases for the goals and any subsequent changes made to those goals. Guidance on documentation is provided in section 13.2.1 of NUMARC 93-01 (Ref. 2). The rule specifically states that the goals are to be "licensee established." Therefore, the inspector should allow licensees maximum flexibility in establishing and modifying their goals. However, the goals must represent reasonable attempts to establish targets for monitoring SSCs within the scope of the rule. Licensees should consider the following when setting goals:

(a) Risk Consideration for Goal Setting: The rule specifically requires licensees to establish goals commensurate with safety (or risk). Information on an SSC's contribution to plant safety can be obtained from various sources including the Individual Plant examination (IPE) or probabilistic risk assessment (PRA) results (if available). Section 9.0 of NUMARC 93-01 (Ref.2) provides guidance on acceptable methods for establishing risk-significant criteria. These methods include the use of risk reduction worth, core-damage frequency contribution, and risk achievement worth. Licensees may use these or other methods to determine risk significance.

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

(b) Operating Experience for Goal Setting: The licensee should also, where practical, take into account industrywide operating experience when establishing goals. Sources of industrywide operating experience include, but are not limited to, NRC bulletins and information notices, the Institute of Nuclear Power Operations (INPO) Nuclear plant

(specific guidance 03.02.a. cont.)

reliability data system (NPRDS), vendor technical information letters (TILs), and vendor service information letters (SILs). Although a great deal of failure information is available in the industry in various forms, the availability, accessibility, and usefulness may be limited. In view of these limitations, the inspector should not expect the licensee to be able to identify all failures of similar SSCs in the industry when reviewing industry operating experience.

The inspector should verify that the licensee has established and implemented a documented method or process for considering industry operating experience, where practical, when establishing goals.

3. Corrective Action: Licensees are required to monitor the performance or condition of SSCs against the established goals and take appropriate corrective action where the goals are not met or where a clearly declining trend in SSC performance or condition indicates the goals would not be met before the end of the next surveillance cycle. Where analysis determines that the performance or condition of the SSC is acceptable, the licensee may elect to modify the original goals and continue monitoring.

The inspector should select a sample of maintenance monitoring records and compare them to the established goals. Where goals were not met, or where a clearly declining trend in SSC performance or condition is indicated, the inspector should examine the licensee's corrective actions to determine if the root cause was identified, if reasonable corrective action was taken, and if an evaluation of the effectiveness of the corrective action was performed. Licensee activities such as root cause analysis and corrective actions must be documented by the licensee.

03.02.b. Preventive Maintenance, 50.65(a)(2). The maintenance rule states that monitoring as specified in paragraph (a)(1) is not required if it has been demonstrated that the performance or condition of an SSC is being effectively controlled through the performance of appropriate preventive maintenance so that the SSC remains capable of performing its intended function. The statements of consideration (SOC) (Ref. 4) clarify that licensees are not required to monitor under paragraph (a)(1) of the rule if they have demonstrated that preventive maintenance has been effective or if an SSC has inherently high reliability and availability as discussed below.

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

(a) Performance Criteria: NUMARC 93-01 (Ref. 2) introduced the use of performance criteria as a method of demonstrating satisfactory performance or condition under paragraph (a)(2) of the rule. Where the performance or condition is not adequately controlled, the SSC would generally be dispositioned to paragraph (a)(1). Section 9.3.2 of NUMARC 93-01 recommends that performance criteria should be availability, reliability, or condition. It also recommends that specific performance criteria be established for all risk-significant

(specific guidance 03.02.b. cont.)

SSCs and for non-risk-significant SSCs that are in a standby (not normally operating) mode. Plant-level performance criteria would be established for all remaining non-risk-significant, normally operating SSCs. Performance criteria would not be required for SSCs determined to be inherently reliable[3] or for those SSCs that contribute little or nothing to safety function and that could be allowed to run to failure (i.e., perform corrective maintenance rather than preventive maintenance).

(b) Maintenance-Preventable (Functional) Failure: Section 9.4.5 of NUMARC 93-01 (Ref. 2) recommends the use of the term "maintenance preventable functional failures (MPFFs)" rather than "maintenance preventable failures (MPFs)" as described in the SOC, in order to differentiate between failures that cause an SSC to be incapable of performing its intended function and failures that do not affect an SSC's function. There are many possible failures of some SSCs that would not affect the intended safety function of the system.

(c) Dispositioning from paragraph (a)(2) to paragraph (a)(1): The SOC (Ref. 4) states that it is expected that where one or more maintenance preventable failures (or MPFFs) occur on SSCs treated under paragraph (a)(2), the effectiveness of preventive maintenance is no longer demonstrated. As a result, 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. Section 9.4.4 of NUMARC 93-01 (REF. 2) provides additional guidance on determining when dispositioning SSCs from paragraph (a)(2) to paragraph (a)(1) would be required. This would generally be required if a performance criterion were not met or if a repetitive MPFF occurs. The inspector should note that an SSC could continue to be treated under paragraph (a)(2) after experiencing a single MPFF if the root cause evaluation determined the cause of the failure and if the corrective action that was taken prevented recurrence. However if a second, repetitive, MPFF occurred, then the SSCs would have to be dispositioned to paragraph (a)(1). Once an SSC's preventive maintenance has been demonstrated effective again, it would be acceptable to return to treating the SSC under paragraph (a)(2). Section 9.4.3 of NUMARC 93-01 (Ref. 2) provides guidance for dispositioning SSCs from paragraph (a)(1) to paragraph (a)(2).

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[3]The 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).

(specific guidance 03.02.b. cont.)

The inspector should verify that the licensee has established and implemented some monitoring or assessment process for determining if the preventive maintenance program is effectively maintaining the reliability of those SSCs (except for inherently reliable SSCs described below) that are maintained exclusively under paragraph (a)(2) of the maintenance rule. The inspector should review the maintenance history for a sample of SSCs maintained under paragraph (a)(2) to verify that the monitoring or assessment process ensures that acceptable performance or condition of the SSCs is maintained and, where that performance or condition degrades to an unacceptable level or experiences a second maintenance preventable failure, the SSC is treated under paragraph (a)(1) until such time as the performance or condition improves to an acceptable level. The inspector should select a sample of SSCs that experienced maintenance preventible functional failures and review the licensee's actions to determine if they were dispositioned properly.

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

(a) Inherently Reliable: 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). It is expected that many structures, such as cable raceways, water storage tanks, and buildings, could be considered inherently reliable. However, it should be noted that such activities as inspections, surveys, and walkdowns could be considered maintenance activities and, therefore, most SSCs would be subject to some maintenance. Therefore, the concept of identifying inherently reliable SSCs as those that require no maintenance may be of limited usefulness. Licensees should document their reasons for concluding that certain SSCs are inherently reliable.

The inspector should review the documentation for a sample of SSCs that have been determined to be inherently reliable, verify that the licensee's determination appears reasonable, and that the SSC's condition or performance is acceptable without maintenance.

(b) Low Risk Significance: Methods for determining risk (or safety) significance are described in NUMARC 93-01, section 9.0 (Ref. 2). As described in NUMARC 93-01, section 9.3.3 (Ref. 2), SSCs that contribute little or nothing to system safety function could be allowed to run to failure (i.e., perform corrective maintenance rather than preventive maintenance). To accomplish this, the licensee should establish appropriate criteria for determining if SSCs have low risk significance and should use these criteria to identify SSCs that could be allowed to run to failure. Licensees should document these criteria and their reasons for deciding that individual SSCs could be allowed to run to failure.

(specific guidance 03.02.b. cont.)

The inspector should select a sample of these SSCs and evaluate them to verify that the licensee has followed its own criteria for determining low risk significance and that these evaluations are reasonable.

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

1. Refueling Cycle Evaluation: The rule requires that licensees evaluate performance and condition monitoring activities and associated goals and preventive maintenance activities at least every refueling cycle, provided the interval between evaluations does not exceed 24 months. The SOC (Ref.4) states that these activities are to be evaluated in light of SSC reliabilities and availabilities as well as the following:

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

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

(b) Preventive Maintenance: For SSCs under paragraph (a)(2), adjustment of preventive maintenance activities may be warranted where SSC availability is judged to be unacceptable. SSCs treated under paragraph (a)(2) which experience repetitive maintenance- preventable functional failures (MPFFs), become subject to the requirements of paragraph (a)(1) or, where this is not feasible, may require other remedial action, such as modification or replacement.

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

(c) Operating Experience: The maintenance rule also requires that the evaluations shall take into account, where practical, industrywide operating experience. Sources of industrywide operating experience include, but are not limited to, NRC bulletins and information notices, the INPO NPRDS, vendor technical information letters (TILs), and vendor service information letters (SILs).

The inspector should verify that the licensee has established and implemented a documented method or process for considering industry operating experience when performing evaluations.

(specific guidance 03.02.c. cont.)

2. Balancing Unavailability and Reliability: The maintenance rule requires that licensees make adjustments 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 activities. The intent of this requirement is to ensure that monitoring or preventive maintenance activities do not result in excessive unavailability that would negate any improvement in reliability achieved as a result of the monitoring or maintenance activity. This process can be qualitative, but it should be documented. Additional guidance is provided in section 12.2.4 of NUMARC 93-01 (Ref. 2).

The inspector should ask licensees to explain their processes and to provide examples of evaluations that resulted in adjustments to achieve this balance. The inspector should verify that the licensee has implemented a method or process for evaluating the improvements in reliability and balancing them against the unavailability that results from maintenance.

3. Assessment of Equipment Out of Service: In performing monitoring and preventive maintenance activities, an assessment of the total plant equipment that is out of service should be taken into account by the licensee to determine the overall effect on the performance of safety functions. This assessment is to be performed on an ongoing basis, not just during the periodic assessment performed at the end of every refueling cycle. As stated in the SOC (Ref. 4), assessing the cumulative impact of out-of-service equipment on the performance of safety functions is intended to ensure that the plant is not placed in risk-significant configurations. These assessments do not necessarily require that a quantitative assessment of probabilistic risk be performed. However the PRA or IPE may provide useful information on risk significance of various SSCs. The level of sophistication with which such assessments are performed is expected to vary, according to the assessments performed. These assessments may range anywhere from simple deterministic judgments to the use of an on-line living PRA. It is expected that, over time, assessments of this type will be refined as the technology improves and experience is gained. In order to accomplish these assessments licensees must keep track of the status (in or out of service) of plant equipment. This status may be kept as a manual list or on a database but must be easily accessible and kept up to date. In order to be useful and accessible the information should be kept in one location and not scattered among several documents (shift logs, status boards, tag out status boards) in various locations. Additional guidance is provided in section 11.0 of NUMARC 93-01 (Ref.2).

The inspector should verify, based on a review of licensee records and discussions with appropriate personnel, that the licensee has established and implemented an ongoing, documented process for assessing the overall effect on the performance of safety functions before SSCs are taken out of service for monitoring or preventive maintenance. The inspector should verify that the licensee maintains a list of all SSCs within the scope of the maintenance rule and that the licensee updates this list to indicate when SSCs are in or out of service. The inspector should select a sample of SSCs from the licensee's list of SSCs that have been taken out of service and review the adequacy of the evaluations made by the licensee before taking the SSCs out of service. The inspector should also verify

(specific guidance 03.02.c. cont.)

that the licensee reviews the results of this process during the periodic assessment performed each refueling cycle.

03.02.d. Scope of the Rule, 50.65(b). The scope of SSCs that are required to be included within the rule is defined in 10 CFR 50.65(b). Section 8.0 of NUMARC 93-01 (Ref. 2) provides additional guidance on methods for selecting SSCs to be included in the scope of the maintenance rule. In order to verify that the licensee has correctly identified and documented SSCs at its facility the inspector should perform the following reviews.

1. Safety-Related SSCs per 50.65(b)(1): Identifying safety-related SSCs should be uncomplicated since all licensees should have a well-defined list of safety-related SSCs in their final safety analysis report, (FSARs), Q-lists or master equipment lists (MELs).

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

2. Non-Safety-Related SSCs That are Relied Upon to Mitigate Accidents or Transients per 50.65(b)(2)(i): The FSAR describes non-safety-related SSCs needed to mitigate accidents and transients. Examples of non-safety-related SSCs that are used in the FSAR analysis to mitigate accidents include: the condensate storage tank (supply to auxiliary feedwater), the fire-suppression system, and the boric acid transfer system used for emergency boration and makeup water to the refueling water storage tank.

The inspector should independently review the plant safety analysis report and attempt to identify a sample of non-safety-related SSCs relied upon to mitigate accidents or transients. If it is not feasible to select an independent sample in this manner, the inspector should perform a review of non-safety related SSCs that were identified by the licensee as necessary to mitigate accidents and transients. This sample may include a very small number of SSCs. The inspector should review the licensees determinations and verify that they appear to be reasonable.

3. Non-Safety-Related SSCs That Are Used in Emergency Operating Procedures (EOPs) per 50.65(b)(2)(i): Paragraph (b)(2)(i) of the maintenance rule states that all SSCs in EOPs are required to be included within the scope of the rule. However, many utilities have included more SSCs in their EOPs than are required by the Emergency Procedure Guidelines. Some of these SSCs were included because they could possibly assist in the event of an emergency, not because they are relied upon in the licensee's accident analysis to protect other equipment from being damaged or contaminated. Subsequently, the NRC staff endorsed the guidance contained in section 8.2.1.3 of NUMARC 93-01 (Ref. 2) which allows the exclusion from the rule of those non-safety-related SSCs that are not considered important because they do not add significant value to the mitigation function of an EOP by providing a significant fraction of the total functional ability required to mitigate core damage or radioactive release. Some examples of SSCs that might be excluded on this basis are instrumentation that provides redundant local information and does not provide a control function, fire-protection system capacity capable of supplying only a small fraction of what is required to mitigate the accident, and portable emergency equipment that is available from offsite sources and is not under utility control.

(specific guidance 03.02.d. cont.)

Conversely, if a fire-protection system provides a large fraction of what is required to mitigate the accident, it should be under the scope of the rule. The inspector should keep these exceptions in mind when reviewing the scope of SSCs included in the rule.

The inspector should independently review the EOPs to identify a sample of non-safety-related SSCs and verify that they are included within the scope of the rule or were excluded based on the criteria described above. The inspector should select a sample of SSCs from the EOPs that were excluded from the rule and verify that the licensee's documented reasons for excluding the SSC from the rule appear to be reasonable.

4. Non-Safety-Related SSCs Whose Failure Could Prevent Safety-Related SSCs From Fulfilling Their Intended Function as per 50.65(b)(2)(ii): To identify failure modes of non-safety-related SSCs that will directly affect safety-related functions, the licensee should investigate the systems and their interdependencies. A utility should rely on actual plant-specific and industrywide operating experience[4], prior engineering evaluations such as PRA, IPE, environmental qualification (EQ), and 10 CFR Part 50 (Appendix R) analyses. Industrywide operating experience should be used to the extent practical to preclude unacceptable performance experienced at a similar plant from being repeated. Examples of such non-safety-related SSCs could include instrument air system that opens containment isolation valves for purge and vent, a fire damper in the standby gas treatment system whose failure would impair air flow, or a condensate storage water tank that is a source of water for ECCS. However, it is not intended that licensees attempt to determine hypothetical failures that could result from system interdependencies that have not previously been experienced or analyzed. NUMARC 93-01, section 8.2.1.4 (Ref. 2) provides additional guidance. See paragraph 03.02.d step 6 below for exceptions.

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

5. Non-Safety-Related SSCs Whose Failure Could Cause a Scram or Actuation of a Safety System as per 50.65(b)(2)(iii): Licensees are required to identify, on the basis of utility-specific and industrywide operating

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[4]Industrywide operating experience includes information from NRC, industry, and vendor sources that is generally available to the nuclear industry. Sources of this type of information could include: NRC bulletins, information notices, generic letters, 10 CFR Part 21 reports; the INPO NPRDS system, vendor service, and technical information letters and reports. It is intended that licensees will obtain this operating experience information from existing programs; it is not intended that licensees will establish new programs to satisfy the needs of the maintenance rule.

experience, those non-safety-related SSCs whose failure could cause a reactor scram or safety system actuation. The licensee should consider other engineering evaluations, such as PRA, IPE, environmental qualification (EQ), and 10 CFR Part 50 (Appendix R) analyses. The licensee should also consider industrywide operating experience and any event that has occurred at a similarly configured plant. However, the licensee is not required to determine hypothetical failures that could result from system interdependencies that have not previously been experienced or analyzed. Examples of transient initiators from the FSAR include turbine trips, loss of feedwater, and loss of instrument air. Examples of non-safety-related SSCs whose failure could cause a plant trip are the turbine generator, non-ESF buses that power reactor coolant pumps, and rod control system failure that allows multiple rods to drop into the core. One example of a non-safety-related system whose failure could cause a safety system actuation is a radiation monitor which could isolate control room ventilation. NUMARC 93-01, section 8.2.1.5 (Ref. 2), provides additional guidance.

The inspector should review licensee event reports or other available operating history information to identify SSCs that have actually caused a scram or safety system actuation and should verify that those SSCs had been included in the licensee's maintenance program.

6. Sscs Outside the Scope of the Maintenance Rule: Unless they meet the criteria described above, the following categories of SSCs are generally outside the scope of the maintenance rule: fire protection systems; seismic class II SSCs installed in proximity to seismic class I SSCs; security systems; and, emergency facilities described in the emergency plan. Further guidance is provided in section 8.2.1.6 of NUMARC 93-01 (Ref. 2).

The inspector should not expect that these SSCs would be included within the scope of the maintenance rule because maintenance requirements already exist for these categories of SSCs.

7. Switchyard Activities: The regulatory guide (Ref. 1) states that the scope of monitoring efforts under the maintenance rule, as defined in 10 CFR 50.65(b), encompasses those SSCs that directly and significantly affect plant operations, regardless of which organization actually performs the maintenance activities. Maintenance activities performed by plant maintenance personnel, as well as by corporate maintenance or contractor personnel, come under the scope of the rule. Since maintenance activities that are performed in the switchyard can directly affect plant operations, electrical distribution equipment out to the first intertie with the off-site distribution system (i.e., equipment in the switchyard) should be considered for inclusion under the scope of the maintenance rule. Plant managers should be aware of, and should have the ability to control, these activities even if the switchyard is not onsite.

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

8. Safety Systems with Non-safety Functions: Examples provided in section 8.2.1 of NUMARC 93-01 (Ref. 2) illustrate that some safety-related systems may perform safety-related as well as non-safety-related functions. In such cases, the components that perform only a non-safety-related function may not necessarily come under the scope of the rule. For example, the

non-safety-related function of an ECCS could be to fill the safety injection accumulators.

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

9. Documentation. The licensee's process for reviewing and selecting SSCs shall be documented. The licensee shall also develop a list of all those SSCs selected for inclusion within the scope of the rule. This list could take the form of either a manual list or an electronic database. In either case, licensees must have a process to periodically revise the list as modifications or other changes are made to the plant that result in SSCs being added or deleted from the scope of the rule. NUMARC 93-01, section 13.2 (Ref. 2) provides additional guidance on documenting the SSC selection process.

The inspector should verify that the licensee has established adequate documentation which includes a listing of all SSCs that are within the scope of the maintenance rule and made provisions for updating the list.

Summary for 03.02.d., Scope of the Rule 50.65(b), steps 1 through 9: If the inspector identifies one or more significant examples, or several minor examples, of failures to identify SSCs required to be within the scope of the rule, the inspector should examine the licensee' process and procedures to determine why they were not included.

03.03. Effectiveness of Emergency Diesel Generator Maintenance Activities. The inspection requirements and guidance given in other sections of this inspection procedure apply to all SSCs within the scope of the maintenance rule, including the emergency diesel generators. In addition, the following requirements derived from Regulatory Guide 1.160 apply to emergency diesel generators only.

03.03.a. Early Implementation for Emergency Diesel Generators: In order to remove certain EDG requirements from the technical specifications and still satisfy certain commitments made in response to the station blackout rule (10 CFR 50.63), licensees may elect to implement the requirements of the maintenance rule for the emergency diesel generators earlier than the effective date of the maintenance rule, July 10, 1996. If the licensee has made the decision to remove the SBO commitments from the technical specifications, then the maintenance of the emergency diesel generators would be subject to inspection under the requirements of the maintenance rule before July 10, 1996.

03.03.b. Target Reliability Values as Goals or Performance Criteria: The station blackout rule (10 CFR 50.63) requires each licensee to perform plant-specific coping analyses to ensure that a plant can withstand a total loss of ac power for a specified duration and to determine appropriate actions to mitigate the effects of a total loss of ac power. Most licensees endorsed the program embodied in NUMARC 87-00 (ref. 3) and subsequently docketed commitments to maintain a target EDG reliability value of either 0.95 or 0.975. These target values could be used as the basis for goals or as performance criteria for EDG reliability under the maintenance rule (10 CFR 50.65). As part of their plant-specific coping analyses, licensees were allowed to use plant-specific data concerning unavailability due to

(specific guidance 03.03.b. cont.)

maintenance. This unavailability due to maintenance, assumed in a plant-specific individual plant examination (IPE) analysis, could also be used as the basis for goals or performance criteria for EDG reliability under the maintenance rule.

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

03.03.c. Balancing Unavailability and Reliability: Paragraph (a)(3) of the maintenance rule requires that adjustments be made 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. Therefore, both plant-specific EDG reliability and plant-specific EDG availability should be monitored as goals under paragraph (a)(1) or should be established as performance criteria under the plant's preventive maintenance program under paragraph (a)(2), to satisfy the objectives of paragraph (a)(3). The regulatory guide endorses the example in NUMARC 93-01, section 12.2.4 (Ref. 2), which refers to optimizing EDG reliability and availability.

The inspector should verify that the licensee is monitoring both plant-specific EDG reliability and plant-specific EDG availability as goals under paragraph (a)(1) or performance criteria under paragraph (a)(2), or that the licensee has established an alternate method of meeting its commitments to the station blackout rule and paragraph (a)(3) of the maintenance rule for emergency diesel generators.

03.03.d. Dispositioning From Paragraph (a)(2) to Paragraph (a)(1): Licensees who decide to establish performance criteria under paragraph (a)(2) of the maintenance rule would establish performance criteria for EDG reliability and EDG unavailability. The performance criteria for reliability could be, for example, no maintenance-preventable failures, or a maximum of one maintenance-preventable failure if it is followed by appropriate root-cause determination, corrective action, and subsequent EDG performance monitoring to assure the problem was resolved. Likewise, the performance criteria for unavailability could be set as a specific maximum number of unavailable hours, on a rotating 1-year basis. If either of the performance criteria is exceeded, then the licensee would be required to set goals and to monitor under paragraph (a)(1) of the maintenance rule. The regulatory guide (Ref. 1) endorses the example in NUMARC 93-01, section 12.2.4 (Ref. 2), which describes an acceptable method to establish EDG performance criteria and/or goals and subsequently monitor EDG performance.

The inspector should review the performance criteria established by the licensee and the performance history of the EDG to verify that the performance criteria were not exceeded, or, if they were exceeded, that goals were set and monitoring was performed in accordance with paragraph (a)(1) of the maintenance rule.

03.03.e. Implementing the Station Blackout Rule: The EDG reliability performance criteria or goals selected for implementing the intent of the station blackout rule (10 CFR 50.63) for coping with station blackout could be

(specific guidance 03.03.e. cont.)

monitored through the use of the triggers and monitoring methods described in Appendix D of NUMARC 87-00 (except for triggers and testing for "problem diesels" as described in section D.2.4.4) (Ref. 3). An acceptable unavailability goal could be to have fewer hours of unavailability (on a rotating 1-year basis) than the number of hours established as acceptable by the licensee.

The inspector should review the EDG reliability and availability commitments made by the licensee in response to the station blackout rule and verify that these commitments have been addressed by the licensee's implementation of the maintenance rule or that the licensee has established an alternate method of meeting its commitments to the station blackout rule and the requirements of the maintenance rule.

XXXXX-04 RESOURCE ESTIMATE[5]

XXXXX-05 REFERENCES

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

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

3. 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."

4. U.S. Nuclear Regulatory 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.

END

[5]The 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.