

TENNESSEE VALLEY AUTHORITY

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December 14, 1979

Director of Nuclear Reactor Regulation  
Attention: Mr. L. S. Rubenstein, Acting Chief  
Light Water Reactors Branch No. 4  
Division of Project Management  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Mr. Rubenstein:

In the Matter of the Application of ) Docket Nos. 50-327  
Tennessee Valley Authority ) 50-328

Enclosed are TVA's responses to NUREG 0585, TMI-II Lessons Learned Task Force Final Report. If you have any questions, please get in touch with D. L. Lambert at FTS 854-2581.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager  
Nuclear Regulation and Safety

Enclosure

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Item 1.1

The corporate management of each licensee should establish a definitive presence and involvement in the selection, training, and qualification of operations personnel. To assure that this has been accomplished, the NRC should require, as part of the application for operator and senior operator licenses, that corporate management certify the competence and fitness of the applicants. Such certification should be required by the highest level of corporate management responsible for plant operation (for example, the Vice-President for Operations). The Task Force recommends that, when the NRC staff judges the quality of applications from a particular utility to be deficient, the corporate official certifying the competence of the applicants be required to discuss the reasons for the decline in competence and planned corrective action with the Director of Nuclear Reactor Regulation.

Response:

TVA will involve corporate management by requiring that the Director of the Division of Nuclear Power certify, in writing, the competence and fitness of each applicant for an operator or senior operator license, before the individual is presented to the NRC for examination.

1632 119

### Item 1.2

Each licensee should be required to review, within one year, its training program for all operations personnel, including maintenance and technical personnel, and should justify the acceptability of training programs on the basis that these programs provide sufficient assurance that safety-related functions will be effectively carried out. Documentation of this review and justification should be retained on site for inspection, but need not be submitted to the NRC for review. The preferred method of fulfilling this recommendation is a position task analysis, in which the tasks performed by the person in each position are defined and the training, in conjunction with education and experience, is identified to provide assurance that the tasks can be effectively carried out. The position task analysis should include normal and emergency duties, including maintenance activities, placing emphasis on the role played by every member of an operations organization in assuring safe plant operations. All levels of the operations organization should be included. This action is regarded by the Task Force as interim measure pending resolution of the question of licensing of additional operations personnel beyond reactor operators and senior reactor operators, as discussed in Recommendation 1.8 of this appendix.

The scope of emergency duties defined in the position task analysis should not be restricted to only the transients and accidents considered in the design basis. The training should recognize that events beyond the current licensing design basis events can occur.

The training should include the use of the systems already installed at the plant to control or mitigate the consequences of accidents in which the core is severely damaged. This training would be an interim measure pending completion of the rulemaking to determine what design features to mitigate these more severe accidents should be required.

### Response:

TVA concurs with this recommendation. TVA had already begun a task analysis program before the TMI accident. Our experience to date indicates that more than a year may be required to complete this program. However, we will establish a schedule of priorities to complete the analysis in a timely manner.

Item 1.3

Each licensee should be required to review, within 90 days, its training program with respect to the conduct of in-plant drills. For tasks performed by shift operating personnel in response to off-normal or accident situations, licensees should assure that sufficient in-plant drills are conducted to enable personnel to maintain proficiency in those tasks. The Task Force considers drills of a walk-through nature acceptable and does not mean to imply the actual manipulation of controls or equipment or initiation of an event (such as by the opening or closing of valves or tripping breakers or pumps). The Task Force considers that drills requiring the physical manipulation of controls are also important but can be more efficiently and safely conducted using an appropriate nuclear power plant simulator. With this in mind, each licensee should develop a schedule for in-plant drills. This schedule should be a part of a disciplined training program for each station. It need not be submitted to the NRC for review; however, it should be available at the site for inspection.

Response:

TVA will evaluate its present program of in-plant drills to ensure that plant personnel maintain proficiency in responding to off-normal or accident situations. Where appropriate, these drills will be conducted at TVA's Power Operations Training Center utilizing its plant unique simulators. As additional criteria or standards in this area are promulgated by the Institute for Nuclear Power Operations, TVA will meet or exceed all such standards.

1632 121

#### Item 1.4 - Operator Licensing

The first areas of personnel qualification that need to be upgraded are those pertaining to licensed senior reactor operators and reactor operators. NRR recommendations to the Commission for improvements in the operator licensing program were contained in Commission Paper SECY 79-220E (Ref.2). We believe these recommendations should be treated as the first steps in a long-term program to upgrade operator proficiency. They are, however, necessary improvements in the program. The ultimate resolution of the issue of qualifications of reactor operators should take a broader perspective. Although the Task Force generally agrees with the recommendations contained in SECY 79-330E, we recommend implementation of the following additional items by the regulatory staff in conjunction with the implementation of the recommendations in SECY 79-330E.

#### Response to SECY 79-330E:

TVA concurs with the NRR positions stated in Commission Paper SECY 79-330E, with the exception of item 13 which concerns the passing grade percentage on written exams. An overall grade of 80 percent would exclude an individual with a 79 percent in each category, while passing those with lower scores in most categories. TVA recommends that a score of 75 percent in each category be established as the minimum acceptable score and that the concept of an overall grade average criteria be abolished.

1632 122

Item 1.4 (1)

As part of the inspector training program of the Office of Inspection and Enforcement (IE), operator licensing program personnel of the Office of Nuclear Reactor Regulation should (a) provide information to IE inspectors on the operator licensing program and (b) identify the types of information the IE inspectors should provide to assist NRR in making decisions with regard to the renewal of operator licenses.

Response:

TVA concurs with this recommendation.

1632 123



Item 1.4(2)

The NRC staff should establish a mechanism whereby individuals committing operational errors are identified in Licensee Event Reports. Such a mechanism should include provisions for protection of the privacy of the individual. The intent of this recommendation is to provide additional information to operator licensing program personnel to assist them in determining the continued qualification of operators in the review of operator license renewal applications. Due consideration should be given to whether such reporting will affect the quality of reports received by the NRC.

Response:

Privacy laws will make it difficult, if not impossible, to exercise fully the potential of Licensee Event Reports to improve operational safety if individuals committing operational errors are identified.

TVA believes that procedures which would require indiscriminate public identification of individuals who commit operational errors might result in coverups and morale problems. However, it is noted that such information is maintained on individual personnel training and personnel records which are available to NRC personnel. TVA recommends that the proposal to require the identification in LER's of individuals committing operational errors should be reconsidered.

1632 124

Item 1.4 (3)

As part of the training program for all licensed operators, a one-week course should be conducted by the NRR operator licensing program personnel with assistance from other NRR technical personnel. Particulars of the course would include:

- (a) Safety analyses
- (b) Probabilistic assessments
- (c) Current safety issues and recent significant operating experience
- (d) NRC and industry responsibilities for safety

This recommendation would reinforce the knowledge of and respect for accident/transient sequences as well as providing a positive feedback for better decisions by NRC staff on reactor operations and design matters. Additional NRC staffing will be required to accomplish this objective.

Response:

TVA endorses the incorporation of this type of material into the training of licensed operators. However, responsibility for implementation of this training must remain a function of the licensee. Positive feedback to the NRC staff on reactor operations and design matters can best be handled by the NRC itself either through I&E or by more direct involvement of the NRC staff in field activities.



Item 1.4 (4)

Prior to assuming initial assignment as shift supervisor or shift technical advisor and on a biennial basis thereafter, individuals should be interviewed by an interdisciplinary group of NRC staff. Such interviews should probe the individual's technical knowledge in the area of transient and accident response and, in the case of a shift supervisor, the managerial ability to command and control the activities of shift personnel.

These interviews should be conducted at NRC headquarters. Criteria for subjects to be covered and acceptable standards of performance of individuals should be developed by NRR operator licensing personnel prior to promulgation of this requirements. This action will require a considerable expenditure of resources and its phasing needs to be carefully considered.

Response:

Assurance that shift supervisory and technical personnel possess the proper qualifications for their positions must remain a responsibility of the individual licensees. A proper role for the NRC staff would be to specify certain criteria or qualification standards and ensure licensee compliance through I&E. An alternative approach would be for the NRC staff to visit individual plant sites to monitor licensee actions in this area.

1632 126

Item 1.4 (5)

The NRR operator licensing program personnel should sponsor an annual workshop for licensed operators to be attended by at least one representative of the licensed shift personnel at each unit. The purpose of this workshop is to provide an opportunity for exchange of information on operating experiences between the NRC staff and the utility shift personnel. For example, such a seminar could lead to an exchange of information on (a) NRC safety concerns related to shift operations, (b) the impact of licensing on shift activities and personnel, and (c) recommendations from shift personnel concerning changes in reactor regulation that would improve safety.

Response:

TVA agrees with the purpose of this recommendation in that the NRC staff needs a mechanism to provide better feedback of activities and events in the field. However, TVA's experience indicates that meetings such as that proposed in the recommendation of single representatives from the licensed operators at each plant do not always give a completely representative picture of events occurring in the plants. TVA recommends that the desired results could be better achieved if NRR licensing personnel spent time at individual plants.

With regard to the exchange of information from the NRC staff to the licensee operating personnel, TVA recommends that the NRC periodically meet with appropriate licensee personnel such as training program instructors to best ensure proper dissemination of the information to the licensed shift personnel.

1632 127

Item 1.4 (6)

As a less prescriptive alternative to Recommendation 6 of SECY 79-330E that "Phase II, III, and IV cold training program instructors and all hot training program instructors that provide instruction in nuclear power plant operations hold senior operator licenses and be required to successfully participate in applicable requalification programs to maintain their instructor status," the following is considered acceptable: Such instructors should hold or have previously held a senior reactor operator (SRO) license on a comparable nuclear power plant and currently possess instructor certification from the Institute of Nuclear Power Operations, provided the INPO certification program has been examined and found acceptable to the NRC. Emphasis should be placed on an instructor's ability to instruct, in addition to his technical competence.

Response:

TVA endorses this recommendation and requires that all hot license training program instructors be licensed on the plant for which they provide instruction. For cold license training programs, instructors will be certified by the applicable NSSS vendor as having completed the vendor's cold license training program. TVA fully concurs in the proposed INPO certification program for all instructors.

It should be noted that some flexibility is necessary in the requirement that all training instructors be licensed personnel. Utilization of specialists and technical personnel as instructors in such areas as plant design, radiochemistry, and health physics is essential to an effective training program.

1632 128

Item 1.4(7)

Consideration should be given to placing resident operator licensing examiners in each of the major geographical areas in which there is a concentration of training centers using nuclear power plant simulators. The intent of this recommendation is to provide for greater interaction by operator licensing examiners in operator qualification and requalification programs.

Response:

TVA endorses this recommendation.

1632 129

Item 1.5

At the present time, several groups are addressing the subject of qualifications of personnel somewhat independently of one another. Even though each of the efforts is appropriate on a short-term basis, a coordinated approach must be developed for the long term. The NRC should increase the staff resources in this area, assure the hiring of needed professional disciplines to increase present staff capabilities, and designate responsibilities and organizational entities within the various offices.

Response:

TVA concurs that the NRC should endorse a single coordinated set of guidelines to the industry regarding personnel qualifications. Licensee participation in this effort should be coordinated through the Institute of Nuclear Power Operations.

1632 130

Item 1.6

A program for raising the qualification requirements for shift supervisors and senior reactor operators should be established. The distinction being made in present practice between senior reactor operators (e.g., shift foreman in a multi-unit station) and shift supervisors should be recognized. As a short-term action pursuant to NUREG-0578 (until such time as staffing and qualification of shift personnel and the control room man-machine interface requirements are upgraded), each licensee has been required to provide an on-shift technical advisor to the shift supervisor. Within the next five years, it is recommended that the qualifications of senior reactor operators and shift supervisors be upgraded as indicated below. Qualification requirements for applicants for licensing prior to initial fuel loading may require special additional considerations, particularly with respect to experience.

Response:

TVA strongly endorses efforts to upgrade the qualification requirements for nuclear plant operating personnel and has previously implemented several changes to strengthen its overall operator training program.

1632 131



Item 1.6 (1)

Shift Supervisor (person in charge of operations on shift at the station) - Shift Supervisors should have at least a Bachelor of Science degree or equivalent training and experience in engineering or the related physical sciences. The Shift Supervisor should also hold a senior reactor operator's license (issued under new proposed requirements defined below) and have served as a reactor operator for one year or senior reactor operator for six months. In establishing equivalency with a Bachelor of Science degree, consideration should be given not only to formal courses in engineering and related sciences, but also to education in the liberal arts. It is recommended that the use of the equivalency to a Bachelor of Science degree be exercised to only a limited degree and that most shift supervisors hold degrees. It is also recommended that shift supervisor qualifications include leadership training and experience.

Response:

The requirement for the shift supervisor to have at least a Bachelor of Science degree or equivalent training and experience in engineering or the related physical sciences could possibly result in significant personnel turnover problems in the shift operating organization. This turnover could result both from the difficulties involved with keeping degreed engineers on shiftwork and from the difficulties to be expected in keeping traditionally trained operations personnel in their positions once they realize that their conventional career path has been effectively blocked by the new educational requirements. Any sort of significant personnel turnover within the plant operations crew would certainly not be in the best interests of plant safety.

TVA provides a dedicated nuclear plant operator training program that includes college-equivalent classroom training and utilizes plant unique simulators. This extensive training program combined with the experience that an individual obtains on the job before becoming eligible for a licensed operator position, the licensed operator training itself, plus the additional experience required before becoming eligible to be considered for a shift supervisor position, provides the equivalent of a degree as a "Nuclear Plant Operations Specialist" if such a degree were available. In addition, TVA is developing formalized leadership training courses for all senior license candidates.

Item 1.6 (2)

Senior Reactor Operator (e.g., shift foreman in a multi-unit station) - Senior Reactor Operators should have at least the same general technical education and specific training in transient and accident response characteristics of nuclear power plants as recently articulated for the shift technical advisor. Additional recommendations for upgrading senior reactor operator qualifications are identified in the Commission Paper SECY 79-330E on Qualification of Reactor Operators.

Response:

TVA concurs and presently provides all senior reactor operators with at least the same general technical education and specific training in transients and accident response characteristics of nuclear power plants as recently articulated for the shift technical advisor. TVA's position on SECY 79-330E has been shown in the response to Item 1.4.

1632 133

Item 1.6 (3)

At present, a basic fundamentals course of approximately twelve weeks is required as part of the operator training program. A prerequisite to satisfactory performance of nuclear power operation is the fundamental understanding of nuclear technology. The Task Force believes twelve weeks to be insufficient time to provide a broad and comprehensive level of understanding in the fundamentals of nuclear technology. It is recommended that the NRC, perhaps in consultation with INPO, examine the content of the basic fundamentals course and establish definitive instructional requirements for the course.

Response:

To become eligible for a licensed operator position, TVA requires that individuals complete a 40-month program of formal classroom and on-the-job training. The twelve weeks of training in basic fundamentals mentioned above represent only a small portion of the total curriculum of the TVA training program. Additionally, to qualify for a licensed operator position, the individual must complete a 12-week license training program, pass internal certification examinations, and pass the NRC reactor operators examination.

1632 134

Item 1.7

The review and evaluation (being conducted by the Quality Assurance Branch) of the management and technical resources available to utilities who own and operate nuclear power plants to handle unusual events or accidents should be completed, and regulatory guidance should be developed that covers the capabilities and role of technical and management personnel in the normal operation of the plant and during an emergency. The criteria should contain a requirement for periodic verification of the licensee's technical and management support capability throughout the operating life of the plant. The present criteria for determining the acceptability of licensee technical and management support is very general and applies only to normal plant operations.

Response:

TVA concurs in this position. Our chairman has expressed this same idea publicly several times. TVA's nuclear power plants are designed, built, and operated by TVA forces. This integrated organization under one corporate management is very effective in transferring experience gained during design and construction to the operating organization. The subsequent operation and support of a TVA nuclear plant is a total TVA function.

1632 135

Item 1.8

The staff should decide which plant personnel, other than reactor operators and senior reactor operators, should be licensed. NRC review of the training and qualifications of nonlicensed personnel has been very limited in the past, based on the assumption that it is the licensed operators who have the most important influence on plant safety. A number of examples from the TMI-2 accident indicate the degree to which plant safety can be greatly influenced by persons in many positions, including managers, engineers, auxiliary operators, maintenance personnel and technicians. All of these previously nonlicensed personnel may affect plant operation, and their roles should receive greater attention from a safety perspective. Answering the questions of how much independent examination of their qualifications and training is necessary and whether NRC licensing is appropriate is a significant undertaking. The prerequisites to an effective examination program are definitive qualification requirements and specific training programs. The current NRC guidelines addressing nonlicensed personnel training and qualification are very general and are not suitable for a licensing program.

The newly formed Institute of Nuclear Power Operations intends to develop standardized training requirements for technicians and nonlicensed operators and to provide certification for the training of these personnel. The Task Force believes this program, if properly implemented in a timely way, could substitute for detailed guidance from NRC, and could, under the right conditions, be endorsed by NRC as meeting its independent licensing requirements for additional operating personnel. A statement of understanding between INPO and the NRC should be established at an early date (within the next six months) so that both groups can decide whether and to what extent to proceed independently.

Response:

TVA endorses the concept of certification and certification standards for nonlicensed nuclear plant personnel. TVA fully supports the plans of the Institute of Nuclear Power Operations in this area and will meet or exceed any standardized requirements developed by INPO. In developing such standards, full advantage should be taken of nationally recognized standards where they exist.

Until such time as the new standards are issued, TVA will continue its own training and internal certification of certain nonlicensed personnel such as assistant unit operators, instrument technicians, and radiochemical laboratory technicians.



Item 2

The Commission's regulations should be revised to more clearly state present staff requirements (as described in the Standard Review Plan, Section 12.1.2) for minimum shift staffing of licensed reactor operators. The governing regulation, 10 C.F.R. 50.54(k), states that "an operator or senior operator licensed pursuant to Part 55 of this chapter shall be present at the controls at all times during operation of the facility." For single-unit power stations, the staff requires the shift crew to include at least one licensed senior reactor operator, two licensed reactor operators, and two additional operators (auxiliary operators) during reactor operation. For multiple-unit power stations with separate control rooms, the staff also requires the shift crew to include at least one licensed senior reactor operator and two licensed reactor operators for each operating reactor. For multiple-unit power stations with a common control room, the staff permits a reduction of licensed reactor operators to one per unit plus one additional reactor operator with the other requirements remaining the same. However, the staff does not require the presence in the control room at all times of two licensed operators and the senior reactor operator. In developing the revision to the regulations, consideration should be given to requiring the presence in the control room at all times during normal operations of two reactor operators and one senior reactor operator. Provisions for tours of the plant by operators will probably need to be made if this staffing proposal is adopted.

Response:

TVA's nuclear plant shift operations staffing provides for a licensed senior reactor operator (i.e., shift engineer) who is in charge of the station operations to be present at all times.

In addition, TVA's staffing requires that an additional licensed senior reactor operator (i.e., assistant shift engineer) be onsite for each licensed unit. The normal work station for this individual is in the control room of his assigned unit. However, this individual is not required to be present in the control room at all times. This provides some flexibility in allowing this individual to give firsthand attention to problems associated with his unit which are external to the control room.

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Additionally, each control room is staffed with one more licensed reactor operator (i.e., unit operator) than there are licensed units. The extra reactor operator assists the reactor operator assigned to each unit in normal operational activities and provides relief for meals and other purposes. This staffing ensures that there will always be at least one licensed reactor operator present at the controls of each licensed unit.

TVA concurs in this recommendation if provisions for plant tours by the senior reactor operator assigned to each control room are recognized as being essential to safe plant operation and are included in any revision to the regulations. Licensed personnel not required to be continuously present in the control room can respond to the control room within five minutes of any emergency situation.

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Item 3

Each licensee should be required to review and revise within 90 days the plant administrative procedures to assure that a sound policy is established covering working hours for reactor operators and senior reactor operators. It is recognized that this is a complex subject involving other interests (e.g., labor unions). The NRC staff should assure that the subject is addressed in a comprehensive manner by all licensees and that the other interests not be allowed to interfere with the basic safety interest. As general guidance, it is expected that licensees' administrative procedures will make it unlikely that personnel would have to be used for more than two consecutive work periods in excess of 12 hours and that a 12-hour rest period would be required between work periods. In the event that special circumstances arise that would cause extended periods of work in excess of 12 hours for more than two consecutive days, such work should be authorized by the Station Manager with appropriate documentation of the cause. Indications aside from Three Mile Island lead the Task Force to conclude that this step must be taken to reasonably assure that individuals are in proper physical condition to perform work at nuclear power plants.

Response:

TVA administrative procedures meet the intent of this position. In recognition of this problem and through negotiated labor agreements, TVA makes every effort to evenly distribute overtime worked by licensed operators. Because of these labor agreements and the normal shift staffing, the need for a licensed operator to work two consecutive shifts in excess of 12 hours is extremely infrequent.

However, it must be recognized that some flexibility in this policy is necessary due to the complexity of the labor agreements and the need to adequately staff the station during unusual circumstances.

#### Item 4 Emergency Procedures

Emergency operating procedures for all nuclear power plants should be reviewed by the NRC. The review should be conducted by interdisciplinary review groups comprising I&E inspectors and NRR technical reviewers knowledgeable in system design, accident analysis, operator training, theories of education and crisis management, human factors, and the underlying technical bases for licensing. Special attention should be paid to the recent advice of the ACRS on the style of the emergency procedures. A safety evaluation regarding the adequacy of the emergency procedures should be issued at the conclusion of the review. Previous NRR reviews and I&E reviews of emergency operating procedures did not specifically investigate their compatibility with the design bases of the systems involved nor was the discipline of human factors included.

This action will require a considerable expenditure of resources and its phasing needs to be carefully considered. It may be satisfactory to limit the general application of this recommendation to new operating licenses for the next year or so. These initial few reviews by the staff, with oversight by the ACRS, will provide the time and experience necessary for the staff and industry to develop and agree upon acceptance criteria for the development, formatting, and future review of all emergency operating procedures. Upon completion of these acceptance criteria, say within the next two years, a systematic effort by all licensees to review their emergency procedures and revise them as necessary could be conducted more productively than it could today.

#### Response:

TVA emergency operating procedures have always been available for review by the NRC and have, in fact, been reviewed by I&E. TVA's program for review of these procedures is intended to ensure that the procedures are reviewed by those most competent to perform the review. For example, TVA's procedures are reviewed by the operating personnel who must use the procedures, are tested on TVA's plant unique simulators, and are reviewed by TVA's design organization to ensure that systems and equipment are operated in accordance with the designer's intent. Additionally, TVA is presently committed to review of the emergency operating procedures by the applicable NSSS vendor to further ensure the adequacy of the procedures.

#### Item 5 Verification Of Correct Performance Of Operating Activities

A more effective system of verifying the correct performance of operating activities is needed to provide a means of reducing human errors and improving the quality of normal operations, thereby reducing the frequency of occurrence of situations that could result in or contribute to accidents. Such a verification system should include automatic system status monitoring and human verification of operations and maintenance activities independent of the people performing the activity.

The Task Force recommends that automatic status monitoring be required by a decision to backfit Regulatory Guide 1.47, "Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems," to plants not already required to meet it. Furthermore, the design to satisfy the objectives of the guide should be flexible and capable of accepting additional monitoring functions at a later date.

The implementation of Regulatory Guide 1.47, although reducing the extent of human verification of operations and maintenance activities, does not eliminate the need for such verification in all instances. Therefore, each licensee should be required to review his procedures for maintenance, test, surveillance and other normal plant operations activities (1) to delineate each activity that requires independent verification because of its importance to safety, (2) to identify the personnel responsible for conducting the verification, and (3) to describe the method of documenting performance of the verification process. The results of this work should be submitted to NRC within six months for use in the development of minimum acceptance criteria for operations verification procedures, probably in the form of a Regulatory Guide. The procedures adopted by the licensees should contain two phases; namely, before and after installation of status monitoring equipment in conformance with Regulatory Guide 1.47.

#### Response:

The Sequoyah Nuclear Plant already has a status monitoring system that complies with RG 1.47. TVA will expand this system to monitor an additional 40 to 60 components in safety systems that are required to operate immediately after an accident. These modifications will be completed by May 1981. TVA, in accordance with IE Bulletin 79-08 has reviewed all procedures such as those for maintenance, testing, plant, and system startup, and periodic surveillance to ensure that safety-related valves are returned to their correct position following manipulation and are maintained in their proper position during all operational modes.

Item 6.1 Nationwide Network

An integrated NRC-utility program to evaluate operating experience should be established. Action within the NRC has been initiated to establish an Office of Operational Data Analysis and Evaluation to provide agency-wide coordination and an overview of all operational data analysis-related activities performed within the line offices of NRC. The nuclear industry, through NSAC and INPO, has established its own operational evaluation program. Pursuant to the recommendations of NUREG-0578, each licensee is now required to have an operations experience evaluation group. The director of the new NRC Office of Operational Data Analysis and Evaluation should take the lead to assure that these diverse programs are formally tied together to the extent necessary to benefit from one another's viewpoint and analysis while recognizing their individual responsibilities.

Response:

TVA concurs with this recommendation and expects to participate through INPO in the industry-wide operational evaluation program. TVA had previously established, in 1972, a multidisciplinary review group solely for the purpose of reviewing industry-wide nuclear plant operating experience.

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#### Item 6.2 Providing Information to the Operator

Each licensee should be required to review, within 90 days, its administrative procedures to assure that a mechanism exists through which lessons learned from operating experience contained in various publications (such as IE Bulletins, Circulars and Notices, and applicable Licensee Event Reports) and from the licensee's own operating experience evaluation group are conveyed to the reactor operators and other affected operations personnel.

Two ways of accomplishing this objective are (1) standard distribution lists or publications and (2) regularly scheduled lectures as part of operations staff retraining. This recommendation is intended to assure that operators and other operations personnel are continually provided with lessons learned from operating experience.

#### Response:

TVA has established a multidisciplinary review group for the purpose of reviewing and disseminating applicable information to the operations personnel and other affected groups. TVA also provides upgrade training weekly to operations personnel using the above information and plant unique activities. TVA further ensures that such information is properly disseminated to and utilized by operating personnel by including applicable lessons learned in both the initial training and retraining of operations personnel conducted at its Power Operations Training Center.

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#### Item 7.1

All licensees should be required to conduct a one-year review of their control rooms. The safety review should consider control room design and control room operational procedures, including emergency operating procedures. In this review, the licensees should evaluate:

- (1) The adequacy of information presented to the operator to reflect plant status for normal operation, anticipated operational occurrences, and accident conditions;
- (2) The grouping of displays and the layout of panels;
- (3) Improvements in the safety monitoring and human factors enhancement of controls and control displays;
- (4) The communication from the control room to points outside the control room, such as the on-site Technical Support Center. (This communication link must also be coordinated with new requirements for transmission of plant systems data to NRC.);
- (5) The use of direct rather than derived signals for the presentation of process and safety information to the operator;
- (6) The operability of the plant from the control room with multiple failures of non-safety-grade and non-seismic systems and control room systems;
- (7) The adequacy of operating procedures and operator training with respect to limitations of instrumentation displays in the control room;
- (8) The categorization of alarms, with unique definition of safety alarms;
- (9) The modification of operating procedures and operator training programs as a function of control room modifications resulting from this review.

The purpose of this recommendation is to improve upon operator-process communications. Guidelines and criteria for the control room design review are now being drafted by the Division of Systems Safety, including consideration of the results of previous studies of this sort and existing technology outside of the nuclear industry. Explicit criteria can probably be developed by about February 1, 1980. Consideration is being given to a series of topical meetings with recognized experts in the field and affected licensees. Specific requirements for backfitting existing control rooms to correct deficiencies will be established in the course of the reviews by licensees.

#### Response:

TVA agrees with this recommendation. TVA has started and will continue its review of the Sequoyah/Watts Bar control room designs. The review

will be conducted in accordance with procedures established by TVA and will meet the guidelines and criteria presently being developed by NRC. Backfits will be made if the review indicates that significant improvements in safety can be achieved.

1632 145

## 7.2 Plant Safety Status Display

Each licensee should be required to define and adequately display in the control room a minimum set of plant parameters (in control terminology, a state vector) that defines the safety status of the nuclear power plant. The minimum set of plant parameters should be annotated for sensor limits, process limits, and sensor status. The annotated set of plant parameters should be presented to the operator in real time by a reliable, single-failure-proof system located in the control room. The annotated set of plant parameters should also be available in real time in the Onsite Technical Support Center.

The objective of this recommendation is to require a concise set of information that is easily available and assessed by the operator and the shift technical advisor to ascertain the safety status of the operating process. The implementation of this recommendation should be undertaken in conjunction with the year-long control room study previously described, but should be completed by January 1, 1981, in consonance with the final implementation date for the onsite technical support center recommended in NUREG-0578. As a further guideline for the development of the safety state vector, the status of the plant process should be designed and instrumented as a function of the various barriers against release of radioactivity. For example, the two primary barriers are the fuel cladding and the reactor coolant pressure boundary. Thus, parameters such as primary liquid inventory and coolant radioactivity levels would be principal components of the state vector for these levels of defense. Similarly, reactor coolant level, containment water level, containment hydrogen content, etc., would be principal components of the state vector for the engineered safety feature levels of defense.

### Response

During the TVA review of the Sequoyah control room design, a minimum set of plant parameters will be identified that define the safety status of the plant. These parameters will be provided to the NRC by January 1, 1980. The data will be available in the TSC by January 1, 1981.

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### 7.3 Disturbance Analysis Systems

We recommend that the Office of Nuclear Regulatory Research establish a program to evaluate the safety effectiveness of designs of disturbance analysis systems. This program should consider the evaluation of all pertinent methodologies being used in disturbance analysis systems. The evaluations should be quantitative in nature and include prototype assessments in operating power plant environments. Experience gained in this program should be used to consider whether regulatory requirements should be formulated for the use of disturbance analysis systems in operating plants.

#### Response

TVA will continue to keep up to date on industry developments.

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#### 7.4 Manual versus Automatic Operations

We recommend that the Office of Nuclear Regulatory Research formulate a program to establish a technical basis for definitive licensing criteria for manual and automatic operations for systems which execute plant safety functions and safety-related functions. The study should include examination of the feasibility of backfit of its conclusions and recommendations to operating plants. The role of the operator should be specifically examined. Complexity of the safety function, the rapidity of the initiating events, the response time available to diagnose the event and to implement corrective action, and verification of the corrective action should be considered in the program. The scope of the proposed study includes the operator, the control room, displays and instrumentation, in addition to the manual and automatic controls that execute safety functions. The research team should consist of human factors engineers, control engineers, and nuclear system engineers and analysts.

#### Response

TVA will continue to keep up to date on ongoing industry studies. TVA has traditionally supported manual operations as appropriate. Unless automatic design can be shown to perform the operation safely and conservatively for all cases or automatic operation which failed can be shown to be correctable by manual action, TVA believes the NRC should proceed cautiously with new criteria for automatic operation.

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## 7.5 Standard Control Room Design

The Institute of Electrical and Electronic Engineers (IEEE) has established a standards development committee to define design requirements for the standard control room. The regulatory staff is represented on the committee. We recommend that this standards committee expeditiously complete its work of establishing standard design requirements for future control rooms. The design requirements should consider the lessons learned from the TMI-2 accident as well as the principles of human-factors engineering for the man-machine interface. Upon completion of the standard, the Office of Standards Development should evaluate the standard for its acceptability in the licensing process, including consideration of its partial applicability to plants under construction.

### Response

TVA is a leader in advanced control room design and is utilizing the best available technology and control concepts in its newest designs. Advanced control room designs have not matured to the point where standardization can be beneficial. Industry guidelines in the near future might be more appropriate to promote design improvements while standardization could be introduced later in the development process.

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## 8. RELIABILITY ASSESSMENTS OF FINAL DESIGNS

The staff should initiate a systematic assessment of the reliability of safety systems in operating units and in units in the late stages of construction using simplified fault and event tree analyses. Since these assessments go beyond the requirements of current regulations, their completion should not be a condition of licensing for operation. The purposes of these assessments would be (1) to audit the implementation of the current NRC design requirements by searching for areas that have potential to seriously decrease reliability, and (2) to identify outliers in overall system safety compared with designs previously subjected to this type of review. Measures to correct any problem areas should be promptly referred to the cognizant licensing organization where, in consultation with the Regulatory Requirements Review Committee, backfit decisions are to be promptly reached. If a particular deficiency is identified and known to exist in several systems or plants, appropriate revisions to NRC design requirements should be made with all licensees and applicants being directed to implement the design revisions in their plants.

Possible approaches would be to assess all systems in one plant or several systems in all plants. An acceptable combined approach would be to do all systems in a few lead plants and then proceed plant by plant unless particular systems indicated possible generic problems. The suspect systems would then be assessed in all plants, in the manner employed with PWR auxiliary feedwater systems in the summer of 1979. This recommendation would apparently be satisfied by the Integrated Reliability Evaluation Program currently under development in the Office of Nuclear Regulatory Research with the previously expressed concurrence of the Office of Nuclear Reactor Regulation.

### Response

TVA agrees that reliability studies can be useful tools for safety evaluations. TVA has already established a reliability group and is discussing with NRC what types of studies and where reliability studies will be useful for Sequoyah. TVA has initiated a comparative risk analysis of the Sequoyah plant auxiliary feedwater system.

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## 9. REVIEW OF SAFETY CLASSIFICATIONS AND QUALIFICATIONS

The owners of operating plants and all plants under construction should be required to evaluate the interaction of non-safety and safety-grade systems during normal operation, transients, and design basis accidents to assure that any interaction will not result in exceeding the acceptance criteria for any design basis event. The review should be systematic and include all non-safety components, equipment, systems, and structures under all conditions of normal operation, anticipated operational occurrences, and design basis accidents initiated both within the plant (such as pipe breaks) and from outside the plant (such as earthquakes, other natural phenomena, and offsite hazards). The interactions and effects should consider various failure modes including spurious operation, failure to operate upon demand, and any unusual or erratic operation that might result from exposure to the abnormal process or environmental conditions accompanying the event under study. As a necessary part of this evaluation, proper qualification of safety systems, including mechanical components, should be verified.

The number of simultaneous failures of non-safety equipment considered should reasonably reflect the expected number of non-safety systems simultaneously exposed during the event under study to conditions for which they were not designed or qualified.

Equipment identified as the potential cause of violation of the acceptance criteria for any design basis event should be appropriately modified to eliminate or significantly reduce the probability of the adverse interaction. Alternatively, the affected safety systems or structures should be modified to cope with the interaction. The results of the evaluations should be used to review, and modify as appropriate, the plant operating and emergency procedures and operator training. The Task Force recommends that these studies be completed within a year, at which time licensees should submit proposed schedules for making the modifications identified in the evaluations. Completion of this study would not be a condition of licensing new plants in the interim of one year if the basis for continued licensing in face of the present unresolved safety issue on systems interaction is judged by the staff to continue to be valid.

### Response

TVA has reviewed safety and nonsafety interactions generally for all TVA plants. Specifically, TVA has conducted a detailed review of Sequoyah safety and nonsafety interaction for pipe breaks as a result of IE Information Notice 79-22 for Sequoyah. In the past, TVA has performed studies of Sequoyah for failures and inadvertent operation of safety and nonsafety equipment because of fire. As additional interactions of safety and non-safety systems are identified in the industry, TVA will evaluate their impact on the safe operation of Sequoyah.

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## 10. DESIGN FEATURES FOR CORE-DAMAGE AND CORE-MELT ACCIDENTS

The Task Force recommends that the Commission issue within three months a notice of intent to conduct rulemaking to solicit comments on the issues and facts relating to the consideration of design features to mitigate accidents that would result in (a) core-melt and (b) severe core damage, but not substantial melting. Specific areas for comment should include, but not be limited to, the following:

- (1) Are design features to mitigate the consequences of either or both of these types of accidents necessary to provide reasonable assurance that the health and safety of the public are protected?
- (2) In lieu of such features, should additional and supplemental means of preventing core damage or core-melt accidents, through improved engineered safety features be required?
- (3) What should be the objective of such design features? Should the design objectives be a set of specific acceptance criteria (e.g., some limitation on calculated offsite dose) or the reduction of potential offsite exposure that is reasonably achievable?
- (4) What should be the characteristics and functions of such design features?
- (5) What are the probabilities and consequences of the various event sequences that might result in releasing significant amounts of radioactivity to the environment? Which sequences are amenable to interdiction and by what means?
- (6) What is the expected effectiveness and performance of suggested means of reducing the consequences of events in which severe damage or substantial melting of the core occurs, in particular, systems for controlled, filtered venting of the containment and for preventing the uncontrolled combustion of hydrogen?
- (7) How should other requirements, and in particular those for siting, emergency plans and procedures, training or other related areas, be modified if such design features were required?
- (8) What additional information is required or desirable before setting requirements? What information is available, and what information needs to be developed through experiment, test, analysis, or evaluation?
- (9) What should be the final form of the requirement, if any? What should be the implementation schedule for new plants, plants under construction, and operating plants?

The Task Force recommends that a proposed rule be published for public comment within one year of the notice of intent.

### Response

TVA will continue to follow this issue and will review the proposed rule.

# 11. SAFETY GOAL FOR REACTOR REGULATION

The Commission should undertake with the staff the development and articulation of clear criteria to define the basic safety goal for nuclear power plant regulation. Since this goal will be used as a benchmark by the staff in defining new regulatory requirements, definitive policy guidance should also be developed regarding the threshold for backfitting of new requirements to existing plants. The Task Force believes that the goal should be supplemented where possible with quantitative reliability or risk criteria, with limitations being placed on their use to assure that such criteria do not impede the capability for timely decisionmaking.

## Response

TVA concurs with this position.

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## 12. STAFF REVIEW OBJECTIVES

The approach, methods, and organization of the NRC staff in performing licensing reviews of nuclear power plants should be revised to emphasize the following objectives:

- (1) An overall system level, integrated review that gives full consideration to operational safety aspects and provides for a design basis accident assessment function from event initiation through consequence mitigation, including the review of emergency operating procedures.
- (2) Timely analysis of operating experience and implementation of needed changes derived from operating experience.
- (3) Discipline in the application of a single overall safety goal.
- (4) Continuity of licensing cognizance and responsibility from initial plant licensing, throughout construction and into operation.
- (5) Technical oversight of Safety Evaluation Reports to assure increased emphasis on safety while still satisfying the requirements of the administrative process of regulation.
- (6) Assurance of adequate operations experience and training for the NRC technical review staff, especially those staff members assigned responsibility in accident response situations.
- (7) Dedication of adequate resources to the three principal functions of the Office of Nuclear Reactor Regulation: reactor licensing, oversight of operating reactors, and resolution of generic safety issues.
- (8) Use of a formal procedure for followup on questions and requests from the Advisory Committee on Reactor Safeguards and its individual members.

### Response

TVA does not believe it appropriate to comment except to support the theme of more attention to operational safety.

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### Item 13 NRR Emergency Response Team

The Task Force recommends the establishment of a designated NRR Emergency Response Team (ERT) to be on immediate call in the event of emergencies. The ERT should be a multi-disciplinary group composed of NRR personnel knowledgeable in reactor systems, instrumentation and control, core physics, accident analysis, radiation control, and health physics. In the selection of team members, emphasis should be given to applicable operations experience where possible, and the team should be trained and drilled regularly in emergency response. The Task Force recommends that the Emergency Response Team be identified and on call by November 15, 1979, and at least several members of that team be relieved temporarily of normal duties to devote full time to the initial ERT task (to be completed February 1, 1980) of identifying resource requirements, procedures, training, and facilities, including deployment in the field, to enable effective emergency response by NRR in support of the Executive Management Team and the Incidence Response Action Coordination Team (IRACT) in the NRC Incident Response Center. The Task Force further recommends that the Commission consider the potential for NRC involvement in nuclear emergencies in foreign countries and provide definitive groundrules for the NRC staff role in such response.

#### Response:

TVA concurs in this position and would assist in any way possible with implementation of this concept. However, this concurrence does not indicate abdication of TVA's position that the licensee has primary responsibility of plant operations, including the handling of emergencies.

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