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June 26, 1992

MEMORANDUM FOR: Gary G. Zech, Chief
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FROM: Richard P. Correia, Chief
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SUBJECT: NRC DRAFT INTERIM INSPECTION PROCEDURE (IP) 62703, "MONTHLY
 MAINTENANCE OBSERVATION"

The enclosed is a draft revision of the "Monthly Maintenance Observation" inspection procedure IP 62703. This IP will be placed in the NRC public document room to make it available for review by interested parties. A public workshop will be held at the Holiday Inn Crowne Plaza in Rockville, Maryland on August 18, 1992, to provide the public and representatives of the nuclear industry the opportunity to comment on IP 62703. A Federal Register notice and press release will be issued to announce the meeting.

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INSPECTION PROCEDURE 62703

MONTHLY MAINTENANCE OBSERVATION

PROGRAM APPLICABILITY: 2515

62703-01 INSPECTION OBJECTIVE

To verify that maintenance activities for safety-related structures, systems, and components (SSCs) are being conducted in accordance with approved procedures, technical specifications (TS), and appropriate industrial codes and standards.

62703-02 INSPECTION REQUIREMENTS

02.01 Inspection Activities. The inspector should verify by making observations, conducting reviews, and interviewing maintenance personnel, that licensees' maintenance activities are performed in accordance with regulatory requirements. The inspector should inspect day shift and back shift maintenance activities, and attempt to balance the inspections among the various functional areas (i.e., mechanical, electrical, I&C,).

- a. Determine if the following licensee activities were conducted in a manner sufficient to assure that maintenance was effective:
 1. Ensured the operability of plant systems and components after the completion of maintenance.
 2. Properly tested and calibrated equipment before returning it to service.
 3. Properly returned to service any equipment being maintained and its associated system, including independently verifying the alignment of valves and breakers.
 4. Properly reassembled electrical equipment that is environmentally qualified after completing maintenance, surveillance, and testing.
 5. Utilized correct parts and tools.
 6. Fulfilled the requirements for preservice inspections and tests as stated in the American Society of Mechanical Engineers (ASME) codes after performing maintenance on systems and components subject to the codes.

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7. Used approved procedures which -- given the skills of the workers involved -- were adequate to achieve desired results, properly incorporated recommendations of the equipment vendor, and addressed special maintenance activities (including emergency contingencies) such as using a freeze seal or plug. Where necessary to ensure that critical work steps are performed adequately, procedures include appropriate quality control or independent verification hold points.
 8. Ensured that workers, including contractors, were sufficiently trained to successfully complete the activity and to take appropriate actions in the event of emergencies such as freeze seal failure. Ensured that contractors were supervised and monitored sufficiently to successfully complete the activity.
 9. Periodically reviewed the equipment history and maintenance records to identify repetitive failures or other adverse trends which may indicate ineffective or inadequate maintenance. Updated the maintenance history and trend records to reflect the maintenance activity.
- b. Determine if the following activities were conducted in a manner sufficient to assure the safety of personnel:
1. Obtained approvals and determined that appropriate safety tagout boundaries were established before initiating the work. The operations department and the maintenance workers communicated appropriately throughout the maintenance activity.
 2. Established and implemented appropriate ignition, fire prevention, and personnel safety controls.
 3. Established and implemented adequate radiological controls, including radiation work permits and appropriate as-low-as-reasonably-achievable (ALARA) reviews.
- c. Determine if the following activities were conducted in a manner sufficient to assure adequate control of plant risk and, where appropriate, compliance with Technical Specification requirements:
1. Avoided violating the limiting conditions for operation (LCO).
 2. Verified that redundant components or systems were operable in accordance with TS requirements.
 3. Took adequate special precautions to preclude a loss of shutdown cooling with the reactor coolant system in a partially drained condition.

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02.02 Maintenance Prioritization. Review outstanding job orders to determine that the licensee is giving priority to safety-related maintenance and has not allowed outstanding job orders to accumulate.

62703-03 INSPECTION GUIDANCE

GENERAL GUIDANCE

Goals

Inspection procedure IP 62703 is a core inspection procedure listed in Appendix A of NRC Inspection Manual Chapter (MC) 2515. Core inspection procedures emphasize the observation and evaluation of ongoing facility operations and supporting activities affecting the safety function of facility structures, systems and components. Core inspection procedures are intended to monitor licensees' activities and identify any adverse trends. Regional initiative and reactive inspection procedures, listed in MC 2515, Appendix B, can be used to further investigate trends or problems identified by the core inspection procedures.

MC 2515, Appendix A specifies a resource estimate of 15 hours per month to perform IP 62703. This estimate is based on recommendations of a task group of regional office and headquarters representatives. It is important for the inspector to understand that these estimates are not goals, standards, or limitations; rather they are included to assist in planning resource allocations, and will be revised periodically, as necessary. It is expected that actual hours required to complete this inspection procedure at a particular site may vary from the estimate. If an inspector believes that significantly more or less maintenance inspection hours are warranted at a specific site, regional management should be informed. The inspection program provides the Regional Administrator flexibility in the application of inspection resources to deal with issues and problems at specific plants.

Due to the need for the inspection program to cover a wide variety of inspection activities, the 15 hours per month allotted to IP 62703 may appear inadequate to cover all the inspection requirements listed in section 62703-02. However, the regions have the option of allocating additional inspection hours to follow up on suspected adverse trends or problems. The NRC inspection program covers only small samples of licensee activities in any particular area. It is not intended that the inspector verify every inspection requirement (62703-02) for every maintenance activity observed. The inspectors knowledge and experience should be used to select a sample of inspection requirements for review.

The inspector's goal should be to observe approximately four maintenance activities each month using the guidance in this inspection procedure. This should include observing some backshift maintenance activities. The inspector should not observe an insignificant maintenance activity just to meet the goal of observing four maintenance activities per month. If the licensee is not

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performing significant maintenance activities, the inspector should perform other inspection activities.

The inspector should consider safety significance when selecting maintenance activities for observation. Choose components that have experienced problems, such as those described in licensee event reports (LER); or activities, such as inadequate training or procedures that have resulted in maintenance problems. The plant-specific Probabilistic Risk Assessment (PRA) or Individual Plant Examination (IPE) can provide information on the safety significance of plant equipment. Appendix C to NRC Inspection Manual Chapter 2515 contains a list of risk-based inspection guides (RIGs) which provide inspection guidance for specific plants.

Inspection Priorities

The inspector should concentrate on inspection of maintenance activities rather than the program or procedures. The inspector may decide to observe only selected portions of maintenance activities. In those instances, the inspector may wish to discuss them with maintenance personnel to obtain information about aspects of the job that the inspector did not observe, including radiological controls, fire prevention controls, and materials used. The inspector should also question maintenance personnel to determine if they are familiar with their assigned maintenance task. If the maintenance activities are performed efficiently and the plant equipment runs reliably, the licensee's program and procedures will likely be adequate. However, if the inspector notes problems during the observations or if plant equipment is not reliable, the inspector may wish to further examine the licensee's program and procedures to determine the cause of the problems.

Troubleshooting Activities

"Troubleshooting" activities are maintenance activities and should be observed periodically. While observing troubleshooting activities, the inspector should give particular attention to the use of jumpers and the possibility of LCO violations. The inspector should also verify that the licensee has not removed equipment from service without proper authorization, has used approved procedures for the troubleshooting activity, and has properly restored the system to its normal configuration after completing the activity.

Post-maintenance verification

The licensee must follow procedures when verifying the proper return of equipment to service. The inspector should independently verify this action by performing the following:

- Observing the equipment in operation (instrument responding to changes in plant conditions)

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- Observing the tests performed on the equipment, providing they are performed with the system in a normal lineup or by independently verifying the alignment of the valve and switches.
- Verifying that any surveillance tests that might have been voided are performed once again.

Enforcement Options

When writing notices of violation for maintenance activities, the NRC normally cites requirements in the technical specifications or in Appendix B to Part 50 of Title 10 of the Code of Federal Regulations, (10 CFR Part 50). Failure to conduct an evaluation before departing from commitments in the FSAR may be a violation of 10 CFR 50.59. Failure to meet commitments in responses to Notices of Violation may be a violation of 10 CFR 50, Appendix B, Criterion XVI. Other failures to meet written commitments, not amounting to a violation of a requirement, contained in safety analysis reports (SAR), Licensee Event Report, or in a licensee's response to a notice of violation, NRC bulletin, or other licensee commitment would be subject to a notice of deviation.

The new maintenance rule, 10 CFR 50.65, contains maintenance requirements that will apply to safety-related equipment and certain balance-of-plant equipment. However, this rule does not take effect until July 1996. Inspectors are cautioned not to enforce the requirements of the new rule before that date. The NRC will provide the regions with regulatory guidance and revised inspection procedures before the effective date of the new rule.

Shutdown Risk

Non-routine activities and the unavailability of some equipment during shutdown increase the probability of complex events which challenge operators in unfamiliar ways. Some licensees have not rigorously considered accident sequences during shutdown operations, a practice which has resulted in instances in which instrumentation or emergency procedures could be unavailable or inadequate, and in which mitigative equipment could be unavailable.

The NRC has established relatively few explicit regulatory requirements which govern the licensee's activities during shutdown. Some plants have operability requirements in the technical specifications for equipment, while others do not. Licensees continue to report events occurring during shutdown conditions which affect their ability to remove decay heat. These events indicate the importance of carefully planning and coordinating anticipated outages of equipment, tests of systems and components, and plant conditions.

The inspector should consider the concerns associated with shutdown risk when observing maintenance activities. The inspector should examine the licensee's plans and procedures for controlling shutdown activities and ensuring that shutdown cooling is always available when needed. While inspecting maintenance activities, the inspector should examine the effect that maintenance activity might have on shutdown risk or the loss of shutdown cooling.

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The NRC issued the following communications to describe events of significance to safety which illustrate the need for increased attention by the staff of the NRC and the licensees: Generic Letter (GL) 88-17, "Loss of Decay Heat Removal," "IRFG-1410 "Loss of Vital AC Power and the Residual Heat Removal System During d-Loop Operation at Vogtle Unit 1 on March 20, 1990," Information Notice (IN) 90-55, "Recent Operating Experience on Loss of Reactor Coolant Inventory While in a Shutdown Condition," and IN 91-22, "Four Outage Events Involving Loss of AC Power or Coolant Spills."

The NRC addressed the issue of shutdown risk in NUREG 1449, "Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States," dated February 1992. The NRC plans to perform inspections using a temporary instruction (TI) titled "Shutdown Risk and Outage Management Inspection," scheduled for issue in October 1992. Inspection hours spent reviewing shutdown risk should be charged against the future TI rather than IP 62703.

Engineering Support

The results of the Maintenance Team Inspections indicated weaknesses throughout the industry in the areas of engineering support, root cause analysis, and the measurement of maintenance trends. Inspection findings included responsibilities for system engineers that were not well defined, inadequate root cause analyses that led to repetitive failures, and poor procedures for analyzing root causes. Weaknesses in the measuring of maintenance trends included not considering component significance in measuring trends, and engineering and system engineers not involved in trending. The inspector should examine these areas as part of the routine maintenance inspection activities and consider the need to request additional regional initiative inspections.

Systematic Assessment of Licensee Performance (SALP)

The inspections performed using IP 62703 typically provide the primary source of information for evaluating a licensee's performance in the maintenance area. The inspector should be familiar with the contents of NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance," (SALP) and understand what type of information will be needed to assemble meaningful SALP input. The inspector should routinely document observations and findings made during the SALP cycle to facilitate the preparation of meaningful input at the end of the cycle.

03.01 Specific Guidance

The specific guidance listed below provides additional information intended to clarify the inspection requirements listed in paragraph 02.01. The letter designations used below correspond to the letters used in paragraph 02.01 (i.e., paragraph 03.01a.1 provides specific inspection guidance for inspection requirement 02.01a.1).

- a.1. To assess the operability of the system and components selected, the inspector should review and assess the material condition, the availability of the system, engineered safety functions (ESF), and

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the results of surveillance and post maintenance tests. The inspector should review the list of outstanding work requests to help assess the operability of equipment, and to assess the adequacy of staffing levels and the capabilities of the plant staff.

- a.2 The inspector should determine that in testing equipment, the licensee tests all attributes of the equipment that may have been affected by the maintenance, and not just those that are tested by performing the surveillance test required in the technical specifications.
- a.3 The inspector should determine that activities for returning equipment to service follow the guidance provided by the staff in NUREG-0737, Item 1.C.6, "Guidance on Procedures for Verifying Correct Performance of Operating Activities."
- a.4 In June 1984, the Office for Analysis and Evaluation of Operational Data (AEOD) issued a report AEOD/C402, "Operating Experience Related to Moisture Intrusion in Electrical Equipment at Commercial Power Reactors." In this report, AEOD documented its study of the failures of environmentally qualified safety-related electrical devices in mild environments. Most of these failures resulted from moisture intrusion, which is often caused by the improper reassembly of enclosures following maintenance or surveillance activities. The inspector should determine that maintenance activities include adequate controls to ensure that vapor barriers, gaskets, and seals are restored to the environmentally qualified condition.
- a.5 No specific inspection guidance.
- a.6 The inspector should determine if the equipment being maintained is subject to the ASME codes. This can be done by questioning the licensee's engineering staff, or by reviewing the licensee's inservice inspection and testing programs. The inspector should verify that any required ASME code pre-service inspections or tests were performed as part of the maintenance activity.
- a.7 The inspector should determine that: licensee and contractor personnel have been properly trained in the use of freeze plugs; adequate emergency contingency procedures are available in the event a freeze plug fails; maintenance and operations personnel have been trained in the use of these procedures; and, that personnel at the site of the freeze plug maintain adequate communication with the control room. The IIRC has provided additional guidance on the use of freeze plugs in the Mechanical Section of Part 9900 of the inspection manual.

The inspector should verify that the licensee has established an adequate vendor interface program which includes:

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- (a) A program with the NSSS vendor as described in the Vendor Equipment Technical Information Program (VETIP), which covers all the safety-related components within the NSSS scope of supply. This program should include provisions for assuring receipt by the licensee/applicant of all technical information provided by the NSSS vendor; and
- (b) A program of periodic contact with the vendors of other key safety-related components not included in (a) above.

The vendor interface program should also take into account the requirements of 10 CFR Part 50, Appendix B which requires the licensee or applicant to be responsible for establishing and executing the quality assurance program.

While it is required for licensees to obtain and review vendor technical information, it is not required that all vendor recommendations be incorporated into the licensee's maintenance program. If after a technical review the licensee determines that a vendor recommendation is not appropriate, the licensee may decide to disregard it.

Additional information on this subject is provided in Generic Letter No. 90-03, "Relaxation of Staff Position in Generic Letter 83-28, Item 2.2 Part 2, 'Vendor Interface For Safety-Related Components,' dated March 14, 1990."

- a.8 Some maintenance activities such as non-destructive examination and welding have formal qualification requirements. If the maintenance task being reviewed involves these activities, then the inspector should verify that the personnel performing the activity are qualified. Other maintenance activities may or may not have specific qualification requirements. The inspector should question maintenance supervisors or management to determine if they have established any qualification requirements for the maintenance task being reviewed. If they have, the inspector should verify by reviewing qualification records, or by questioning the maintenance personnel performing the task, that these qualification requirements have been met.

Contract personnel, including those from nuclear steam supply system (NSSS) vendors, must conform to the same requirements as do plant maintenance personnel. Some contract personnel work directly for regular plant maintenance supervisors and supplement the regular plant maintenance staff. They are subject to oversight by plant quality assurance personnel. However, the licensee may contract with outside vendors to complete specific tasks and to provide their own quality assurance program. In those cases, the licensee must verify that the contractors have an adequate quality assurance program. The inspector should ensure that the licensee has audited

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the contractor's quality assurance program and that the licensee has determined that the contract personnel are following their own quality assurance requirements.

- a.9 While conducting monthly observations of maintenance practices, the inspector should review engineering support, root cause analysis, and maintenance trends. To find any weaknesses in these areas, the inspector should examine equipment and maintenance history records and other appropriate records such as licensee event reports for indications of repetitive failures.

The inspector should also verify that the licensee's engineering staff helped resolve technical problems encountered while performing maintenance activities and that the maintenance activity does not constitute an unauthorized design change.

- b.1 The inspector should attempt to verify that maintenance personnel have adequately coordinated the work with operations personnel. Verify that the maintenance personnel have obtained the necessary approval from the operations department (such as from the senior reactor operator (SRO)) on the work package or procedure; a requisite. Question the onshift plant operating crew to verify that the operators are aware of all continuing maintenance activities that might affect plant operation. This activity should include any activity that reduces the number of redundant safety systems available in the event of an accident, or any activity that could cause a plant trip or other transient.

b.2 No specific inspection guidance.

b.3 No specific inspection guidance.

- c.1 while verifying that the activities are not violations of the limiting conditions for operation (LCO), the inspector should determine if the activity involves a voluntary entry into an LCO. A number of licensees voluntarily enter technical specification LCO action statements as a matter of convenience to perform preventive maintenance. For example, some licensees voluntarily enter LCO action statements at the end of an operating cycle in order to begin outage work early, such as overhauling diesel generators.

On April 18, 1991, the NRC issued NRC Inspection Manual, Part 9900, "Technical Guidance," to provide guidance on voluntary entry into LCO action statements to perform preventive maintenance. In Part 9900, the staff stated that the NRC is only beginning to quantitatively study the significance to safety (risk) of the trend toward increasing the amount of preventive maintenance during power operation. Consequently, the NRC can not yet establish quantitative criteria by which the NRC or a licensee could determine the effect on safety that online preventive maintenance (PM) would have at a

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facility. Part 9900 provides temporary guidance to be used until studies of this issue are completed. Part 9900 allows for conducting PM activities while the plant is at power if the licensee expects the reliability of the affected equipment to improve in a manner that would decrease the overall risk to safe operation of the plant. Part 9900 provides some guidance on the means by which a licensee should be able to justify expecting improved safety. The inspector should closely examine the guidance provided in Part 9900 and contact NRC management if a licensee appears to exceed these guidelines. In a memorandum to the regional administrators on April 30, 1991, T. E. Murley offered the following direction: "The objective of the [Part 9900] guidance is to qualitatively convey the point at which NRC inspectors should become concerned regarding a licensee's on-line preventive maintenance practices. Such concerns should be discussed with NRC management before they are discussed with the licensee."

- c.2 No specific inspection guidance.
- c.3 Specific inspection guidance will be provided in a temporary instruction (TI) titled "Shutdown Risk and Outage Management Inspection" which is scheduled for issue in October, 1992. For further information, the inspector should refer to that document (when issued) and the discussion on shutdown risk provided in the general guidance section of this inspection procedure.

62703-04 RESOURCE ESTIMATE

The resource estimate for this inspection procedure is approximately 15 hours of direct inspection effort each month.

END