

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
METROPOLITAN EDISON COMPANY,) Docket No. 50-289
et. al.)
(Three Mile Island Nuclear)
Generating Station Unit 1))

NRC STAFF TESTIMONY OF BRUCE A. BOGER
REGARDING BYPASS AND INOPERABLE STATUS INDICATION

(UCS Contention 9)

- Q. 1. Please state your name and position with the NRC.
- A. My name is Bruce A. Boger. I am a Reactor Engineer assigned to the Operator Licensing Branch, Office of Nuclear Reactor Regulation.
- Q. 2. Have you prepared a statement of professional qualifications?
- A. Yes. A copy of this statement is attached to this testimony.
- Q. 3. Please state the nature of the responsibilities that you have had with respect to the Three Mile Island Nuclear Stations.
- A. A list of my activities is attached to this testimony.
- Q. 4. What is the purpose of your testimony?

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A. The purpose of my testimony is to respond, in part, to UCS Contention 9. Specifically, my testimony supplements that of Mr. Donald Sullivan, NRC.

Q. 5. Will the staff backfit Regulatory Guide 1.47 at TMI-1?

A. The backfitting of Regulatory Guide 1.47 is the subject of Sections I.D.3.a and I.D.3.b of the NRC Task Action Plan, NUREG-0660.

In summary, the staff is presently reassessing the matter of backfitting Regulatory Guide 1.47 at operating plants. The Office of Nuclear Reactor Regulation will study the need for all licensees and applicants not presently committed to the requirements of Regulatory Guide 1.47, "Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems," to monitor and verify operations, test and maintenance activities by means of an automatic status monitoring system such as that described in Regulatory Guide 1.47. This study is to be performed following a review of procedures and other nonautomatic actions to verify these activities.

The Staff position with respect to backfitting Regulatory Guide 1.47 at TMI-1 will be developed in 1982, or later, subsequent to completion of the aforementioned study.

Q. 6. What action does the staff consider necessary pending development of the staff position on backfitting Regulatory Guide 1.47?

- A. Item I.C.6 of the NRC Task Action Plan, NUREG-0660, requires that the licensee's procedures be reviewed and revised, as necessary, to assure that an effective system of verifying the correct performance of operating activities is provided. In the clarification letter of September 5, 1980 (D. G. Eisenhut to All Licensees of Operating Plants), an acceptable program for *this verification* is described, except as noted in the September 5, 1980 letter, in Section 5.2.6 of Draft 3 of ANS 3.2 (ANSI Standard N18.7-1972), "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants." The staff will require the licensee to comply with item I.C.6 pending development of the staff position on backfitting Regulatory Guide 1.47.
- Q. 7. What is the implementation schedule on item I.C.6 of the NRC Task Action Plan?
- A. The Action Plan provides that the licensee must complete this item by January 1, 1981, or prior to the receipt of a full power license, whichever is later. For TMI, this is required before restart. The Office of Inspection and Enforcement will audit the implementation of this item.
- Q. 8. What additional staff requirements were issued to address the administrative controls on safety-related systems?
- A. The staff requirements are outlined in IE Bulletin 79-05A, item 10, which states:

"10. Review and modify as necessary your maintenance and test procedures to ensure that they require:

- a. verification, by inspection, of the operability of redundant safety-related systems prior to the removal of any safety-related system from service;
- b. verification of the operability of all safety-related systems when they are returned to service following maintenance or testing; and
- c. means of notifying involved reactor operating personnel whenever a safety-related system is removed from or returned to service."

Q. 9. Has the licensee complied with this IE Bulletin item?

A. Yes. The details are given in NUREG-0680, "TMI-1 Restart," pages C2-7 and C2-8 (item 10). In part, the licensee has modified its administrative controls in the areas of tagging, log entries, and surveillance testing to ensure redundant safety systems are not simultaneously removed from service. Equipment tagging and safety-related systems surveillance testing will be under the direct control of the Shift Foreman. The Shift Foreman maintains an awareness of systems status through a mandatory shift relief and turnover program which requires

a review of the station logs. The modified tagging procedure, AP 1002, "Rules for the Protection of Employees Working as Electrical and Mechanical Apparatus," requires that redundant safety-related systems be tested for operability prior to removal of equipment from service. This procedure also requires the Shift Supervisor to sign tagging applications that remove these systems from service. In addition, log entries must be made when equipment required by Technical Specifications is taken out of service or returned to service. Those systems, permitted in a degraded mode of operation by the Technical Specifications, will be noted on the shift turnover checklists which are reviewed by the Shift Foreman. Additional information on the use of shift turnover checklists is given in NUREG-0680, "TMI-1 Restart", pages C8-54, and C8-55. Based upon the Shift Foreman's awareness of plant status and the procedural and Technical Specification requirements, redundant safety systems should not be removed from service simultaneously.

Q. 10. Have other controls been required by the staff to ensure proper safety system alignment?

A. Yes. Additional controls were required by IE Bulletin 79-05A, item 5, and NUREG-0578, item 2.2.1.c.

IE Bulletin 79-05A, item 5, states, in part:

"Review all safety-related valve positions and positioning requirements to assure that valves are positioned (open

or closed) in a manner to ensure the proper operation of engineered safety features. Also review related procedures, such as those for maintenance and testing, to ensure that such valves are returned to their correct positions following necessary manipulations."

The additional controls delineated in NUREG-0578, item 2.2.1.c, require the licensees to review, and revise plant procedures as necessary to assure that a shift turnover checklist is provided and completed by the on-coming and off-going individuals responsible for command of operations in the control room.

Q. 11. Has the licensee complied with these additional controls?

A. Yes. The details are given in NUREG-0680, "TMI-1 Restart," pages C2-5 and C2-6 (item 5) and pages C8-54 and C8-55 (item 2.2.1.c).

The licensee has revised the procedures to ensure that proper valve positions in safety-related systems are consistent with the process flow diagram and are maintained during power operations and after maintenance and testing. The revised procedures also require an independent reverification of valves and switches manipulated during the test and maintenance. In addition, a complete safety-related valve lineup per the system operating procedure lineup checklist will be performed prior to startup.

The licensee has revised the administrative procedures to incorporate Shift Turnover and Engineered Safeguards checklist to be reviewed by incoming and off-going control room operators, shift foremen and shift supervisors.

Q. 12. How will these controls ensure that an operator is informed that a safety system has been disabled?

A. These controls will require that operators review the readiness of safety-related systems on a shift basis via checklists. This checklist review will ensure that the operator is aware of the status of all safety-related systems.

Q. 13. Do these measures described above provide information on safety-related system status equivalent to that which would result from conformance to Regulatory Guide 1.47?

A. No.

Q. 14. In what respect do the measures described above not provide information equivalent to that provided by conformance with Regulatory Guide 1.47?

A. Regulatory Guide 1.47 requires that an automatic system be provided to indicate, on a system level, the bypassing or deliberately induced inoperability of a safety-related system, whereas the measures being implemented at TMI are administrative in nature. In addition, the licensee's

controls do not require tagging (indication) at a system level. However, to provide operator awareness of system bypass at the system level, the licensee relies on tagging at a component level supplemented by notations in the station log books and shift turnover checklists.

An operator's mandatory review of these logs and checklists, in conjunction with his knowledge of system design and component interactions, will provide awareness of the bypass or inoperability of equipment at a system level.

- Q. 15. Why are these administrative controls sufficient to allow restart without conformance to Regulatory Guide 1.47 or equivalent?
- A. Since the issuance of Regulatory Guide 1.47, and primarily since the TMI-2 accident, the administrative controls over safety-related systems have been strengthened considerably. The areas in which controls have been upgraded include:
- (1) Verification of safety-related system alignment during normal operations;
 - (2) Approvals required to remove equipment from service;
 - (3) Monitoring of equipment while out of service;
 - (4) Reverification of proper safety-related system alignment after maintenance and testing; and
 - (5) Periodic audits to review the effectiveness of administrative controls.

The specific changes made to the administrative procedures at TMI-1 in these five (5) areas are outlined below.

- (1) Verification of safety-related system alignment during normal operations -- The licensee has modified Administrative Procedure 1012, "Shift Relief and Log Entries," to include an E.S. checklist of valves, breakers and switches from the control room. This check will be performed on every shift. In addition, manual valves in the main flow paths of engineered safeguards and emergency feedwater systems will be checked at least daily by the auxiliary operator and recorded on a logsheet.

AP 1012 also requires the completion of shift turnover checklists for the Shift Supervisor, Shift Foreman and Control Room Operator. These checklists identify the status of E.S. equipment, Technical Specification action items, abnormal lineups and planned operations. Thus, AP 1012 will assure monitoring of E.S. equipment for normal alignment and will assist in the notification of operating personnel when this equipment is out of service.

- (2) Approvals required to remove equipment from service -- The licensee has modified the administrative procedures controlling the removal of equipment from service for maintenance and testing. AP 1002, the switching and tagging procedure, requires the Shift Foreman to approve the tagging (removal) of equipment and also states that redundant engineered safeguards equipment must be tested prior to

removal of equipment from service. To ensure proper safety-related system operability during testing, the revised surveillance tests on safety-related systems have been revised to require Shift Foreman approval prior to testing. In addition, these tests require a check of the redundant safety system for operational prior to testing.

- (3) Monitoring of equipment while out of service -- As noted in (1) above, the licensee has revised AP 1012 to require the completion of shift turnover checklists. These checklists will identify any E.S. equipment that is out of service and will also specify the time period the equipment may remain out of service according to the Technical Specifications. To account for periods of absence from operating duties (leave, training, etc.), AP 1012 requires that relieving individuals review the station logs, records and special instructions which have been generated since *their last* shift.
- (4) Reverification of proper safety-related system alignment after maintenance and testing -- To assure proper system alignment after maintenance, AP 1002 was revised to require that the restoration switching order (return of equipment to service) be verified by a second person. In addition, a second person will verify proper execution of the switching order. To assure proper system alignment after testing, the surveillance tests have been revised to include an independent position verification. There-

fore, after maintenance or testing safety related system, emergency standby readiness will be verified independently by two individuals.

- (5) Periodic audits to review the effectiveness of administrative controls -- The licensee will evaluate the effectiveness of these programs by requiring: a) the applicable department heads to periodically review/sign their departments' shift turnover log-sheets and b) the Operation Quality Assurance Department to periodically audit and review the effectiveness of the shift turnovers.

Therefore, even though conformance with Regulatory Guide 1.47 has not been achieved, the upgraded administrative controls are adequate to provide us with reasonable assurance that operators will know the status of safety-related systems while the study concerning the backfitting of Regulatory Guide 1.47 is completed.

PROFESSIONAL QUALIFICATIONS LIST

BRUCE A. BOGER

Education

June 1971 Received BSNE - University of Virginia
June 1972 Received MENE - University of Virginia

Work Experience

June 1972 to Virginia Electric and Power Company
June 1977 Surry Nuclear Power Station

Assistant Engineer - Performed startup testing on Unit
No. 2.

Engineer - Assisted the Supervisor-Engineering Services;
trained for and received a Senior Reactor Operator License.

Supervisor - Engineering Services - Directed the activities
of the onsite engineering staff.

June 1977 to Virginia Electric and Power Company
September 1977 Richmond, Virginia

Supervisor - Nuclear Engineering Services - Directed the
activities of the offsite engineering staff in support of
Surry Power Station.

October 1977 to U. S. Nuclear Regulatory Commission
Present Bethesda, Maryland

Reactor Engineer in the Operator Licensing Branch - Admin-
ister licensing examinations to nuclear power plant and
research reactor personnel.

Professional Affiliations

Registered Professional Engineer - State of Virginia
Member - American Nuclear Society

Participation in TMI Activities

Bruce A. Boger

November 1978, April 1980: Administered operator license examinations on Unit One.

November 1978, March 1979, March 1980: Administered operator license examinations on Unit Two.

March - April 1979: Member of the TMI-2 emergency response team, assisted in the preparation of emergency and contingency procedures.

July 1979 - Present: Member of the TMI Technical Support Staff, conducted audit examinations on post-accident installed equipment on TMI-2. Also participated in the review of training and procedures in conjunction with the TMI-1 restart programs. This included preparation of SER inputs and testimony.

OUTLINE

This testimony of Donald F. Sullivan and Bruce A. Boger contains the NRC Staff's response to UCS Contention 9.

The purpose of this testimony is to demonstrate that, contrary to the assertions made in the contention, a bypass and inoperable status indication system meeting the guidelines of Regulatory Guide 1.47 or equivalent is not required to adequately protect the health and safety of the public.

Conclusions to be drawn from this testimony:

- The design provisions of Regulatory Guide 1.47 are intended to aid operators in maintaining an awareness of the bypass, or other deliberately induced inoperability of safety system(s).
- TMI-1 is not required to conform to the provisions of Regulatory Guide 1.47.
- The Licensee has not volunteered to install a "bypass and inoperable status" system that conforms to Regulatory Guide 1.47.
- The Staff is presently conducting a study to determine whether to require plants such as TMI-1 to conform to Regulatory Guide 1.47, but a decision will not be made until 1982 or later.
- Pending completion of the study and a backfit decision, the Staff has required licensees to improve their administrative controls for removing safety systems from service for maintenance and returning them to service.
- Met Ed has complied with those requirements at TMI-1.
- The strengthened administrative controls do not provide information to the operator equivalent to that which would be provided by conformance to Regulatory Guide 1.47.
- The upgraded administrative controls provide reasonable assurance of no undue risk to public health and safety.