

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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SUBJECT: Responds to violations noted in Safety Sys Functional Insp  
 Rept 50-263/87-05.

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October 13, 1987

Mr H J Miller, Director  
Division of Reactor Safety  
US Nuclear Regulatory Commission Region III  
799 Roosevelt Road  
Glen Ellyn, Illinois 60137

MONTICELLO NUCLEAR GENERATING PLANT  
Docket No. 50-263 License No. DPR-22

Response to Safety System Functional  
Inspection Report No. 50-263/87005

On August 13, 1987, a report covering the Safety System Functional Inspection conducted during the period April 13 through May 1, 1987 was sent to us. This report noted violations and unresolved/open items as well as observations and conclusions made by the inspection team. The purpose of this letter is to provide our responses to the violations and unresolved/open items identified by the inspection team.

A thirty day extension of the schedule for responding to these items was granted by Mr G C Wright of your staff during a telephone conversation with Mr B D Day (NSP) on September 9, 1987.

Please contact us if you have any questions related to our response to the Safety System Functional Inspection Report.

C E Larson  
Vice President Nuclear Generation

c: Regional Administrator-III, NRC  
Sr NRR Project Manager, NRC  
Sr Resident Inspector, NRC  
G Charnoff

Attachment

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## SSFI VIOLATION RESPONSES

### VIOLATION 1 (263/87005-10)

10 CFR 50 Appendix B Criterion III, as implemented by the licensee's Operational Quality Assurance Plan revision 10, requires design control measures be provided for verifying or checking the adequacy of design, such as by the performance of design reviews, or by the performance of a suitable testing program.

Contrary to the above, the design calculations for the 250 volt DC batteries and instantaneous overcurrent relay setting for the core spray pumps were neither reviewed or approved nor was the system suitably tested to demonstrate its design intent.

### RESPONSE TO VIOLATION

Extensive testing has been done to demonstrate core spray and battery system performance. It is agreed, however, that required reviews were not properly documented on the design calculations and that the testing conducted does not fully address the design intent.

### CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

1. A letter has been sent to all site engineering personnel directing them to obtain a review on all safety related design calculations or perform suitable testing to verify adequacy of design.
2. Design calculations for the 250 volt DC batteries and instantaneous overcurrent relay settings have been reviewed.

### CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER VIOLATIONS

Controls will be enhanced to assure that all safety related design calculations are properly reviewed or that testing is done to verify adequacy of design.

### DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Enhancement of controls will be completed by March 31, 1988.

VIOLATION 2 (263/87005-08)

10 CFR 50 Appendix B Criterion III, as implemented by the Licensee's Operational Quality Assurance Plan revision 10, requires that design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design.

10 CFR 50.59 requires that a determination be made as to whether a change to the facility constitutes an unreviewed safety question prior to implementing the change.

Contrary to the above at an undetermined time the hold down mechanism for both torus access hatches, which are primary containment boundaries, was modified without a 50.59 review or the appropriate design control measures being implemented.

RESPONSE TO VIOLATION

It is believed that the substitution of hatch fasteners occurred several years ago and that improvements made to the modification process reduce the likelihood of similar occurrences.

CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

1. Safety Evaluation of the as found configuration was performed and concluded that the situation did not constitute an unreviewed safety question.
2. Hold down mechanism for both hatches has been replaced with materials specified in the original design drawing.
3. Procedure for securing torus hatch covers has been revised to include verification of proper bolting materials.
4. Inspection of bolt-head to cover contact was performed when new materials were installed. The bolt-head to cover areas on the southwest torus access hatch cover did not exhibit any damage attributable to point loads.
5. Inspection of containment closure fasteners, which included the CRD hatch, drywell seismic restraint inspection ports, torus drain flanges, and TIP system penetrations, was performed and all fasteners were found to be installed per design. Inspection of the drywell equipment hatch revealed that three fasteners out of eight did not appear to be the originally installed fasteners and verification of the exact material composition could not be made. Evaluation of the situation assuming all fasteners were made of the lowest strength material that is commercially available determined that the fasteners would not be over stressed under any design condition. Replacement drywell equipment hatch fasteners have been ordered.

CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER VIOLATIONS

1. Drywell equipment hatch closure fasteners will be replaced with fasteners of the proper material.
2. Inspection of closure fasteners for the drywell head and drywell head manway will be performed to verify that they are installed per design.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

All corrective actions will be completed by the end of the 1987 refueling outage provided materials for the drywell equipment hatch are available.

VIOLATION 3 (263/87005-15)

10 CFR 50 Appendix B Criterion VI, as implemented by the licensee's Operational Quality Assurance Plan revision 10, requires that documentation, and changes thereto, affecting quality be reviewed for adequacy.

10 CFR 50 Appendix B Criterion V, as implemented by the licensee's Operational Quality Assurance Plan Revision 10, requires that drawings and procedures which affect quality to be appropriate to the circumstances.

Contrary to the above, numerous plant specifications and drawings were found to be neither appropriate nor properly reviewed for adequacy.

Examples included:

- a. Specification MPS 275 had been superseded by MPS 351. MPS 275 was neither marked as superseded nor had it been removed from the files.
- b. HPCI Elementary Diagram 729E816 sheet 6, Rev G did not reflect the actual circuit wiring for valve MO-2071.
- c. Core Spray system Elementary Diagram NX-7833-21-2, Rev M was not updated to incorporate modification 85Z019.
- d. RHR system Elementary Diagram NX-7905-46-2, Rev. F did not properly indicate a relay contact development for a core spray interlock.
- e. Core Spray system Piping and Instrument Drawing NH-36248, Rev. Q was not updated to fully reflect modification 85Z019.
- f. Maintenance Procedure MT-PP7.54, for core spray pump breaker 152-505, was not consistent with latest system design.

RESPONSE TO VIOLATION

Specifications: Specifications were identified that had been superseded but were not designated as such in the Specification Control System. Current practice at Monticello has been to maintain all specifications in the Specification Control System for consideration as design input when performing modifications. Specifications "superseded" by later revisions or other specifications may still be applicable to installed equipment. Identifying those documents as "superseded" could be misleading to users. When performing modification activities, users must review all specifications that may apply and determine which, if any, apply to the modification and if new specifications may be needed.

Drawings: Drawing discrepancies of the type similar to those cited in the violation had been previously identified in an NSP QA audit and were addressed in a Finding (FG 87-1). Corrective actions identified for this area had been previously initiated in response to that finding.

FSAR/USAR: USAR discrepancies of the type identified are believed to have occurred in the transition from the PSAR to the FSAR and were not identified at the time of USAR preparation. This type of error would not be identified during subsequent modification activities unless that specific section was involved. It is felt that current USAR controls are effective in assuring the USAR is updated when modifications are made.

Maintenance Procedures: Information in the report text referencing maintenance procedure MT-PP7.54 identified an inconsistency (i.e., acceptance criteria and step sequencing) with MT-PP7.63. These differences do not relate to an inconsistency in system design. Acceptance criteria should have been upgraded; however, the original acceptance criteria were adequate. Consistency of procedure step sequencing for redundant equipment is not a requirement of our administrative controls. Each procedure is considered on its own merit as subsystem differences may lead to unique considerations.

#### CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

Specifications: A memorandum has been issued to users of Monticello Specifications to recognize that all specifications applying to given equipment must be reviewed to determine applicability for modification activities.

Drawings: Drawing changes for the discrepancies identified have been submitted, except for the following two situations:

- A. NX 7833-3, Rev. B, August 11, 1986 - Core Spray Functional Control Diagram. This drawing was not updated to show the revised control logic, including bypassing the automatic initiation functions, with the addition of the alternate shutdown system (Mod 85Z016). Currently, Functional Control Diagrams are Class 2 drawings. Class 2 drawings are not considered essential to safe and reliable plant operation and are not required to be updated.
- B. NF 36177, Rev. E, November 1986, Single Line Meter and Relay Diagram, 4160 - Volt System Buses No. 13, 14, 15, and 16. This drawing was not updated since the 700 HP motor installed with modification 82M098 is being replaced during the Fall 1987 outage with a 600 HP motor as identified on the drawing.

An interim control on use of drawings has been established with issuance of a memorandum to operations and engineering personnel. This memorandum requires verification of as built configuration whenever feasible when performing engineering reviews or when modifying circuits.

Corrective action identified for Finding FG 87-1 included the initiation of a project to perform as-built reconciliation of Class 1 electrical drawings. That project has been initiated. Procedures and controls are currently being developed. It is felt this will take several man years to

complete and a detailed schedule is being developed. Aspects of this reconciliation that involve panels associated with the Control Room Design Review effort will be completed with that effort.

FSAR/USAR: The checklist (Form 3028) used for the periodic review of operations manual sections has been revised to identify that the USAR section is to be verified correct during the periodic review.

#### CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER VIOLATIONS

Specifications: An upgrading of Configuration Management Controls is being pursued and will address specifications. Combining applicable specifications and then deleting the specifications superseded through this effort will be considered.

Drawings: Appropriate Administrative Controls Documents will be revised to:

- a. Require verification of as built configuration whenever possible when performing engineering reviews or modifying circuits. As built verification will include comparing independent drawings and checking terminal strip configuration.
- b. Ensure that all personnel understand their responsibility to identify drawing discrepancies so that corrective actions can be taken.
- c. Require second level review of drawing changes.

FSAR/USAR: The USAR will be reviewed to assure it is correct with system installation and that the associated Operations Manual section is consistent with the USAR.

Maintenance Procedures: Procedure MT-PP7.54 will be revised to specify acceptance criteria similar to MT-PP7.63.

#### DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Specifications: The approach to take with Specifications with upgraded Configuration Management Controls will be determined by March 31, 1988.

Drawings: Revision of the Administrative Controls Documents will be completed by November 30, 1987.

FSAR/USAR: The biennial review cycle to assure the USAR is correct will be completed December 31, 1989.

Maintenance Procedures: Procedure MT-PP7.54 will be revised by October 30, 1987.



VIOLATION 4 (263/87005-20)

Technical Specification 6.5.A requires procedures for coping with emergency conditions involving potential or actual releases of radioactivity.

Technical Specification Section 6.5.C requires preventive or corrective maintenance procedures for plant equipment and systems that could have an effect on nuclear safety.

10 CFR 60 Appendix B Criterion V, as implemented by the licensee's Operational Quality Assurance Plan Revision 10, requires that procedures affecting quality be appropriate to the circumstances.

Contrary to the above, the procedures listed below were not appropriate to the circumstances.

- a. The Emergency Operating Procedures (EOP's) did not reference opening within one hour, two manually operated valves in the Emergency Service Water System which is required for extended operation of all Emergency Core Cooling (ECCS) pumps.
- b. Procedures for motor operated valve preventive maintenance involving lubrication controls:
  - (1) The valve stem thread lubrication on MO-2106 was dry. The licensee had no apparent procedure for periodic lubrication of valve stems.
  - (2) The limit switch gears in MO-2106 appeared to be lubricated with mixed grease. The licensee's procedure did not caution against use incompatible grease nor was there a program for evaluating greases for compatibility.
  - (3) Upper bearing grease zerks on valves were not being used for lubrication of the upper bearing as specified by Limitorque.
  - (4) The procedure does not address the compatibility of grease added to the upper bearing zerk, versus that used in the gear case. Since grease added to the zerk fitting joins that in the gear case, the potential exists to have incompatible greases mixed in the gear case.

RESPONSE TO VIOLATION

Steps to open the Emergency Service Water (ESW) valves did exist in the event specific Abnormal Operating Procedures (AOP's). However, because the situation in this violation involves a unique case where operator action is needed to assure continuation of safety system design function it is agreed that a procedural inadequacy existed.

The EOP's are symptom based, high level procedures which cannot and should not contain all actions needed to respond to specific events. It is required that EOP's, AOP's and system operating procedures be followed and executed concurrently. Actions have been taken to assure that this requirement is reinforced in operator training.

This situation (i.e., requiring operator action to open these valves) is temporary in that a modification to the system is planned which will eliminate the need to open the valves.

Mobil Corporation was contacted concerning the mixing of limit switch greases, Mobil 28 and Beacon 325. Mobil responded with a letter stating that these particular greases are compatible and can be mixed with no detrimental effects.

#### CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

1. The EOP's were revised to remind the operators to open the ESW valves when the normal service water system is lost.
2. A review of abnormal operating procedures and temporary operating manual changes has been conducted to determine if other unique, currently identified situations exist where special steps are needed to assure continuation of safety system design function under design basis conditions. Appropriate procedures have been revised as necessary.
3. The preventive maintenance procedure for Limitorque motor operated valves has been revised to include a step to clean and lubricate the valve stem, visually inspect the grease to insure greases are not mixed, insure the top drive sleeve bearing is adequately greased using the Zerk fitting and to include a table attached to each procedure which identifies the type of grease to be used in each specific Limitorque motor operator.

#### CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER VIOLATIONS

Administrative controls will be enhanced to ensure that EOP's are considered when procedure changes are prepared which require operator action to ensure safety system design function.

#### DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Administrative controls will be enhanced by March 31, 1988.

## VIOLATION 5 (263/87005-25)

10 CFR 50 Appendix B Criterion XVI, as implemented by the licensee's Operational Quality Assurance Plan revision 10, requires that measures be established to assure that conditions significantly adverse to quality are promptly identified and documented, the cause of the condition identified and documented, and the corrective action be documented.

Contrary to the above, the licensee failed to take corrective action after identifying that the installed motor for core spray valve MO-1750 was not properly reflected by the drawing. This resulted in an undersized fuse being installed in the valve breaker (4327). Further, documentation of as found problems, the cause of the problem, and corrective actions taken were not being documented.

### RESPONSE TO VIOLATION

The SSFI report indicates that the NRC team identified the problems associated with MO 1749 and MO 1750. In fact, these problems were identified and interim corrective actions implemented before the NRC team arrived on site. The NRC team was informed of these problems during the inspection and was provided a copy of Engineering Evaluation 87-027 which documented the problem and final corrective actions. Final corrective actions were implemented during the inspection.

MO 1749 and MO 1750 are the test return valves for the "A" and "B" Core Spray systems respectively. The safety function of these valves is to close automatically during a Core Spray initiation so that the full capacity of the system is directed to the reactor vessel.

In March of 1985, a drawing discrepancy associated with these valves was identified. The drawings indicated that the motor operator was rated at one horsepower when, in fact, the motor is rated at five horsepower. Evaluation of this discrepancy revealed that the motor line fuses were undersized so that locked rotor current could not be sustained for five seconds as required by the Core Spray specification. This condition reduces the likelihood that the safety function of the valves can be performed.

Resolution of this problem was not given immediate priority because of the following factors:

1. These valves have a history of successful performance during monthly surveillance when they are tested under conditions which duplicate their safety function (i.e., operating continuously in the close direction under conditions of full system differential pressure). The line fuses have opened on two known occasions after being repeatedly subjected to motor starting current (i.e., while jogging the valve). This is more severe duty than would likely be experienced during a safety actuation.
2. The probability of a Core Spray system initiation occurring while the system is in the test mode is low. Since only one train of Core Spray is tested at a time, this condition, by itself, could not affect the availability of the Core Spray function.

Actions are being taken to improve responsiveness to such concerns. The engineering staff is currently being augmented by contract personnel and the size of the permanent staff is being increased. Assignments which deal with system operability are designated as Priority One and schedules for their completion are subject to management review and approval. The need to consider a justification for continued operation (JCO) and compliance with licensing requirements when conditions affecting operability exist has been emphasized.

#### CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

1. The line fuses for MO 1749 and MO 1750 were resized to ensure proper coordination with the motor thermal overloads so that the Core Spray valve specification was met.
2. The problems with MO 1749 and MO 1750 and the corrective actions taken were documented in Engineering Evaluation 87-027.
3. Maintenance personnel were instructed to provide more detailed written documentation of the cause of problems and work performed.

#### CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER VIOLATIONS

1. The work control process and the training program will be upgraded as needed to ensure proper documentation of investigations, repairs, and cause of component failures.
2. Discussion of the need to consider JCO and licensing requirements when problems are identified which affect system operability will be added to the technical staff continuing training program.

#### DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

1. Necessary improvements to the work control process and the training program will be completed on the schedule committed to in our response to Violation #7.
2. The technical staff continuing training program will be revised by December 31, 1987.

## VIOLATION 6 (263/87005-28)

10 CFR 50 Appendix B Criterion V, as implemented by the licensee's Operational Quality Assurance Plan revision 10, requires that procedure affecting quality include appropriate acceptance criteria.

Technical Specification Section 6.5.C requires procedures for calibration of instrumentation that could affect the nuclear safety of the plant.

Administrative Control Document 4 ACD-6.4, "Calibration and Control of Inspection, Measuring and Test Equipment" requires that a calibration record include both calibration accuracy and "as-found/as-left" data.

Contrary to the above "as-found" data was not recorded of three IRD Model 306 vibration meters and, neither "as-found" nor "as-left" accuracy acceptance criteria was specified for four measuring and test equipment pressure gauges maintained by Operations Engineering.

### RESPONSE TO VIOLATION

IRD, the vibration monitoring equipment manufacturer, who also performs the calibration, was contacted concerning the "as found" data. The result was that past data were not maintained in their records and could, therefore, not be obtained. When sending vibration equipment to IRD under the current purchase order it is now required that the vendor supply "as found" data.

The team pointed out in paragraph 4.3.2 of the report, that the Section XI accuracy requirement for vibration equipment is  $\pm 5\%$  and that three meters were calibrated to  $\pm 11\%$ . A review of past test results with an 11% correction factor added indicated that plant equipment would still be within acceptance criteria. New vibration equipment with accuracies better than  $\pm 5\%$  have been procured.

When "as found" and "as left" accuracy tolerances are not specified on calibration data sheets, calibration procedures require that a 1% default acceptance criterion be used. A determination was made, however, of the appropriate accuracy acceptance criteria for the four pressure gauges. The calibration data sheets have been revised accordingly.

### CORRECTIVE ACTIONS AND RESULTS ACHIEVED

1. The Section XI test procedures have been revised to require the use of vibration monitors with an accuracy of less than or equal to  $\pm 5\%$ .
2. The calibration data sheets have been revised to include "as found" and "as left" acceptance criteria.
3. The Operations Engineering measuring and test equipment has been properly identified and labeled.

CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER VIOLATIONS

1. The calibration purchase order to IRD will be revised to require that the Certificate of Calibration for each vibration monitor include "as found" data.
2. A review of the calibration program for Operations Engineering test equipment is underway to compare the program to plant Administrative Control Directives and ensure compliance with all requirements.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

1. The revised purchase order with IRD for calibration of the vibration monitors will be in effect January 1, 1988.
2. Review of the Operations Engineering test equipment program will be complete no later than June 30, 1988.

VIOLATION 7 (263/87005-24)

10 CFR 50 Appendix B, Criterion XI requires that a test program be established to assure that all testing required to demonstrate that systems and components will perform satisfactorily is performed.

Contrary to the above, the licensee has not established a post maintenance test program which will assure that the system or component will perform satisfactorily as evidenced by the lack of post maintenance review prior to specifying testing requirements.

RESPONSE

System engineers are currently required to identify post maintenance testing during review of planned work. This requirement is established in current provisions of 4ACD-15.4, Work Request Authorization (WRA) Processing, as follows:

- 6.5.7 The system engineer shall review WRA's used as maintenance procedures involving safety related equipment to assure:
1. Post maintenance operability testing is included in the WRA.
  2. Operability testing demonstrates that the equipment is capable of performing its safety function before being returned to service.
  3. Operability testing satisfies technical specification testing requirements and operability criteria.
  4. Technical manuals, vendor information, and engineering recommendations have been considered for testing recommendations.
- 6.5.8 When reviewing WRA's used as maintenance procedures involving safety related equipment which reference surveillance procedures for post maintenance operability testing, this review shall assure that the WRA, together with the surveillance procedure, satisfy the above requirements.

The processing identified above has generally resulted in adequate identification of post maintenance testing requirements as demonstrated by past equipment performance. However, it is recognized that testing specified for WRA's in which work activities are not specifically identified may be inadequate with the above processing. Accordingly, a system engineer review for proper specification of post maintenance testing after work is completed for those WRA's can provide an improvement in the identification of testing.

It is also recognized that maintenance personnel observe the running of equipment after maintenance and do various observations based on their training to assure equipment is performing satisfactorily. Many of these observations are basic to their training and would not be specified as testing requirements. However, it is prudent that these observations be documented to substantiate acceptability of maintenance conducted.

#### CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

1. Discussions were held to make system engineers aware of the potential weakness of WRA's in which testing is specified prior to performance of the work. These discussions emphasized the need to be aware of the maintenance conducted and to assure testing identified is adequate to assure operability of the equipment.
2. Discussions were also held with maintenance personnel, as addressed in response to Violation #5, to address documentation of work completed and of the observations they made during initial operation of equipment.

#### CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER VIOLATIONS

1. Provisions will be added to 4ACD-15.4, WRA Processing, to require holds for system engineer review of WRAs which are not specific in scope to assure that post maintenance testing is consistent with work performed.
2. Provisions similar to the above will be established in the ACD on Procedure Content (4ACD-15.3) to address procedure controlled activities in which flexibility in work to be conducted is provided and post work review for adequacy of testing is prudent.
3. Guidance will be developed for reference by the system engineers for identification of appropriate post maintenance testing.
4. Provisions will be added to 4ACD-15.4, WRA Processing, to require review of completed WRAs by maintenance supervisors and by system engineers to assure completed work and testing is adequately documented.
5. Provisions will be added to 4ACD-15.4, WRA Processing, to establish independent review of post maintenance testing results to assure testing was adequate and had acceptable results.
6. System engineers and job/responsible supervisors will receive training on their involvements with the revised processing specified above.
7. Surveillances will be conducted by plant Quality Assurance to review adequacy of documentation provided on completed WRAs.



DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Revisions to ACDs specified in 1, 4, and 5 above will be completed by November 30, 1987. Revision to the ACD specified in 2 above will be completed by December 31, 1987. Implementation of revised provisions is expected by January 31, 1988.

A system for developing guidance for post maintenance testing will be initiated by January 1, 1988. Identification of specific testing guidance for various maintenance activities will be an ongoing effort as appropriate guidance is developed.

Training on these revised provisions and on the proper documentation of work and testing will be completed by March 31, 1988.

QA surveillances with appropriate followup actions will be conducted on at least a monthly basis and will continue until an acceptable level of work and testing documentation is achieved.

VIOLATION 8 (263/87005-34)

Technical Specification 6.2.B.4.h required the Operations Committee to review, "All procedures required by these Technical Specifications."

Technical Specification 6.5 required, "Detailed written procedures, including the applicable checkoff lists and instructions, covering...surveillances, and testing requirements that could have an effect on nuclear safety.

10 CFR 50, Appendix B, Criterion 5 requires, as implemented by the licensee's Operational Quality Assurance Plan revision 10, activities affecting quality shall be prescribed by documented instructions, procedures,...of a type appropriate to the circumstances...".

Contrary to the above, the following surveillance procedures and checkoff lists were not reviewed adequately by the Operations Committee to assure they were appropriate to the circumstances for which they were issued:

- a. Alarm Procedure 3-A-22, Page B.3.1-0017.80, of the Core Spray Operations Manual stated as response to the "Core Spray Pump 11 Lockout" to close "MO 1751 and MO 1752" in lieu of "close MO 1751 and MO 1753."
- b. Alarm Procedure 3-B-15, Page B.3.1-0018.00, of the Core Spray Operations Manual stated as response to the "Core Spray Pump 12 Lockout" to close "MO 1752 and MO 1752" in lieu of "close MO 1752 and MO 1754."
- c. Steps 3 and 20 of test Procedure No. 0255-03-III required an indicated system pressure of  $\geq 10$  psi in lieu of  $\geq 30$  psi prior to starting a core spray pump to prevent water hammer.
- d. The "Reactor Building Daily Checksheet," Form No. 2009, Revision 14 gave a minimum value of 10 psig for the pressure in the keep fill system on the core spray pumps. This was too low to prevent water hammer while operating the system.
- e. The "Reactor Building Daily Checksheet" did not provide for a periodic check of the oil in the core spray pump motors during daily round checks.

RESPONSE TO VIOLATION

Recent improvements to the procedure review process (e.g., definition of independent review requirements and implementation of a user review) will help prevent such problems.

CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

1. Operations Manual B.3.1 has been revised to correct the errors identified in items (a) and (b) of the violation.
2. Test Procedure 0255-03-III was revised to correct deficiency noted in item (c).

3. The Reactor Building Daily Checksheet was revised to include the correct pressure required for the keep fill system and a check of the core spray pumps oil level during daily rounds in response to items (d) and (e).
4. A memorandum from the plant manager was sent to all procedure reviewers to emphasize the importance of complete and conscientious reviews of all procedures.

CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER VIOLATIONS

No further actions are needed.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

All necessary corrective actions have been completed.

VIOLATION 9 (263/87005-33)

10 CFR 50.55a(g) requires the implementation of an inservice testing program per the requirements delineated in the applicable edition of Section XI of the American Society of Engineers' Boiler and Pressure Vessel Code, unless specific relief is granted by the Commission. The version of the Code currently applicable to Monticello is the 1977 Edition through and including Summer 1978 Addenda.

Contrary to the above, the licensee failed to implement an inservice testing program per the requirements as indicated below:

- a. IWP-3300 in Section XI requires the yearly monitoring of bearing temperatures from which the licensee has requested relief for the core spray pumps, stating that the mechanical condition of the pump would be assessed by using vibration data. Contrary to this, the vibration data for the pump thrust bearing, located in the motor housing, was excluded from evaluation in the test procedure.
- b. IWP-3110, 3210, and 4500 in Section XI prescribe pump vibration testing requirements from which the licensee requested relief. The licensee had proposed alternate testing, including a table of allowable vibration limits, using vibration velocity and comparing periodic readings to initial test data used as reference values. Contrary to this, the licensee chose high, fixed vibration limits for test evaluation that had no relation to previous pump performance.
- c. IWP-3100 in Section XI requires fixing either pump flow or head at its reference value and then comparing the measured values of the "non-fixed" parameters to their reference values according to Table IWP-3100-2. Contrary to this, the test procedure allowed both flow and head to vary around their reference values, which fails to limit test criteria within bounds intended by the code.
- d. IWV-3412 in Section XI requires stroking valves that provide an active safety function. Contrary to this, valves CST-104-1 and CST-96 were not included in the valve test program to verify their safety-related closure capability.
- e. Code Interpretation XI-1-79-18 is an ASME published interpretation of the intent of IWV-3300 requiring the verification of remote valve position indications against actual valve operation. Contrary to this, the licensee has not included the position indication verification of accessible valves in their program.

RESPONSE TO VIOLATION

With respect to item a, it is noted that the vibration measurement was being taken during monthly pump testing and was being reviewed by the system engineer; however, acceptance criteria were not called out in the procedure.

CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

1. Core Spray pump procedure 0255-03-III has been revised to correct the deficiencies noted in items a and b.

2. Core Spray pump procedure 0255-03-III has been revised to require a fixed value of flow. When sufficient data are accumulated using this procedure, reference values will be specified.

CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER VIOLATIONS

1. The inservice testing program and implementing procedures will be reviewed and updated to ensure compliance with ASME Section XI and applicable code interpretations or with specific relief requests that have been granted or requested. The update will include improvement of the vibration monitoring program, addition of pressurizing station check valves (e.g., CST-104-1 and CST-96), remote position indication verification of accessible valves, and a process for considering new code interpretations.
2. Pressurizing station check valves will be tested in accordance with ASME Section XI.
3. Remote position indication verification of accessible valves will be performed.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

1. Review and update of IST Program and implementing procedures will be completed by December 31, 1988.
2. Testing of pressurizing station check valves will be completed during the 1987 refueling outage.
3. Remote position indication verification of accessible valves will be completed during the 1987 refueling outage.

VIOLATION IDENTIFIED IN SECTION 4.5.c

The Team reviewed reports on QC surveillances performed on the core spray system by the Quality Engineering QC inspectors from 1980 through 1986. The Team noted that when nonconforming items were identified, the QC inspector would document and inform someone of the problem; however, there was no documentation to indicate that a follow-up by the QC inspector had been performed to verify that proper corrective action had been completed. The same type of problem was identified in an audit of the Monticello Plant QC inspection program performed by Nuclear Operations QA auditors during January and February, 1987, and documented in Audit Report No. AG 86-65-9. The audit report identified that there was no documentation to indicate that proper corrective action had been completed for several nonconformance items identified in the audit report. The licensee was in the process of formulating corrective action regarding follow-up on nonconforming items. This is considered a violation for which no citation will be issued in accordance with 10 CFR 2, Appendix C, Section V.A.

CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

Plant administrative control documents 4 ACD-2.3, Plant Inspection Program, and 4 AWI-2.3.1, Plant QC Inspections, have been revised to require that documentation of nonconforming items indicate follow-up/corrective actions.

CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER VIOLATIONS

No further action is required.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Full compliance has been achieved.

SSFI OPEN ITEM RESPONSES

OPEN ITEM (263/87005-01)

Net Positive Suction Head for Core Spray Pumps

Technical Specification 3.5.A.4 requires that each division of the Core Spray System be capable of delivering 3020 gpm to the reactor core with the reactor pressure at 130 psi above torus pressure.

At the time of the inspection, the licensee had no analysis which showed that the Core Spray System has sufficient NPSH for all design and emergency conditions. Although the licensee had performed two calculations which address NPSH, neither addressed the specific design basis conditions for the plant. It is noted that the licensee's calculations might have been more conservative than the design basis condition.

RESPONSE

The Net Positive Suction Head Available (NPSHA) for all design conditions was evaluated by General Electric. The evaluation found that sufficient NPSH was available for the Core Spray pumps under design conditions. Emergency operating procedures control post-LOCA drywell depressurization to assure adequate NPSH is maintained.

OPEN ITEM (263/87005-02)

Basis for Core Spray System Surveillance Test Acceptance Criteria

As described previously, the Core Spray System must be capable of delivering 3020 gpm to the reactor core with the reactor pressure at 130 psi above the torus pressure. This capability is intended to be verified monthly per Surveillance Procedure No. 0255-03-III, Revision 8. At the time of the inspection there was indication that the acceptance criteria in this procedure were incorrect, and there was no verified and approved analysis to show what the correct acceptance criteria were.

RESPONSE

Surveillance test acceptance criteria have been determined by General Electric. These criteria have been incorporated into monthly surveillance tests. The Core Spray System has been tested and found to meet these criteria when instrument inaccuracies are taken into account.

An evaluation by General Electric indicates that Appendix K acceptance criteria can be met with core spray delivering significantly less flow than the Technical Specification requirement. It is, therefore, believed that Technical Specification performance criteria include sufficient margin to take these possible inaccuracies into account. General Electric is being consulted to determine the original basis for the Technical Specifications. Based on results of this evaluation, a determination will be made regarding the need to permanently incorporate criteria which account for expected instrument accuracy.

OPEN ITEM (263/87005-03)

Potential for Water Hammer Due to Draining of System

As a part of the licensee's monthly surveillance testing of the Core Spray System (Procedure No. 0255 03 IA, Part 1), the stroke times of the full flow bypass valves MO 1749 and MO 1750 are verified by opening and closing the valves. This evolution is performed with the core spray pumps not running which allows water in the upper portions of the core spray piping to drain down into the torus through these valves, leaving the piping empty. Upon closure of the valves, the Condensate Service Water System begins refilling the piping through the keep filled stations. However, this refilling process takes approximately 30 minutes, per the licensee, during which time the system is vulnerable to water hammer if the pump(s) were to start. Water hammer has the potential of damaging or incapacitating the system. Additionally, since both divisions of the system are normally tested in quick succession by the same procedure, the situation could exist in both divisions at the same time. This situation was recognized by the licensee.

RESPONSE

The inservice testing program has been changed so that MO 1749 and MO 1750 are only cycled during cold shutdown. The surveillance test has been revised so that the valve is cycled only while the pump is running. This will prevent draining of the Core Spray System during periods the system is required to be operable. A review of other ECCS systems for similar concerns was performed and changes were made to the applicable procedures.

OPEN ITEM (263/87005-04)

Potential for Water Hammer Due to Incomplete Venting

The core spray system piping cannot be properly vented during filling since there are no high point vents provided on the piping. Although some venting can be accomplished through drain and test connections located high in the system, the piping cannot be completely vented and, therefore, cannot be completely filled. In this condition there is the potential that water hammer can occur.

RESPONSE

The test and drain connections that are used as vents are in the horizontal run of pipe that is the high point in the system outside the drywell. Because of this orientation, the amount of air that is in the system is small. Years of operating experience with this configuration has resulted in no evidence of water hammer. A similar configuration exists in the RHR system.

It is planned to improve the high point vents in these systems.



OPEN ITEM (263/87005-05)

Isolation of Overpressure Protection Devices

USAS Power Piping Code B31.1-1967, to which the Monticello Plant was built, Section 122.6.1, requires that "there shall be no intervening stop valves between piping being protected and its protective device or devices." Contrary to this requirement, Isolation Valves CST-150 and CST-151 were discovered between the Condensate Service System piping which supplies water to keep the core spray system piping filled and the relief valves, RV-2470 and RV-2471, respectively, which provide protection for the piping.

RESPONSE

Upon discovery of this concern, isolation valves CST-150 and CST-151 were immediately locked open. It is planned to remove these isolation valves during the 1987 outage. All safety related systems have been reviewed and no similar relief valve isolation concerns were found.

Isolation valves CST-150 and CST-151 were part of the original plant configuration. The modification process requires codes and standards to be considered in the design. These requirements will prevent this from happening in the future.

OPEN ITEM (263/87005-06)

Containment Isolation

The RBCCW system provides cooling water to the drywell cooling units and the recirculation pump seals, both non safety-related loads. Supply and return lines for the water penetrate the primary containment at two locations. Single containment isolation valves are provided at each of these locations. The system is non safety-related and all of the piping is non-safety, non-Q, non-seismically designed except at the containment penetrations.

The basic criteria to which the Monticello Plant was designed are contained in the Federal Register, Volume 32, No. 132, Tuesday, July 11, 1967. Criterion 40 of this document states that "protection for engineered safety features (such as primary containment) shall be provided against the dynamic effects and missiles that might result from plant equipment failures." Criterion 53 states that "penetrations that require closure for the containment function shall be protected by redundant valving and associated apparatus."

The Reactor Building Closed Cooling Water (RBCCW) system inside the containment, while closed to the containment environment during normal operation, cannot be considered a part of the containment boundary because it is not protected as required by Criterion 40. Isolation of the containment by redundant isolation valves, as required by Criterion 53, is not met either because only single valves are provided at each penetration and automatic closure is not provided.

## RESPONSE

This open item deals with the issue of whether or not the original design for the Reactor Building Closed Cooling Water (RBCCW) containment isolation provisions is adequate. This is a generic issue that has been previously reviewed and resolved. Review of containment isolation provisions for all containment penetrations was performed in accordance with Item 2.1.4 of NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short Term Recommendations", July, 1979. Our existing configuration was found acceptable and this is documented in a March 21, 1980, letter from Mr. T. A. Ippolito, NRC, to Mr. L. O. Mayer, NSP. The BWR Owners Group reviewed this issue as part of NUREG-0737 Item II.E.4.2. The conclusions of the BWROG on the RBCCW isolation provisions supports the adequacy of our existing configuration.

### OPEN ITEM (263/87005-07)

#### Seismic Qualification of RHR Pump Motor Replacement

In 1982 the 600-horsepower No. 11 RHR pump motor failed. It was replaced with a larger 700-horsepower motor that was not originally purchased for nuclear application.

As part of the replacement, a seismic analysis was performed on the motor and some of the associated equipment. The analysis was deficient in some respects.

## RESPONSE

1. As stated in the description of this item, reanalysis was performed with the new heavier motor weight and all areas addressed in the original design change were found to be acceptable.
2. Nutech Engineers was contracted to perform an analysis of the seismic effects on the pump case. This analysis has been completed and the stresses in the pump casing due to seismic loads were found to be well within the Code allowable stresses.
3. Bechtel Engineers performed an analysis to evaluate the effect of the increased motor weight on the pump foundation bolts. This evaluation showed the loads on the bolts are within the allowables.
4. An analysis was performed to evaluate the operability of the pump/motor assembly during a seismic event with the heavier motor installed. The analysis showed that the pump/motor assembly is operable during a seismic event.

An addendum to the design change package that installed the replacement motor will be written to formally document the additional evaluations that were done.

OPEN ITEM (263/87005-09)

Q-List for Regulatory Guide 1.97 Instrumentation

The Inspection Report recognized that:

"...some of the instruments in the Core Spray system required to follow the course of an accident, or used to verify the capabilities of the system, or which act or may act as a barrier for radioactive material were not color coded on the Q-List Extension P&IDs. Examples are flow indicators F1-14-5D A and B which are used to monitor the core spray flow to the vessel during an accident and are also used to determine flow during monthly surveillances of the system, and pump suction pressure instruments P1 14-36 A and B which are used to determine TDH developed by the pumps during monthly surveillances and act as a barrier for radioactive material.

In response to the team's concern, the licensee committed to revise the Q-List Extension to include items related to Regulatory Guide 1.97 commitments as well as commitments to include safety grade items relating to ATWS, ASDS, etc., items related to high energy line break, and other special design criteria items. The revision will include designation of additional color codes and requirements that the system engineers be consulted before any activities associated with these items are performed."

RESPONSE

The Administrative Controls document which addresses the Q-List Extension has been revised to:

1. Require identification of these regulatory commitment items, and;
2. Have the System Engineer consulted for non-routine maintenance, modification, and procurement activities associated with these items.

A systematic approach will be implemented to update the involved P&IDs accordingly.

OPEN ITEM (263/87005-11)

Safety-Related Motor Protection Instantaneous Relay Setting

The licensee has chosen the setting for the instantaneous relay on the basis of providing a minimum factor of 1.6 over the starting current required by the motor as described in Engineering Evaluation No. 86-075. The Team reviewed the instantaneous relay setting for the Core Spray pump and RHR pump motors and found that the relays were set at 1.73 (refer to Section 4.1.10a for core spray discussion) and 1.615 times the motor starting current respectively. The motor current was recorded during conditions when the motor bus voltage was approximately 4200 volts.

While use of a multiplying factor of 1.6 is recognized industry standard to account for motor starting current asymmetry, the setting of the instantaneous relay using this standard (i.e., 1.615 for the RHR pump motor) is not in accordance with standard industry practice.

Re-evaluate the instantaneous relay settings based on the maximum bus voltage operating condition for the ECCS motors, including the Emergency Service Water pump motors, and modify settings, as required, at the next refueling outage.

#### RESPONSE

The instantaneous relay settings are established using a minimum factor of 1.6 to account for DC offset on starts of large motors (Westinghouse Applied Protective Relay Handbook). The ECCS motor settings have been evaluated for maximum expected bus voltage (4375) and found to provide a minimum of 1.6. To provide added margin and to be consistent with standard industry practices, a nominal factor of 1.75 will be implemented for instantaneous relay settings during the 1987 outage.

The Emergency Service Water Pump motors are 480Volt and do not have instantaneous relay protection. This item does not apply to the Emergency Service Water Pump Motors.

#### OPEN ITEM (263/87005-12)

##### Relay Setting Operational Tolerance and Corrective Action Criteria

The Team reviewed the Maintenance and Testing (MT) Procedures for the Core Spray Pump Circuit Breakers No. 505 and No. 605, MT-PP7.54 and MT-PP7.63 respectively, and the MT series procedures for all the other 4.16kV circuit breakers on the No. 15 and No. 16 switchgears to verify that the instantaneous relay (Device 50) setting tolerance was adequate to insure pump motor operability. The MT procedures allowed an operational setting tolerance of  $\pm 5\%$ . Also, the criteria for formal corrective repair action in an "as found" condition is a variance of  $\pm 10\%$  of the required setting.

Since the licensee has elected to set the instantaneous trip device just slightly above the calculated asymmetrical motor starting current (less than 1% margin for the RHR pump motors; less than 8% margin for the core spray pump motors; and less than 4.6% margin for the RHR service water pump P-109D motor), the error allowed in the setting of the instantaneous relay in the negative tolerance range could allow for spurious motor trips on motor starting for the RHR and RHR service water pumps. In addition, the acceptable instantaneous relay drift "as found" could be as high as  $\pm 10\%$  before formal corrective repair action is taken, allowing by procedure for the possibility of any of the aforementioned motors to become inoperable due to relay drift.

RESPONSE

The breaker maintenance and testing procedures will be reviewed and revised as appropriate before their next use. The objective will be to establish criteria that will maintain a minimum factor of 1.6 on instantaneous overcurrent relay settings when accounting for maximum voltage, instrument accuracy and relay drift. "As left" settings will use a nominal factor of 1.75 per standard industry practices.

OPEN ITEM (263/87005-13)

Capability of the 250-volt Batteries

The Team estimates that the Division I 250-volt battery is undersized with the present loads and if called upon to operate at minimum temperature could result in a trip of the UPS inverter whenever the EBOP starts and the battery voltage drops below 210 volts.

RESPONSE

Calculations on battery capacity show that if the batteries degrade to 80% of rated capacity and the battery temperatures dropped to 60°F, the batteries would be slightly undersized for design loads. However, the latest battery capacity test has demonstrated that the batteries perform at over 100% of rated capacity and the lowest battery temperature recorded to date is 67°F. Therefore, the present condition of the batteries assures that they can supply the design basis loads. Due to battery post seal problems, the 250 Volt DC batteries will be replaced during the next refueling outage and upgraded to provide additional capacity margin. Additionally, battery load profile tests will be performed to further verify the batteries can supply the design basis loads.

OPEN ITEM (263/87005-14)

125-volt Battery Capacity

Based upon the Team's assessment of the margin indicated by the existing load study and the results of the latest battery capacity test of the 125 volt batteries, the Team is confident that sufficient capacity presently exists in this system.

Justification of the system (125VDC) minimum acceptable voltage and completion of the formal calculation for battery sizing is required.

## RESPONSE

Under Mod 83M094, the 125 VDC batteries were replaced and the safety evaluation stated that a minimum voltage of 101 VDC was acceptable. Due to the lack of documentation and difficulty in obtaining component data, the minimum acceptable voltage will be changed back to 105 VDC, the plant original design standard. The batteries have excess capacity and are capable of supplying the design basis loads at 105 VDC. The 125 VDC battery sizing calculation will be completed and reviewed.

### OPEN ITEM (263/87005-16)

#### Thermal Overload Relay Heater Selection

Motors used for valve actuators have short time duty ratings (usually 15 minutes for AC motors and five minutes for DC motors). This is normally more than adequate because the valve stroke times for the core spray system are less than 60 seconds. For these type motors, electrical protection is more critical for the stalled, or locked rotor condition, especially when the torque switch is bypassed. Valve operator manufacturers suggest that locked rotor currents be limited to ten seconds.

Based upon the manufacturer's data sheets obtained from the licensee (GEH-4729, June 1979 - CR124C Thermal Overload Relay Instructions, and GES-7202, August 1983 - CR2240 Time Current Curves), the Team calculated that the locked rotor trip times for the core spray system could range from five to 300 seconds. Also, the Team believes that the lower limit only exists because an electrical drawing incorrectly identified a 5-horsepower motor as a 1.0-horsepower motor and selected the overload relay heater sizes for the incorrect motor.

## RESPONSE

A review of motor operated valve protection will be conducted. This will include the choice of overload relays, overload heaters and fuse coordination.

While a thermal overload protection device having an excessive trip time may fail to protect the motor, it does help ensure that all uncertainties are resolved in favor of completing the safety-related action. The fuses present are designed to protect the cabling, switchgear, and buswork. It is felt, therefore, that the existing motor operated valve protection is safe.

The merits and alternatives associated with modifying the thermal overload configuration to provide overload protection during non-safety applications and bypassing thermal overload protection during safety applications is being investigated. In such a configuration, the thermal overload heaters would be re-sized to provide valid protection. Based on the results of this investigation, a determination will be made whether to pursue the modification.

Upon completion of these reviews, appropriate administrative controls will be established to ensure correct and consistent methodology for maintenance and modifications involving motor-operated valve thermal overload and fuse selection.

OPEN ITEM (263/87005-17)

Limit Switch Contact Selection

Torque switches are usually bypassed in the opening direction by limit switches. Core Spray discharge valves in each loop are interlocked with each other by also using limit switches. The team noted that the limit switches used for the interlocks (and for position indication) are on the same limit switch rotors as the limit switches used for the opening torque switch bypass. Correctly setting the bypass limit switches could, therefore, lead to position indication and interlock inaccuracies. This can result in the potential for one discharge isolation valve not being fully closed when the other is opened. The team noted that remaining spare limit switch rotors are available and could be utilized, thereby separating the bypass and interlock circuits.

RESPONSE

Instructions have been provided requiring throttle valve control switches to be held in the "close" position for a period of time after receiving a closed position indication. This helps to ensure full valve closure.

The use of a fourth rotor for the torque switch bypass limit switch has been determined to be beneficial. A modification will, therefore, be performed to place the torque switch bypass limit switch on a fourth rotor where four rotors currently exist. This will permit the setting of the torque switch bypass limit switch to a desired location without affecting the valve position indication or the operation of the valve interlocks.

Where four rotors are not available, a case by case review will be conducted to determine whether the benefits justify the additional operator modifications required for four rotor installation.

OPEN ITEM (263/87005-18)

Circuit Breakers

The Team reviewed maintenance procedures for the 4160 volt and 480 volt circuit breakers associated with the core spray systems and maintenance performed under the Work Request and Authorization (WRA) program. During the review, the Team observed that the maintenance procedures did not incorporate the lubrication requirements recommended by General Electric Service Information Letter (SIL) No. 448. SIL 448 provides maintenance and lubrication instructions for General Electric's line of Type AK circuit breakers.

RESPONSE

SIL 448 was a result of investigative work initiated by NSP in March, 1984, when a breaker failed to trip (LER 84-08). The problem at that time was identified as grease hardening and PM procedures were revised to periodically clean and relubricate. SIL 448 was issued subsequent to the 1986 refueling outage when breaker maintenance was last performed. SIL 448 provides additional recommendations on use of improved lubricants which will further reduce the chance of grease hardening. This latest recommendation will be included into circuit breaker maintenance procedures before their next use.

OPEN ITEM (263/87005-19)

Inspection and Test of Motor Overload Relays

Preventive Maintenance Procedure 4811-1 described the required motor starter inspections for the core spray system, Loop No. 11 motor operated valves. The procedure was considered weak in three areas:

- a. It did not specify if the test of the overload relay was performed as installed or if the relay was removed and bench tested.
- b. The procedure called for the application of approximately 400 percent of full load current. It is the team's understanding that the test is actually run with 500 percent of heater minimum current.
- c. The procedure specified that the time to trip should be verified against the time current characteristic curve. Instead of a time-current curve the licensee produced an uncontrolled table of test currents and acceptance times presumably obtained in the mid-to-late 1960's from the overload relay manufacturer's senior application engineer.

The Team compared the time-current curves used to develop these tables against the manufacturer's published instructions (GEH 4729-6/79) for the type overload relays used at Monticello, looking at tripping times in both cases for a 40-C ambient, and found that both the slope of the curves and the tolerance bands were different.

RESPONSE

The following are responses to the individual items listed in the inspection report:

1. The procedures will be revised to specify test condition based on GE test instructions which we have been using.
2. The test is actually run at 400% of nominal trip amps which is equivalent to 500% of minimum motor amps. This is consistent with GE test instruction.
3. The time-current curves from GE's latest bench test instructions have been compared against GE's published instructions (GEH 4729) and the slope is the same. The acceptance time band is wider on the bench test time-current curves because of the variables involved with bench tests such as temperature, airflow, instrument accuracies, etc. The maintenance procedure will be revised to include the table of test currents/acceptance times which is based on GE's latest bench test instructions.



UNRESOLVED ITEM (263/87005-21)

Motor-Operated Valve (MOV) Torque and Limit Switch Settings

A review of the MOV maintenance procedures and physical valve inspections indicated that the licensee's limit and torque switch setting techniques and instructions were inadequate and inappropriate. While the vendor's instructions and limit switch contact development figures are referred to in Preventive Maintenance (PM) Procedure No. 4901 Revision 5, "Test Requirements for Motor-Operated Valve Maintenance," they represent the same generic type of instructions that have failed to assure proper valve setup and allowed many of the MOV problems that are now being recognized as prevalent in the industry.

The impact of improper torque switch and geared limit switch settings is a complex issue involving individual valve logic design, valve mechanical characteristics, and actual field setup. The problem is compounded by a recent logic design change adopted by the licensee which puts a reliance on the open torque switch bypass where there may have been none before. Resolution of the issues in this area is considered an Unresolved Item pending resolution by the licensee and Region III review.

RESPONSE

Procedures used for setting torque and limit switches were based on vendor recommendations/instructions, limit switch development figures and an experience based methodology. Historical plant performance data reveals that few motor-operated valve failures have occurred as a result of torque and limit switch settings. Many tests and actuations have been completed satisfactorily at or near actual design differential pressures. Examples of valves operated at or against design differential pressures include:

- a. Reactor Core Isolation Cooling (RCIC) valve MO-2106 was successfully cycled against the discharge of the RCIC pump dead-headed (minimum flow present to prevent damage). This test was conducted immediately following the recent logic design change described in the inspection report.
- b. Low Pressure Coolant Injection throttle valves (MO-2012, MO-2013) are cycled at near pump shutoff head as shut-down cooling is placed in service.
- c. Core Spray discharge isolation valves (MO-1753, MO-1754) are cycled once per cycle at near pump shut-off head in conjunction with Core Spray sparger flushing.

In many cases, the torque switches are bypassed altogether.

A motor-operated valve upgrade program is being developed. This program will include the following:

- a. All safety related valves will be set-up and maintained using diagnostic testing techniques similar to that being employed for IE Bulletin 85-03 applicable valves.

- b. As specified in the response to Open Item 4.1.13b (Limit Switch Contact Selection), the torque switch bypass limit switch will be placed on its own rotor. This will allow increasing the bypass time as necessary to ensure full valve unseating without adversely affecting position indication and interlock operability.
- c. Using the diagnostic testing techniques, torque switches will be set by measuring actual thrusts produced. This will help ensure valve operability under design basis conditions.
- d. "Threshold" power levels for each valve will be determined and maintenance procedures upgraded to include the checking of running power levels following packing adjustments. By maintaining running power levels below the "threshold" value, operability under design basis conditions is ascertained.

Items a through d of the upgrade program described will be completed for the High Pressure Coolant Injection System and Reactor Core Isolation Cooling System motor-operated valves during the 1987 refueling outage.

During the interim period while remaining safety related valves are being upgraded, the following will be performed:

- a. Limit switch adjustment procedures will be revised to provide more specific guidance for the setting of both the open and closed limit switches. These revised procedures will be used to maintain each given valve until the valve has been set-up under the motor-operated valve program using diagnostic testing techniques. Revised procedures will be available for use during the 1987 refueling outage.
- b. To ensure valve operability, each safety related motor-operated valve will have either:
  - 1. the torque switch bypassed for automatic safety actuations;
  - 2. the torque switch set at factory minimum setting for which a more widely accepted engineering basis exists;
  - 3. testing conducted at design basis conditions; or
  - 4. other technical justification for valve operability.

#### OPEN ITEM (263/87005-22)

##### Packing Controls

The licensee's procedures for packing tightening required that the packing be tightened until leakage stopped. Valve packing controls of this type are not adequate to prevent packing overtightening which could cause a valve to become inoperable.

## RESPONSE

Present procedures require checking for unusual binding and resistance by stroking the valve both manually and electrically following maintenance. This aids in the identification of an over tightened packing condition.

Upon completion of IE Bulletin 85-03 and the motor-operated valve upgrade program, each safety related motor-operated valve will have a "threshold" power level determined. Following packing adjustment, the valve operator running power level will be measured. It will be verified that the running power level measured is maintained below this "threshold" power level. This ensures that enough reserve operator thrust is available to overcome line and differential pressures. (Direct current motor operator threshold power levels will be determined as MOVATS Inc. direct current motor load units become commercially available.)

Future maintenance procedures for valve operators set-up during the IE Bulletin 85-03 and motor-operator valve upgrade programs will require the checking of valve operator power levels following packing adjustments.

### UNRESOLVED ITEM (263/87005-23)

#### Undervoltage Qualification

The lack of a Limitorque torque switch limiter plate, identified during inspection of MO-2106, raised a question on undervoltage qualification of the valve operators.

The licensee reviewed photos of the limit switch compartments, taken during the 1986 Limitorque inspection, and noted that out of eighteen old, original Limitorque switches, three had limiter plates installed, five had no limiter plates, and ten had photos which were indeterminate. There are two problems with the limiter plates: (1) The lack of a limiter plate appears to constitute an unauthorized modification that can allow the valve to be adjusted outside its design limits (mechanical as well as electrical); and (2) low voltage operability requirements do not appear to have been adequately addressed. Both of these items are considered Unresolved Items pending further licensee review and resolution.

## RESPONSE

All motor-operators were initially purchased to provide required thrust at 80% voltage. These operators are, therefore, capable of producing the thrust required to overcome design basis conditions at 80% voltage. A maximum torque switch setting which does not reflect reduced voltage conditions, can be viewed in effect as a potential bypass of torque switch protection; a condition which will ensure that a safety actuation is completed. Existing maximum torque switch settings, therefore, will not hinder valve safety actuations under reduced voltage conditions. The plant procedure for the set-up of motor-operator switches is being revised to provide procedural constraints to prevent the setting of torque switches beyond maximum settings. These procedural constraints will be utilized until limiter plates are obtained.

During the engineering phase of the IE Bulletin 85-03 compliance program, available operator thrusts at reduced voltages were determined and the corresponding maximum torque switch settings identified for all bulletin applicable motor-operated valves. During the valve set-up and testing phase of the IE Bulletin 85-03 program, appropriate limiter plates will be installed (subject to limiter plate availability). The limiter plates will restrict torque switch setting to those maximum settings determined with respect to reduced voltage.

As additional safety related motor-operated valves (non IE Bulletin 85-03 applicable valves) are being incorporated in the motor-operated valve upgrade program, reduced voltage information for each valve will be obtained and utilized. Again, appropriate limiter plates for these valves will be procured and installed.

Existing plant directives require activities to be reviewed to ensure that a modification is not involved. If a modification is determined to be involved, the work falls under the plant modification process. This process helps ensure that unauthorized modifications do not occur.

#### OPEN ITEM (263/87005-26)

##### Cooling for Core Spray Pump Motor Bearings

The licensee has requested relief from monitoring bearing temperatures, stating that bearing vibration monitoring would adequately serve the same purpose. Due to inadequacies with this approach, there appears to be a loss of operability assurance for the water cooled bearings.

The core spray pump motors appear to be fairly insensitive to short term losses of bearing cooling. However, due to the apparent fowling problem and the lack of a means for monitoring flow to the bearing coolers, the licensee is encouraged to evaluate the situation for possible improvement.

A limited discussion with the licensee's staff on safety-related room coolers indicated that the licensee has been evaluating this area.

#### RESPONSE

A procedure has been established for periodically flushing and verifying the flow path of each bearing oil cooler. This ensures the effectiveness of the oil coolers. Flow monitoring devices will be considered to provide continuous indication of flow.

Cooling capacity testing on the RHR room coolers was performed in April, 1987, with acceptable results. The cooling capacity test for the safety related room coolers has been established as a periodic surveillance test.

#### OPEN ITEM (263/87005-27)

##### APRS Permissive Setpoint Concern

The Automatic Pressure Reduction System (APRS) receives a permissive signal from the low pressure ECCS systems via a pressure switch set to

indicate when the low pressure pumps are running. At Monticello the calibration of the pressure switches is accomplished by Procedure 0037/0038, "APRS-Low Pressure Core Cooling Pumps Discharge Pressure Interlock Instruments Test and Calibration." The procedure required the I&C Engineer to be notified if the set point was found to be greater than 100 psig which is the technical specification maximum allowable pressure. Procedure 0037/0038 however did not take into account that the pressure switches in the "A" RHR room were located above the pressure tap and therefore would always "read" approximately 6.4 psi less than the discharge pressure of the pump. In this case, if the instrument was found to trip at a value of greater than 93.6 psig (apparently within the technical specification allowable range), the technical specification value would have been exceeded. Additionally the licensee had neither evaluated the recommended change in the set point from less than or equal to 100 psig (Design Document 22A1435AJ, Revision 1 Specification Sheet MPS 329) to less than or equal to 185 psig (Design Document 22A1455AD, Revision 1 Specification Sheet 332) nor were they sure whether the set point was pump discharge pressure or the pressure at the switch.

#### RESPONSE

Development and implementation of a setpoint methodology for all safety related instruments is being pursued. This open item is specifically concerned with the evaluation and application of the set point for the APRS-Low Pressure Core Cooling Pump Discharge Pressure Interlock. The Technical Specification set point applies to both the Core Spray and RHR pumps (core cooling pumps). When the design set point for Core Spray was revised to less than or equal to 185 psig on April 7, 1970, the design set point for RHR was still less than or equal to 100 psig. Therefore, the RHR design set point governed what was used in the Technical Specifications, i.e., less than or equal to 100 psig. In order to verify the adequacy of the setpoints, General Electric has re-evaluated and found them to be acceptable. Procedure 0037/0038, which calibrates the interlock pressure switches, has been revised to identify the as-found set point for operability as being between 50 and 96 psig. The 96 psig value allows for instrument inaccuracies when evaluating for Technical Specification operability but it does not take head corrections into account. The 50 psig value ensures that there will not be a false indication of a pump running due to containment pressure and includes instrument inaccuracies. Note that the 100 psig limit is an arbitrary limit with a large margin from the actual design limits for both Core Spray and RHR and that there is no practical gain from applying head corrections. The set point methodology for this set point is to not apply head correction; the set point is for the pressure at the switch.

#### OPEN ITEM (263/87005-29)

##### Surveillance Testing of ECCS Initiation Logic

Surveillance Procedure 0036/0039, "ECCS Automatic Initiation Test, Including Loss of Auxiliary Power," was reviewed for adequacy of testing of the core spray system automatic initiation signals. While it was determined that the licensee was adequately testing all the logic inputs, permissives/interlocks, and logic combinations, some concerns were identified.

## RESPONSE

It was identified that Surveillance Test 0036/0039 had not been revised to incorporate the modification on the ADS logic. The ADS logic modification was installed during the last refueling outage (i.e., in 1986). Because the ADS modification had been tested under a modification procedure, it was not necessary to also test under ST 0036/0039.

It was also identified that ST 0036/0039 provided for repetitive starts of large motors without controlling time between starts. Upon discovery, Operations Memo 87-18 was issued which discusses the starting criteria for large motors.

An administrative hold has been placed on ST 0036/0039 to ensure these two items are included before next use.

### OPEN ITEM (263/87005-30)

#### Core Spray Test Procedure Review

The testing of the core spray pumps and valves is covered in two Test Procedures: 0255-03-IA, Part I, R8 (monthly valve test) and 0255-03-III, R8 (monthly pump test). These procedures were reviewed for adequacy in assuring system operability. A number of problems were identified.

## RESPONSE

- Item (a) New test criteria for verifying Technical Specification criteria have been established and incorporated into the surveillance test procedure.
- Item (b) An IRD Model 818 which has a published accuracy of 5% is now used for vibration measurements. The firm doing calibration of the instruments is now reporting "as found" and "as left" calibration data. The IRD Model 818 will be used for all Section XI pumps.
- Item (c) The Core Spray and RHR tests have been revised to incorporate the higher pressure requirements.
- Item (d) Test has been revised to monitor pump D/P at a specific flow rate. All other tests will be reviewed and revised, if necessary, as part of our IST Program review.
- Item (e) Stroking of the valve, while the pump is stopped, has been deleted from the pump procedure. The valve is stroked under design conditions during the test. All ECCS System tests have been evaluated for the possibility of draining the system.
- Item (f) This will be part of the independent review of the Section XI IST Program. Comments from that review will be incorporated into the whole program.

Item (g) No action required by Monticello. When the Monticello Section XI Program receives final approval, a change to Technical Specifications which establish surveillance frequency will be pursued.

OPEN ITEM (263/87005-31)

Inservice Testing (IST) Program

The licensee's pump and valve IST program implementation was reviewed with respect to the core spray system to verify compliance with 10 CFR 50.55a(g); and Subsections IWP and IWV of Section XI of the ASME Boiler and Pressure Vessel Code (1977 Edition with addenda through Summer, 1978). The Team identified several items which did not appear in any of the licensee's procedures:

- a. The methods and criteria used for imposing and relaxing increased frequency testing requirements. The licensee issued an Operations Memo (OM 87-30) on this subject.
- b. The method to be used for stroke timing valves was not defined. The licensee reissued an Operations Memo, during the inspection, addressing this item.
- c. The method to use for remote position indication verification was not defined or delineated.
- d. No guidance was provided on the performance of engineering evaluations as required by IWP-3200. This omission resulted in several instances of inadequate test data analysis.

RESPONSE

Items (a) and (b) - These findings were addressed during the inspection.

Items (c) and (d) - These findings will be addressed during the review of Section XI IST Program. (See response to Violation 9.)

OPEN ITEM (263/87005-32)

Inservice Testing of Pumps

The Team reviewed trending records and test results associated with inservice testing of pumps and noted several deficiencies in the licensee's vibration program.

RESPONSE

The program for non-safety related pumps, which the NRC team deemed superior to the safety related pump program, has been extended to include the safety related pumps.

The vibration monitoring program will be reviewed and further improvements will be made where required. It is expected that this will be done during the Section XI IST Program review. (See response to Violation 9.)

OPEN ITEM (263/87005-35)

Review of Operations Memos

Inspection team discussions with training department personnel indicated they only see Operations Memos if the memos involved a change to the Operations Manual. The team believes that licensed operators should review Operations Memos to keep abreast of current operating practices and to review the Memos for possible incorporation in training materials.

RESPONSE

Monticello Plant Form #3271 contains the format, required approvals, and distribution instructions for the Operations Memos. This form has been revised to include distribution to the Supervisor, Operations Training.

OPEN ITEM (263/87005-36)

Instrument and Control Technician Training

The Team noted, during a review of the Plant Protection course, that specific training material was not provided on ECCS initiation Channels, logic, interlocks or permissives. Additional training on this subject would assist the technician in performing ECCS surveillance tests, preventive and corrective maintenance, and could assist in the prevention of an inadvertent ECCS initiation.

RESPONSE

The recommended training will be added to the I&C Technician training program.