TVA NUCLEAR PROGRAM REVIEW:

Sequoyah Nuclear Plant and the Report of the President's Commission on the Accident at Three Mile Island

Task Force on Nuclear Safety
Tennessee Valley Authority
November 1979

PREFACE

This Report was prepared by the special task force appointed by the TVA General Manager to review Sequoyah Nuclear Plant unit 1 in light of the recommendations contained in the Report of the President's Commission on the Accident at Three Mile Island. The task force members are:

E. Gray Beasley, Chief, Nuclear Safety Review Staff - Cochairman

David G. Powell, Associate General Counsel - Cochairman

Ernest A. Belvin, Jr., Manager, Office of Health and Safety

H. J. Green, Assistant Manager of Power Operations

Carlyle Michelson, Nuclear Staff Specialist

Larry M. Mills, Manager of Nuclear Regulation and Safety

Dwight R. Patterson, Chief, Nuclear Engineering Branch

Lee C. Sheppeard, Acting Director of Information

E. Gray Beasley

David G. Powell

Ernest A. Belvin, Jr.

H. J. Green

Carlyle Michelson

Larry M. Mills

Dwight R. Patterson

Lee C. Sheppeard

1808 149

INTRODUCTION

On Wednesday, October 31, 1979, the Report of the President's Commission on the Accident at Three Mile Island (Kemeny Report or Report) was released. On Monday, November 5, the TVA General Manager appointed this task force to review the recommendations in the Kemeny Report, and to report its findings promptly to him. The Report concentrates on Sequoyah Nuclear Plant since unit 1 at that plant is ready to load fuel.

The work of the task force was greatly facilitated due to the TVA Nuclear Program Review, a special report to the TVA Board made shortly after the Three Mile Island (TMI) accident. This review made many recommendations which were also recommended in the Kemeny Report, especially in the areas of operator training, emergency planning, postaccident monitoring, and establishment of an independent safety group to review nuclear plant design, construction, and operation.

With regard to those recommendations directed to the utility and its suppliers, Sequoyah unit 1 essentially meets the Report's recommendations through the integrated management of TVA, the force-account method of designing, constructing, and operating nuclear plants, the safety-first attitude of the TVA Board of Directors and the ability of the TVA Board to set rates which permit implementation of new safety measures and standards of excellence.

The TVA nuclear program is a leader in operator training and in some aspects exceeds the recommendations in the Report.

Most of the recommendations in the Report relating to technical deficiencies have already been examined for the Sequoyah plant and have been or are being corrected. Some of the recommendations will require further study and evaluation for future action. Hydrogen generation, consideration of core melt, and postaccident cleanup are examples in this category.

In the area of worker and public health and safety, this study shows that Sequoyah has a fully adequate supply of equipment and trained personnel to meet the recommendations, and that TVA supports health-related radiation effects research.

The emergency planning and response recommendations have been more than satisfied at Sequoyah. The Sequoyah emergency plan has been fully coordinated with federal, state, and local agencies and has received the highest attention by the Governor of Tennessee and the TVA Board.

The discussion of the recommendations in the Report concerning the public's right to information shows that TVA is internally equipped to fully inform the public during an emergency. TVA will expand its ongoing program to educate the media and the public concerning nuclear power.

Some of the Kemeny Report recommendations are beyond the scope of TVA's responsibilities. For example, we have not responded to those directed to the Nuclear Regulatory Commission's basic mandate, structure, and functions. Other recommendations are directed to matters that require a united industry effort which may take months or years to accomplish. The

most that TVA can do at this time is to participate in and support those efforts.

While specific responses to the Kemeny Report recommendations are important, the Three Mile Island accident has a fundamental lesson in it which must be heeded--a fundamental change in attitude toward safety is essential.

We believe that the TVA Nuclear Program Review in May of this year reflected changes in attitudes toward safety; outlined innovative steps which TVA was already taking; and initiated others that went beyond existing regulatory requirements, such as the Nuclear Safety Review Staff.

The conclusion of this task force is that the TVA nuclear program, and specifically Sequoyah Nuclear Plant, measures up very well against the recommendations made by the President's Commission on Three Mile Island. Even so, this task force identified several items where further TVA actions are appropriate and recommends that TVA:

1. Endorse the concept of the Institute for Nuclear Power Operations and pursue membership with the understanding that the Institute will consolidate the efforts on review and analysis of operating experience (see response to recommendation B.1.).

2. Expand the operator training program and associated simulator program to include more complex transients as these more complex

1808 152

transients are identified and defined (see response to recommendation C.3).

3. Continue a systematic evaluation of post accident monitoring to determine any additional needs (see response to recommendation D.1).

4. Study ways to contain larger amounts of hydrogen and to backfit feasible features into the Sequoyah design (see response to recommendation D.2.2).

5. Study possible operator actions for multiple failure and to use this information to instruct operators (see response to recommendation D.4.a).

6. Study the letdown/makeup system to determine if it is necessary to enclose the system or to provide means to route excess waste gas to the containment (see response to recommendation D.4.c.ii).

7. Monitor the cleanup effort at Three Mile Island and plan for cleanup of major accidents at Sequoyah (see response to recommendation D.6).

8. Offer to assist the media in training reporters (see response to recommendation G.3).

It is the conclusion of this task force that the TVA program meets the recommendations of the Kemeny Commission Report.

1808 153

TABLE OF CONTENTS

1808 154

COMMISSION RECOMMENDATION A. THE NUCLEAR REGULATORY COMMISSION

The Commission found a number of inadequacies in the NRC and therefore, proposes a restructuring of the agency. Because there is insufficient direction in the present statute, the President and Congress should consider incorporating many of the following measures in statutory form.

Agency Organization and Management

The Commission believes that as presently constituted, the NRC does not podsess the organizational and management capabilities necessary for the effective pursuit of safety goals. The Commission recommends: . . .

The Agency's Substantive Mandate

The new agency's primary statutory mission and first operating priority must be the assurance of safety in the generation of nuclear power, including safeguards of nuclear materials from theft, diversion, or loss. Accordingly, the Commission recommends the following: . . .

Agency Procedures

The Commission believes that the agency must improve on prior performance in resolving generic and specific safety issues. Generic safety issues are considered in rulemaking proceedings that formulate new standards for categories of plants. Sepcific safety issues are considered in adjudicative proceedings that determine whether a particular plant should receive a license. Both kinds of safety issues are then dealt with in inspection and envorcement processes. The Commission believes that all of these agency functions need improvement, and accordingly recommends the following measures: . . .

Response

These recommendations are directed to the Nuclear Regulatory Commission and its basic mandate, structure, and functions. It would not be appropriate for TVA to respond to these recommendations.

1808 155

COMMISSION RECOMMENDATION B. THE UTILITY AND ITS SUPPLIERS

B.1 To the extent that the industrial institutions we have examined are representative of the nuclear industry, the nuclear industry must dramatically change its attitudes toward safety and regulations. The Commission has recommended that the new regulatory agency prescribe strict standards. At the same time, the Commission recognizes that merely meeting the requirements of a government regulation does not guarantee safety. Therefore, the industry must also set and police its own standards of excellence to ensure the effective management and safe operation of nuclear power plants.

a. The industry should establish a program that specifies appropriate safety standards including those for management, quality assurance, and operating procedures and practices, and that conducts independent evaluations. The recently created Institute of Nuclear Power Operations, or some similar organization, may be an appropriate vehicle for establishing and implementing this program.

Response

TVA endorses the concept of the newly established Institute of Nuclear Power Operations. The Evaluation and Assistance Division within the institute will provide appropriate safety standards and independent evaluations of industry compliance to such standards. However, it will be sometime before the institute is fully functional.

TVA does specify safety standards in its nuclear program in several ways, and does provide for feedback to top TVA management concerning nuclear safety issues. TVA has a comprehensive quality assurance program independent of the design, construction, and operating divisions. Operational quality assurance requirements are applied both to the selection and training of personnel and to all activities affecting the quality of safety-related items. This is reviewed and audited by an independent quality assurance staff.

1808 156

TVA is also a member of an industry group that performs periodic independent audits of each utility's complete quality assurance program. The audit team is composed of QA specialists from the utilities other than the one being audited.

The TVA Nuclear Safety Review Board advises the Manager of Power on the adequacy and implementation of TVA's nuclear safety policy and program and provides an independent, offsite review. This board also maintains an overview of the quality assurance programs.

TVA has a Nuclear Safety Review Staff which is independent of the power, design, and construction operations. This staff reports through the Director of the Office of Health and Safety to the General Manager to advise on the adequacy of the safety of the TVA nuclear program. The staff also makes recommendations for changes to enhance nuclear plant safety. See response to recommendation B.2 for a more detailed discussion.

b. There must be a systematic gathering, review, and analysis of operating experience at all nuclear power plants coupled with an industry-wide international communications network to facilitate the speedy flow of this information to affected parties. If such experiences indicate the need for modifications in design or operation, such changes should be implemented according to realistic deadlines.

Response

TVA has a Nuclear Experience Review Panel, an interdivisional, interdisciplinary group with engineering, operations, and quality assurance expertise. The Panel reviews many sources of operating information, including reports initially prepared and directed to NRC by other licensees, events abstracted and reported in various publications, industry trade journals, NRC releases, Electric Power Research Institute Technical

Summaries, vendor information letters, personal communications, and other industry publications.

These reviews assess the reports for generic problems that could affect safe plant operation, and select items which would be helpful in operator training by pointing out personnel error and operating problems at other nuclear plants. In addition, each plant staff is required to review various industry publications, including the NRC "Gray Book" and listings of reportable occurrences, to assist in bringing industry information of a generic nature to a specific application in TVA nuclear plants.

TVA endorses the concept of the Institute for Nuclear Power Operations taking the lead in the systematic gathering, review, and analysis of operating experience. TVA is pursuing membership in the Institute under the concept that the Institute will be the focal point for such work and will consolidate in the Institute the review and analysis now being conducted in several different organizations.

B.2 Although the Commission considers the responsibility for safety to be with the total organization of the plant, we recommend that each nuclear power plant company have a separate safety group that reports to high-level management. Its assignment would be to evaluate regularly procedures and general plant operations from a safety perspective; to assess quality assurance programs; and to develop continuing safety programs.

Response

Since the accident at Three Mile Island, TVA has established a Nuclear Safety Review Staff completely independent of the power, design, and construction organizations. This staff advises on actions needed to

protect public health and improve nuclear safety and reports to the TVA Board through the General Manager and the Office of Health and Safety. The staff performs an overview function that regularly reviews procedures, practices, general nuclear plant operations, and the nuclear design and construction programs. The staff works directly with employees and management to resolve employee concerns on nuclear safety, where the employee feels that the nuclear safety concern is not being adequately addressed.

The Nuclear Safety Review Board, which is in the power organization but independent of the operating division, advises the Manager of Power on the adequacy and implementation of TVA's nuclear safety policy and program.

B.3 Integration of management responsibility at all levels must be achieved consistently throughout this industry. Although there may not be a single optimal management structure for nuclear power plant operation, there must be a single accountable organization with the requisite expertise to take responsibility for the integrated management of the design, construction, operation, and emergency response functions, and the organizational entities that carry them out. Without such demonstrated competence, a power plant operating company should not qualify to receive an operating license.

a. These goals may be obtained at the design stage by 1) contracting for a "turn-key" plant in which the vendor or architect-engineer contracts to supply a fully operational plant and supervises all planning, construction, and modification; or 2) assembling expertise capable of integrating the design process. In either case, it is critical that the knowledge and expertise gained during design and construction of the plant be effectively transferred to those responsible for operating the plant.

b. Clearly defined roles and responsibilities for operating procedures and practices must be established to ensure accountability and smooth communication.

c. Since, under our recommendations, accountability for operations during an emergency would rest on the licensee, the licensee

1808 159

must prepare clear procedures defining management roles and responsibilities in the event of a crisis.

Response

Sequoyah unit 1 was designed, built, and will be operated by TVA forces. This integrated organization under one corporate management is effective in transferring experience gained during design and construction to the operating organization. In both the design and operating divisions, TVA has separated the nuclear organization from the organizations responsible for plants operating on coal, oil, and hydroelectric power. It has placed a senior management person experienced in nuclear plant operation as assistant to the Manager of Power Operations (TVA's chief operating officer). These moves were designed to put management emphasis on nuclear safety and to separate the nuclear safety effort and expertise in support of its nuclear power plants from the conventional power program.

The TVA design organization remains responsible for the design of a nuclear plant for the life of the plant, which provides a vital continuity. Modifications cannot be made to a nuclear plant without the involvement and concurrence of the design organization. In addition, design personnel are readily available to assist, not only during emergency situations but also in day-to-day operational problems. The operation and support of a TVA nuclear plant is a total TVA function and provides for transfer of information between the design and operating organizations.

TVA has established office procedures and interdivisional procedures to ensure that the knowledge and expertise gained during design and construction of the Sequoyah plant are effectively transferred to the operating

division. Similar procedures are in place to assure that operational information will be fed back to the design organization. The procedures were, for the most part, originally developed to accommodate the Browns Ferry Nuclear Plant and have been revised and improved based upon that experience.

In addition to the TVA practice of demonstrating and proving nuclear plant operational procedures at the training simulator and during the preoperational and startup test periods, a new TVA interdivisional procedure will require all operating procedures to be reviewed by the Division of Engineering Design as a prerequisite to their use at Sequoyah. This will further ensure that the manner in which plant systems and components are operated is consistent with the basic design intent.

TVA has a system of office, division, and plant procedures which clearly delineate management roles and responsibilities for day-by-day and emergency operations. Specifically, the radiological emergency plan clearly establishes the role of various levels of management, including corporate management during emergencies. As a result of TMI, TVA has already implemented several changes to improve its response capability and anticipates further changes as NRC requirements are issued. A radiological drill conducted at Sequoyah Nuclear Plant on October 28 and 29, the third and most comprehensive at this plant, demonstrated the effectiveness of the TVA radiological emergency plan.

B.4 It is important to attract highly qualified candidates for the positions of senior operator and operator supervisor. Pay scales should be high enough to attract such candidates.

Response

Within TVA, all candidates for nuclear plant operator positions, regardless of prior education and work experience, are initially placed in a comprehensive operator training program. This program requires operators to satisfactorily complete a minimum of 40 months of formal and on-the-job training before becoming eligible for operator positions requiring an NRC license. As part of this training, personnel must successfully pass a minimum of 12 examinations before progressing to the level requiring a license. Additionally, the on-the-job portion of the training program and the time-in-grade requirements for the assistant unit operator position provide several years in which the on-shift performance of personnel in these classifications can be evaluated to provide further assurance of suitability before progressing to licensed operator positions.

The TVA program is successful in attracting and retaining competent, motivated personnel within its operator program. This has been accomplished by offering personnel entering the program a career vocation with unlimited advancement potential and a formal academic training curriculum comparable to a technical degree at an associate level.

We believe that incentives in TVA for senior reactor operators and shift engineers, including pay, career incentives, benefits, and pay differential for licenses, are fully adequate to attract and retain highly qualified personnel.

Section C provides a more detailed discussion of the operator training program.

B.5 Substantially more attention and care must be devoted to the writing, reviewing, and monitoring of plant procedures.

a. The wording of procedures must be clear and concise.

b. The content of procedures must reflect both engineering thinking and operating practicalities.

c. The format of procedures, particularly those that deal with abnormal conditions and emergencies, must be especially clear, including clear diagnostic instructions for identifying the particular abnormal conditions confronting the operators.

d. Management of both utilities and suppliers must insist on the early diagnosis and resolution of safety questions that arise in plant operations. They must also establish deadlines, impose sanctions for the failure to observe such deadlines, and make certain that the results of the diagnoses and any proposed procedural changes based on them are disseminated to those who need to know them.

Response

Clarity and conciseness of all procedures are checked by their use during operator training on the simulator and during preoperational and startup testing of the unit.

A substantial efffort has been underway in TVA to improve plant procedures. All Sequoyah plant procedures are reviewed by the plant operations review committee and quality assurance staff and approved by the plant superintendent before being used. In addition, all operating procedures will be reviewed by design engineers in the Office of Engineering Design and Construction before being used at Sequoyah. Plant operating and test procedures are used at the plant simulator where they undergo review by experienced personnel. Clarity and conciseness are also checked during preoperational and startup testing of the plant.

1808 163

As procedures are reviewed on a periodic basis, substantial attention will be given to determining that the operator is provided with as much information as possible, including format, clarity, conciseness, engineering, and operating factors, to assure that safety is a prime consideration.

All plant procedures are written to comply with a preestablished format, with predefined checklists provided when necessary. Hold points for second-party or quality assurance verification are provided if appropriate. Strict guidelines for any actions to be taken based on measurable and observable parameters are provided in procedures whenever needed. Whenever additional verifying information is available for decisionmaking, especially in abnormal conditions and emergencies, the availability and accessibility of the needed information is in the procedure to assist in diagnosis. As we complete analyses of additional abnormal situations, we will develop procedures to respond and will include applicable diagnostic information from the analysis.

TVA requires that all vendors and contractors providing equipment or services relating to safe operation of the plant be committed to the reporting stipulations of 10 C.F.R. pt. 21 (1979), which provides sanctions for failure to report. TVA has demonstrated in its past performance in response to NRC concerns, bulletins, orders, and information concerning possible deficiencies received from other sources, that it complies with both the letter and spirit of the regulations by providing timely review of safety problems, whether they are generic in nature or plant specific.

1808 164

Procedures are in force concerning review of items which have safety significance or which may constitute an unreviewed safety question. This includes review of findings by the plant operations review committee, the plant independent Nuclear Safety Review Board, with overview by the Nuclear Safety Review Staff. These groups also review reported or suspected incidents involving safety questions, violations of the technical specifications, violations of plant instructions, reportable occurrences, unusual events, operating anomalies, and abnormal performance of plant equipment.

In addition, TVA employees can appeal safety concerns by several different routes when they do not feel management is responsive.

TVA has a system in place to document that all licensed personnel are informed of any administrative or operational procedure or procedure changes which could affect their duties. This assures that the necessary information is received. Changes in plant design are reviewed to determine whether corresponding changes are needed to plant procedures.

TVA has within the Division of Nuclear Power and each plant a system for tracking all assignments, with particular attention paid to items of safety significance. The system establishes deadlines for completing tasks, with routine weekly reviews of the status of all open items. Division of Nuclear Power management is thus made aware in a brief, concise format of the status of staff assignments and can use this information to provide sanctions for those failing to meet deadlines.

1808 165

B.6 Utility rate-making agencies should recognize that implementation of new safety measures can be inhibited by delay or failure to include the costs of such measures in the utility rate base. The Commission, therefore, recommends that state rate-making agencies give explicit attention to the safety implications of rate-making when they consider costs based on "safety-related" changes.

Response

Fixing electric power rates is a matter which Congress has entrusted to the discretion of TVA under the Tennessee Valley Authority Act of 1933, 48 Stat. 58, as amended, 16 U.S.C. §§ 831-831dd (1976). This discretion is not subject to judicial review. Thus TVA power rates are not controlled by any other agencies. The TVA Board is fully committed to a very strong nuclear safety program and recognizes the cost and rate implications of safety-related changes.

1808 166

COMMISSION RECOMMENDATION C. TRAINING OF OPERATING PERSONNEL

C.1 The Commission recommends the establishment of agency-accredited training institutions for operators and immediate supervisors of operators. These institutions should have highly qualified instructors, who will maintain high standards, stress understanding of the fundamentals of nuclear power plants and the possible health effects of nuclear power, and who will train operators to respond to emergencies. (See recommendation A.4.a.)

a. These institutions could be national, regional, or specific to individual nuclear steam systems.

b. Reactor operators should be required to graduate from an accredited training institution. Exemption should be made only in cases where there is clear, documentary evidence that the candidate already has the equivalent training.

c. The training institutions should be subject to periodic review and reaccreditation by the restructured NRC.

d. Candidates for the training institute must meet entrance requirements geared to the curriculum.

Response

TVA has its own Power Operations Training Center, an institution for those employees who operate and supervise the shift operations of its nuclear power plants and is independently pursuing accreditation of the training center's training curriculum. TVA fully supports the Institute of Nuclear Power Operations and expects to play an active role in establishing Institute policy and direction. TVA will require that its training program meet or exceed Institute standards in the areas of curriculum and qualification of instructors.

The TVA Power Operations Training Center is an NRC-approved training facility utilizing the most modern equipment and methods available, and the center maintains what TVA believes to be the industry's highest standards in the initial training and retraining of all the TVA nuclear

1808 167

plant operators and operations supervisory personnel. This center is presently headed by a highly qualified individual with both operating and university experience. All instructors at the training center who teach nuclear plant operators are highly qualified persons who are either qualified licensed operators or college faculty members. The one exception is the certified health physics technician who teaches courses in radiation protection. All operator candidates entering the TVA operator nuclear program must complete all training requirements regardless of educational background or previous related training.

When selecting candidates for the nuclear operator training program, only those scoring in the top one-third on the General Aptitude Test Battery are selected for further consideration. The selected candidates are then screened prior to acceptance into the operator program as follows: they must have a suitable educational background; must indicate a high aptitude for power plant operation; and must successfully complete thorough physical, physiological, and personal security examinations.

As a result of the TVA Nuclear Program Review published in June 1979, additional intelligence testing will be required starting January 1980 in the selection screening process for nuclear operators.

C.2 Individual utilities should be responsible for training operators who are graduates of accredited institutions in the specifics of operating a particular plant. These operators should be examined and licensed by the restructured NRC, both at their initial licensing and at the relicensing stage. In order to be licensed, operators must pass every portion of the examination. Supervisors of operators, at a minimum, should have the same training as operators.

1808 168

Response

A TVA candidate for an NRC reactor operating license is required by TVA to have completed the 26-month student operator training program, which covers all aspects of nuclear power plant operation. He is also required to serve a minimum of 14 months as an assistant unit operator, which includes having successfully completed a highly technical and comprehensive 13-week program of study consisting of classroom lectures, plant unique simulator exercises, observation training, and plant walkthrough exercises.

During this training program, each candidate is closely supervised and evaluated. Each candidate's progress is completely documented and this documentation is available for review at any time. Supervisors of operators receive the same training as licensed operator personnel.

Sequoyah operations personnel who are candidates for an NRC reactor operator or senior reactor operator license have completed this basic TVA training. In addition, those Sequoyah license candidates who have not been previously licensed at Browns Ferry have been at the Sequoyah site for a minimum of five years participating in procedure preparation and preoperational testing activities in conjunction with their license training activities. Most of the Sequoyah cold license candidates have completed at least six different courses on the simulator in addition to the eight-week cold license training course. These additional training courses have averaged about one week in duration and have involved cold

1808 169

license retraining, special refresher programs, and special accident analysis training.

TVA agrees that NRC should give the initial license examination. Rather than NRC conducting relicensing or requalification examinations of licensed TVA personnel on an individual basis, TVA feels the recommendation can be met by NRC placing emphasis on continually evaluating and monitoring the adequacy of TVA's operator requalification program on a program basis.

C.3 Training should not end when operators are given their licenses.

a. Comprehensive ongoing training must be given on a regular basis to maintain operators' level of knowledge.

b. Such training must be continuously integrated with operating experience.

c. Emphasis must be placed on diagnosing and controlling complex transients and on the fundamental understanding of reactor safety.

d. Each utility should have ready access to a control room simulator. Operators and supervisors should be required to train regularly on the simulator. The holding of operator licenses should be contingent on performance on the simulator.

Response

Training at TVA does not end when an operator receives a license. TVA's requalification program requires that each license holder, including the operation supervisors, attend three weeks of training each year. This training consists of classroom lectures and simulator exercises conducted on a plant-specific simulator. TVA presently has plant-specific simulators for the Browns Ferry, Sequoyah, and Watts Bar Nuclear Plants and has committed to provide plant-specific simulators for any future nuclear plants.

Each reactor and senior reactor operator's training evaluations are fully documented and are available for review at any time. TVA provides weekly operator upgrade training based on plant and applicable experiences. This training includes a review of reportable occurrences from both within and outside of TVA, vendor information letters, procedure changes, and plant modifications. Training which requires the use of simulators is conducted during the annual retraining at the Power Operations Training Center. During the simulator exercises, emphasis is placed on diagnosing and controlling transients, including multiple failures, on the specific plant for which the operators have a license. As more complex transients are identified that are not presently modeled on the simulator, TVA will include this information in the training program and associated simulator exercises where possible.

C.4 Research and development should be carried out on improving simulation and simulation systems: a) to establish and sustain a higher level of realism in the training of operators, including dealing with transients; and b) to improve the diagnostics and general knowledge of nuclear power plant systems.

Response

The TVA simulators have a high degree of fidelity and are constantly updated to reflect changes in plant design. TVA does not engage in simulator research and development activities but relies on the following:

1. TVA has a systematic program whereby engineers and operations specialists review and evaluate for operator training purposes all Browns Ferry, Sequoyah, and Watts Bar design changes to identify those that could affect plant operational characteristics or

control board design. Simulator consoles and programs are updated to reflect these design changes as appropriate.

2. For operating plants, appropriate personnel review the annual report for each of the plants as a check to verify that all plant changes have been accounted for that might affect the simulator. For nonoperating plants such as Sequoyah, administrative procedures provide for the review of plant design modifications as they are implemented at the plant for possible impact on the simulator.

3. TVA coordinates the approval or certification of the simulators and training programs with NRC's Operator Licensing Branch.

4. Plant transients are studied in detail in the classroom and then demonstrated during the simulator exercises. Each license holder is evaluated for the ability to recognize and handle the transients.

5. Unusual occurrences or transients which occur in the plant are covered in simulator training whenever such events can be properly modeled and are within the capability of the simulator.

COMMISSION RECOMMENDATION D. TECHNICAL ASSESSMENT

D.1 Equipment should be reviewed from the point of view of providing information to operators to help them prevent accidents and to cope with accidents when they occur. Included might be instruments that can provide proper warning and diagnostic information; for example, the measurement of the full range of temperatures within the reactor vessel under normal and abnormal conditions, and indication of the actual position of valves. Computer technology should be used for the clear display for operators and shift supervisors of key measurements relevant to accident conditions, together with diagnostic warnings of conditions.

In the interim, consideration should be given to requiring, at TMI and similar plants, the grouping of these key measurements, including distinct warning signals on a single panel available to a specified operator and the providing of a duplicate panel of these key measurements and warnings in the shift supervisor's office.

Response

As part of its review of the TMI accident and its consequences, TVA has reviewed the Sequoyah plant design and had previously made several significant changes aimed at providing better information to operators. The following are features provided for this purpose. Many are in addition to the conventional instrumentation normally provided in nuclear plant control rooms.

1. Postaccident Monitoring and Sampling

TVA recognized the need for postaccident monitoring instrumentation and in 1975 provided redundant readout instruments for the vital parameters for Sequoyah Nuclear Plant. As a result of TMI, TVA has committed in the TVA Nuclear Program Review to install additional monitoring capability. Also, in response to NRC's Short-Term Lessons Learned Report (NUREG-0578), TVA has committed to add or upgrade additional instrumentation. These are all outlined below. TVA will continue a systematic evaluation of postaccident monitoring to determine any additional needs.

1975 Redundant Readout Instruments

(a) Reactor hot-leg temperature

(b) Reactor cold-leg temperature

(c) Reactor coolant system pressure

(d) Pressurizer level

(e) Containment pressure

(f) Containment sump level

(g) Steam line pressure

(h) Steam generator level (both wide and narrow range)

(i) Refueling water storage tank level

SQN also has redundant, qualified containment hydrogen analyzers.

TVA Nuclear Program Review

(a) Reactor vessel water level monitor (installed by 4-81)

(b) Saturation condition readout (installed now)

(c) Extended range of incore thermocouples (installed now)

(d) Containment radiation monitor (installed by 1-81)

(e) Residual heat removal system radiation monitor (installed by end of first refueling outage after equipment is delivered)

(f) Sampling of reactor coolant system (installed by 1-81)

(g) Sampling of residual heat removal system installed by end of first refueling outage after equipment is delivered

(h) Sampling of containment atmosphere (installed by 1-81)

1808 174

NRC Short-Term Lessons Learned

(a) high-range noble gas effluent monitors (installed by 1-81)

(b) particulate and iodine effluent monitors (state of the art) (installed by 1-81)

(c) containment radiation monitors (installed by 1-81)

(d) direct indication of valve position pressurizer relief and safety valves (installed now)

(e) high-range containment pressure (installed by 1-81)

The instruments have a range sufficient to cover the postulated accident conditions.

In addition, prior to TMI, TVA uniquely identified (on the control boards) those instruments specified for postaccident monitoring. The nametags for these instruments have a special symbol that enables them to be easily identified by the operator.

2. Status Monitoring System

The function of the status monitoring system is to provide the operator a continuous indication of the availability of the plant safety systems. The system makes use of computer technology to monitor the status of the plant safety systems and to display it to the operator in a simplified manner. This information is available on one console section within the operator's viewing area. Human factors relating to operator interface were considered in color selections, symbology, format density, design of the console,

1808 175

arrangement of the system status light assembly, and the display formats shown on the video unit. The formats show in a clear and concise manner the status of safety systems by displaying system flow diagrams.

This system was a part of the plant design prior to the TMI accident but is being expanded and improved as a part of TVA's Nuclear Program Review. These additions will be complete by May 1981.

3. Monitor Lights

There are special monitor lights for the purpose of giving quick indication when pumps and automatic valves in the safety injection, containment spray, and recirculation systems change to an off-normal condition. These monitor lights are grouped into monitoring panels on the main control boards in easy view of the operator. The monitor lights are illuminated when the component operating mode/position changes to the off-normal condition. The monitor lights have the same qualification as the control board annunciator and are testable. In addition to this monitor light arrangement, certain critical valves have an annunciator to indicate and alarm a change of the off-normal operational mode. To assist the operator in determining when a component is not in its correct mode, the monitor lights are grouped on the control board as follows:

Group 1 Those components whose status is not changed during the injection, spray, or recirculation phases of SIS operation.

1808 176

Group 2 Those components whose status is not changed during the injection phase but is changed during the cold-leg recirculation phase and remains in that position for the hot-leg recirculation phase.

Group 3 Those components whose status is changed during the injection phase and is changed back during the cold-leg recirculation phase and remains in that position for the hot-leg recirculation phase.

Group 4 Those components whose status is changed for the injection phase and maintained throughout both recirculation phases.

Group 5 Those components that are needed for containment isolation.

Group 6 Those components whose status is not changed during the injection, or cold-leg recirculation phases, but is changed for the hot-leg recirculation phase.

These lights allow the operator to quickly assess the status of the safety components after an accident. Those light groups for devices that must change status at the time of an accident are located within direct view of the operator.

This feature of Sequoyah Nuclear Plant design was incorporated prior to the TMI accident.

1808 177

4. TVA Simulators and Training

The Sequoyah simulator features an exact duplicate of the Sequoyah plant control room. Operators are trained and periodically retrained utilizing various accident sequences on the simulator. This training provides assurance that the operators are familiar with the control room layout including its response during accidents.

5. Continuing Design - Operability Review

TVA will continue its review of the Sequoyah control room design. The review will be done in accordance with procedures established by TVA and will meet guidelines and criteria to be defined by NRC as set forth in NUREG-0585. Backfits will be made if the review indicates that significant improvements in safety can be achieved.

6. Plant Status Display--Onsite Technical Support Center

In response to NUREG-0578, TVA has committed to provide plant status display in the onsite technical support center. The basic support center will be established; and plans for additional work, including the definition of plant status readout, will be submitted to NRC by January 1, 1980. Plant monitoring equipment will be installed in the technical control center by January 1, 1981.

D.2 Equipment design and maintenance inadequacies noted at TMI should be reviewed from the point of view of mitigating the consequences of accidents. Inadequacies noted in the following should be corrected: iodine filters, the hydrogen recombiner, the vent gas system, containment

1808 178

isolation, reading of water levels in the containment isolation, reading of water levels in the containment area, radiation monitoring in the containment building, and the capability to take and quickly analyze samples of containment atmosphere and water in various places. (see recommendation A.7.)

Response

1. Iodine Filters

According to the Commission findings (A.11), the TMI-2 iodine adsorbers were "partially expended due to improper use before the accident," and testing requirements to verify filter effectiveness were not accomplished. As a result, the iodine adsorbers did not perform as designed.

The design concepts of the iodine adsorbers for Sequoyah emergency gas treatment system (EGTS) and auxiliary building gas treatment system (ABGTS) are described in detail in section 6.2.3 of the Sequoyah FSAR. Features of these filters which assure effective removal of radioactive iodine and iodides in a radiological emergency are:

a. Both the EGTS and ABGTS are isolated from exposure to the building environs during normal plant operations. They are operated only during the radiological accident condition and during prescribed testing periods to assure they are operable and available if needed during an accident.

b. Both the EGTS and ABGTS contain redundant air cleanup units that are seismically qualified and served by class 1E power.

1808 179

c. The EGTS is very conservatively designed with a two-stage impregnated, activated carbon adsorber system. If, due to some unlikely condition, the first-stage adsorber should be rendered ineffective for iodine adsorption, it would protect the second-stage filter, which would remain effective for iodine and iodine adsorption.

d. The EGTS- and ABGTS- activated carbon beds have been tested initially prior to startup and will be tested periodically thereafter to provide assurance that the charcoal beds will effectively remove iodine when needed. Carbon beds not passing the prescribed test will be replaced.

The above-listed design features and stringent test requirements will assure effectiveness of these adsorbers in an emergency.

2. Hydrogen recombiners

Most power reactors, including Sequoyah, are not designed to accommodate the large amount of hydrogen which is now believed to have been generated during the Three Mile Island accident. For this reason we are reassessing the effect of hydrogen on plant safety. We believe that further long-term assessment of means to accommodate large amounts of hydrogen is needed, and TVA intends to participate in such efforts. However, TVA has taken several positive measures to prevent and to mitigate the consequences of hydrogen release; and we believe that the Sequoyah Nuclear Plant can be operated safely until the final resolution of this issue is made.

1808 180

There are several key features of the Sequoyah Nuclear Plant design which were not available at the Three Mile Island plant which would make it

much less probable that an event such as occurred at TMI could occur at Sequoyah. Also, operating procedures and operator training at Sequoyah have been modified as a result of TMI to emphasize the nature of such events. This will further decrease the probability of any event leading to hydrogen generation beyond the design basis.

We have evaluated the capability of the Sequoyah containment to withstand hydrogen releases beyond design and our analysis indicates that the Sequoyah containment has considerable margin beyond the design basis. Our analyses indicate that Sequoyah containment could withstand the TMI event without exceeding the calculated ultimate strength of containment.

The Sequoyah Nuclear Plant design has redundant, seismically qualified hydrogen recombiners inside the containment (see Sequoyah FSAR § 6.2.5) which have been environmentally qualified to operate under accident conditions.

The hydrogen recombiners are classified as passive equipment since they only require the operation of electrical heaters and open air draft passages to operate. Thus, they are very reliable. The equipment has a design life of 40 years and is designed to sustain all normal loads and accident loads including seismic loads and temperature and pressure transients from a loss-of-coolant accident. The equipment has been qualified for the design basis accident environmental conditions by simulated tests by Westinghouse. The installed equipment is tested prior to plant operation and periodically thereafter at six-month intervals.

1808 181

Two recombiners are installed inside containment. Only one is required to maintain combustible gas control for the design basis accident. The two recombiners provide 100 percent redundancy required for engineered safety features. For the design basis accident, which assumes 5 percent metal-water reaction, the concentration of hydrogen is maintained below 3 percent with one hydrogen recombiner in operation if the recombiner is started within 24 hours after the accident begins and operates at the design flowrate of 100 SCFM. The redundant recombiner, if available, could also be operated, thus doubling the hydrogen recombination capacity. By actual test one recombiner was measured to have a throughput of 113 SCFM and the other one measured 114 SCFM, giving a minimum capacity of 113 percent of design capacity.

The recombiners are manually actuated from the main control room and thus present no personnel radiation hazard in placing the equipment in operation. The recombiners can be placed in operation at any time.

This system has not been changed as a result of TMI.

3. Vent Gas System

At TMI a known leak in the gas waste header led to release of radioactivity when the makeup tank was vented to the system.

At SQN such a leak should be detected during normal operation by the plant effluent monitoring system, area and airborne radiation monitors, or health physics surveys, since such a leak would result in a release

of radioactive material to the building atmosphere. A daily review of outstanding maintenance items is made, which would result in prompt repair of a leak in the vent header.

4. Containment Isolation

The containment isolation system at SQN is designed to prevent the release of radioactive material to the environment after an accident while ensuring that systems important to postaccident mitigation are operational.

As a result of the TVA Nuclear Program Review, TVA will add radiation monitors to fluid lines that carry potentially radioactive material from inside to outside containment. These monitors automatically isolate the lines if the radiation level is high. These changes will be made prior to May 1981. In response to NUREG-0578, we have reviewed the SQN containment isolation system and have found it to be acceptable. Specifically, after containment isolation occurs, the isolation valves must be manually reset after the isolation signal is cleared before they can be opened. The results of our review and the system design are described in our response to NUREG-0578.

5. Reading of Water Levels in the Containment Area

The floor of the reactor building serves as the sump for the containment. It is instrumented with four separate, qualified, and continuous level instruments (wide range monitors) which indicate in the main control room. The range of the instruments is from less than 6 inches above the floor up to 20 feet above the floor. Expected maximum post-LOCA water level is 13.2 feet above the floor; this includes the fluid volume of the

refueling water storage tank, reactor coolant system, safety injection accumulators, and total ice melt. A small sump (about 120 cubic feet) in the reactor building floor serves as a collector for the recirculation piping exiting the containment.

These provisions were in the design of SQN prior to TMI.

6. Radiation Monitoring in the Containment Building

The present Sequoyah design has one high-range radiation monitor located in the auxiliary building opposite one of the containment personnel hatches. In response to NUREG-0578, TVA will provide by January 1, 1981, a second qualified high-range radiation monitor for each reactor unit. These monitors are designed to monitor radiation levels up to 10^8 rad/h inside containment.

While NRC has intended that these monitors be physically located inside the containment, TVA studies indicate that high containment radiation levels can be effectively monitored by placing the detection outside containment, thus eliminating problems associated with environmental qualification of the instruments.

7. The Capability To Take and Quickly Analyze Samples of Containment Atmosphere and Water in Various Places

In response to the TVA Nuclear Program Review and NUREG-0578, TVA will:

a. Make provisions for sampling water from the reactor coolant system and the residual heat removal system for the degraded accident conditions. Sample lines will be routed to a shielded sampling station in an accessible area.

1808 184

b. Make provisions for sampling the containment atmosphere for the degraded accident conditions. Sample lines will be routed to a shielded sampling station in an accessible area.

c. Analyze samples onsite if practical, or be capable of removal off-site for analysis. We have made provisions for Oak Ridge National Laboratory to analyze samples and will have available the provisions for transporting the sample from Sequoyah to Oak Ridge.

TVA is performing a design and operational review of the reactor coolant and containment atmosphere sampling systems and analysis facilities at the Sequoyah Nuclear Plant which will be complete by January 1, 1980. TVA will complete the modifications by January 1, 1981.

Until the design modifications are complete, procedures will be devised to evaluate the primary coolant system activity depending on the accessibility of the sampling stations for particular degraded conditions.

In the TVA Nuclear Program Review, it was decided to provide a sample of containment water by way of the RHR system in lieu of direct sampling of the sump. This decision was based on the following points:

a. The RHR system would provide a well mixed sample.

b. To provide a sample of the sump directly would require a new containment penetration and a piping run from the sample point through

1808 185

the containment into the lower compartment and through the crane wall. It would also require a pump and return line because of the long run of piping and the higher elevation of the sample station.

c. While the RHR sample does not provide any information until recirculation mode starts, it was felt that sampling of the sump without recirculation would not provide a representative sample because of a lack of mixing in the sump.

D.3 Monitoring instruments and recording equipment should be provided to record continuously all critical plant measurements and conditions.

Response

The SQN control room is equipped with numerous monitoring instruments (see response to recommendation D.1 above) showing plant measurements and conditions. In addition, critical plant measurements are recorded in the control room. Data is recorded on control room devices such as continuous chart recorders, computer-driven trend recorders, and computer output typers.

The continuous chart recorders are used for critical parameters needed by the operator during normal operation and for postaccident monitoring. There are 10 of these charts in the control room recording 18 parameters (for 2 units). There are 6 computer-driven trend recorders per unit, each capable of handling 2 parameters to display and record. The computer output typers (2 per unit) print out alarms as well as preselected parameters. There are about 1800 data points available in the computer for printout.

1808 186

The computer output typers will be replaced with higher speed devices. These will help ensure the rapid output of information from the computer; this is particularly useful during a disturbance which significantly increases the load on the computer. A joint project with Westinghouse is underway to replace the existing plant computer system with a new, more modern system. This replacement, which is expected to take approximately two years, will provide additional data acquisition, data handling, and data display capability. In addition to being able to scan more data, greater power is available for data analysis and for compatible displays of data for the operator.

D.4 The Commission recommends that continuing indepth studies should be initiated on the probabilities and consequences (on-site and off-site) of nuclear power plant accidents, including the consequences of meltdown.

a. These studies should include a variety of small-break loss-of-coolant accidents and multiple-failure accidents, with particular attention to human failures.

Response to a

As a result of the TVA Nuclear Program Review, TVA is committed to following closely the studies of small lossofcoolant and related accidents performed by the reactor vendors and NRC to assure that TVA concerns are resolved.

Utilities owning Westinghouse nuclear steam supply systems are funding studies by Westinghouse of the small-break loss-of-coolant accident and other related analyses described below. Work is well underway. TVA is providing financial support and guidance. Small break lossofcoolant accident analyses have already been performed and submitted to the NRC by

1808 187

Westinghouse. They present a comprehensive study of Westinghouse system response to small breaks.

Additional transient and accident analyses will use realistic computer models and will include event-tree analyses. The analyses will consider operator errors and equipment failures, including single failures in multiple-system and multiple-operator errors. The event-tree approach being examined by the owners group will permit the quantitative assessment of the probabilities of multiple failures of systems. The results of the study can then be used to determine the plant response to the more probable combinations of failures. By focusing on the more probable failure combinations, operating procedures and operator training can be improved.

The owners group program will also evaluate the long-term consequences of accidents using realistic assumptions which incorporate the effects of the following:

1. Operator's failure to act when required.
2. Operator's inappropriate actions during an accident.
3. Additional failures.
4. Selected system operations (e.g., restarting of reactor coolant pumps, etc.). The event tree approach will aid in this evaluation.

TVA will study and consider operator actions that could be taken for various multiple-failure situations where the situations go beyond the design basis events presently considered. To some extent this has been

1808 188

done earlier, and some mitigating features for these multiple-failure events are included in present TVA designs. These studies will utilize qualitative analyses and will be documented in succinct narrative form. The studies will include identification of the major factors that should be considered in the actions taken by the operators and engineers to ameliorate the postulated multiple-failure situations should the situation ever occur. These studies will be based on present designs and the equipment and systems that are included in these designs. In general, TVA does not propose that software and hardware changes be made based on these studies, or that emergency and abnormal operating procedures be developed for these events.

These studies will be discussed in operator training as general guidelines for handling multiple-failure situations. The techniques of qualitative safety review will be reviewed with operators simultaneously with the discussion of the guidelines. The studies will be available in the various emergency centers for those persons responsible for emergency situations.

b. Results of these studies should be used to help plan for recovery and cleanup following a major accident.

Response to b

The results of data gathered from the TMI recovery and the accident studies will be used in developing future plans for postaccident cleanup.

c. From these studies may emerge desirable modifications in the design of plants that will help prevent accidents and mitigate their consequences. For example:

(i) Consideration should be given to equipment that would facilitate the controlled safe venting of hydrogen gas from the reactor cooling system.

Response to c(i)

TVA will provide the capability to vent the reactor pressure vessel, the pressurizer, and the high points in the primary system piping of the plant. All venting operations will be conducted by the operator from the control room, and the vent system will be designed in accordance with safety system design practices. The installation will be done in two phases. Phase I will provide remote manual venting capability to the containment by January 1981. Phase II will complete the installation by providing throttled venting capability to the containment and the pressurizer relief tank. Phase II will be completed by October 1982. TVA plans are described in more detail in our response to NUREG-0578, the NRC task force report on short-term recommendations following the TMI accident.

(ii) Consideration should be given to overall gas-tight enclosure of the letdown/makeup system with the option of returning gases to the containment building.

Response to c(ii)

TVA is studying the letdown/makeup system to determine whether it is desirable, based upon the Sequoyah design, to enclose the system or to provide a means to route excess waste gases to the containment.

d. Such studies should be conducted by the industry and other qualified organizations and may be sponsored by the restructured NRC and other federal agencies.

Response to d

We agree that the recommended studies are needed. We believe that a comprehensive effort should first be defined by NRC. We welcome the opportunity to participate in an effort to define the scope of such studies.

D.5 A study should be made of the chemical behavior and the extensive retention of radioactive iodine in water, which resulted in the very low release of radioiodine to the atmosphere in the TMI-2 accident. This information should be taken into account in the studies of the consequences of other small-break accidents.

Response

TVA agrees that information of the type suggested in the Commission's recommendation can aid in a more realistic assessment of the dose to the public following a nuclear accident. This will better assist responsible public officials in making decisions under those circumstances. TVA's calculations of the dose consequences of accidents at its nuclear plants have generally been designed to demonstrate the safety of these plants and have therefore used conservative assumptions and methodology.

D.6 Since there are still health hazards associated with the cleanup and disposal process, which is being carried out for the first time in a commercial nuclear power plant, the Commission recommends close monitoring of the cleanup process at TMI and of the transportation and disposal of the large amount of radioactive material. As much data as possible should be preserved and recorded about the conditions within the containment building so that these may be used for future safety analyses.

Response

TVA will closely monitor the cleanup processes at TMI and the transportation and disposal of the large amount of radioactive material. Data gathered and experience gained from these operations will be evaluated for use in future safety analysis, design, and plans for cleanup.

TVA will formulate procedures and plans for postaccident cleanup and radioactive waste disposal. SQN has certain provisions which, although designed for radiation protection during normal operation, should ease accident cleanup. These include:

1808 191

1. Use of metal reflective insulation for most applications inside containment.

2. Special decontamination coating on many surfaces inside containment and in many areas of the auxiliary building.

3. Extensive compartmentation of auxiliary building with significant shielding provided between areas.

In addition, the containment design, which is divided into upper and lower compartments with the lower compartment subdivided by the crane wall, should help in containment cleanup.

D.7 The Commission recommends that as a part of the formal safety assurance program, every accident or every new abnormal event be carefully screened, and where appropriate be rigorously investigated, to assess its implications for the existing system design, computer models of the system, equipment design and quality, operations, operator training, operator training simulators, plant procedures, safety systems, emergency measures, management, and regulatory requirements.

Response

TVA is in complete agreement with the President's Commission regarding the importance of experience of operating plants. TVA presently devotes substantial effort to the review of Licensee Event Reports (LER's) and other operating experience through the efforts of the Nuclear Experience Review Panel in the Division of Nuclear Power and the Nuclear Safety Review Board in the Office of Power. The present TVA program also includes the Task Force on Availability and Reliability Improvement, which is charged with coordinating TVA efforts to develop a data system to provide an effective utilization of large amounts of operating

information from TVA and other U.S. nuclear plants. TVA's design organization has committed to review LER's to assess implications on plant design. Likewise, TVA's operating organization will review LER's to assess implications on operations and training.

TVA has established the Nuclear Safety Review Staff, which is independent of the TVA design, construction, and power organizations. One responsibility of the NSRS is to perform an overview investigation and review of operating events or incidents at TVA nuclear plants. These overviews will assess the implications on the many varied aspects of nuclear safety.

1808 193

COMMISSION RECOMMENDATION E. WORKER AND PUBLIC HEALTH AND SAFETY

E.1 The Commission recommends the establishment of expanded and better coordinated health-related radiation effects research. This research should include, but not be limited to:

a. biological effects of low levels of ionizing radiation;

b. acceptable levels of exposure to ionizing radiation for the general population and for workers;

c. development of methods of monitoring and surveillance, including epidemiologic surveillance to monitor and determine the consequences of exposure to radiation of various population groups, including workers;

d. development of approaches to mitigate adverse health effects of exposure to ionizing radiation; and

e. genetic or environmental factors that predispose individuals to increased susceptibility to adverse effects.

This effort should be coordinated under the National Institutes of Health -- with an interagency committee of relevant federal agencies to establish the agenda for research efforts -- including the commitment of a portion of the research budget to meet the specific needs of the restructured NRC.

Response

TVA supports the recommendation of expanded and better coordinated health-related radiation effects research. With the largest nuclear power program in the country, TVA is committed to collecting and supplying data for its numerous occupational radiation workers to the national registry for power plant workers as part of a research effort sponsored by the Electric Power Research Institute. The purpose of this national registry project is to develop a comprehensive data base of epidemiological information for workers in all phases of electric power generation, including both nuclear plants and fossil-fueled steam plants. This information, along with any additional data needed for epidemiologic surveillance,

1808 194

would be made available to a national coordinating agency such as the National Institutes of Health.

Radiation health effects such as cancer are rare, generally involve latent periods of 5 to 20 years before expression, and cannot be distinguished from identical health effects caused by other factors. The results of controlled, well designed, and coordinated epidemiological studies probably lie years away. Existing work, such as studies of radiation workers at the Hanford facilities and studies of the general population using data collected in the Tri-State Survey, can provide valuable information for design and analysis procedures.

E.2 To ensure the best available review of radiation-related health issues, including reactor siting issues, policy statements or regulations in that area of the restructured NRC should be subject to mandatory review and comment by the Secretary of the Department of Health and Human Services. A time limit for the review should be established to assure such review is performed in an expeditious manner.

Response

It is not appropriate for TVA to respond to this recommendation.

E.3 The Commission recommends, as a state and local responsibility, an increased program for educating health professionals and emergency response personnel in the vicinity of nuclear power plants.

Response

Tennessee Department of Public Health, Division of Radiological Health (DRH), personnel attend the "Ten-Week Health Physics Course" in Oak Ridge, sponsored by Oak Ridge Associated Universities. Additionally, they attend a 2-week course in radiation emergency response at the Nevada Test Site. This course enables each person to participate in a series of simulated radiological incidents in a variety of roles.

Many Tennessee Department of Civil Defense and Emergency Preparedness personnel take "Introduction to Radiological Monitoring," a Federal Emergency Management Agency (FEMA) sponsored course, and other courses relevant to radiation emergency response.

Additionally, both civil defense and public health personnel are scheduled to attend the "Radiological Emergency Response Planning Course" sponsored by FEMA. The course is designed to enable State personnel to coordinate emergency response, such as evacuation and medical treatment.

TVA has met with volunteer fire and rescue personnel from Soddy-Daisy, Tennessee, near the Sequoyah plant, to plan for a radiological emergency and discuss preparedness needs. Emergency response personnel, which include Soddy-Daisy and Chattanooga fire and rescue squads and local hospitals, are designated in the radiological emergency plan and receive periodic training and/or participate in emergency exercises. These groups perform routine and emergency rescue services, supplement police service, and assist in providing communications and aid wherever needed.

E.4 Utilities must make sufficient advance preparation for the mitigation of emergencies:

a. Radiation monitors should be available for monitoring of routine operations as well as accident levels.

Response

1. Environmental Monitoring

TVA's environmental monitoring program has several features which are considered unique to the industry and which will provide

1808 196

valuable information and communication links during an emergency. These features include strip chart recording, telemetry to the control room, and voice communications between each monitoring station and the site environmental emergency control center.

a. Equipment

The routine atmospheric environmental radiation monitoring network is divided into three subgroups. Two local air monitors are located within the site boundary in the directions of the primary wind flow. Eight perimeter monitors are located at distances out to 11 miles from the plant in the more populated areas. Two remote air monitors are located at distances out to 19 miles from the site.

Each monitor collects iodine, rainwater, particle fallout, and moisture. Thermoluminescent dosimeters are used to record gamma radiation levels at each station.

Each of the local and perimeter air monitors continuously scans the particulate filter, and the disintegration rate of the atmospheric radioactivity is continuously recorded at each station. The count rates are telemetered to a strip chart recorder in the control room. There is also voice communication capability between each of these stations and the site environs emergency control center.

Thermoluminescent dosimeters are located at 16 stations out to approximately 10 miles from the plant site and 2 stations up to 19 miles away.

Three TLD's are placed at each station. Sufficient TLD's are being purchased to equip approximately 40 stations. These additional TLD's are expected to be in place prior to June 1980.

Three automatic water samplers are in operation on Chickamauga Reservoir in the vicinity of Sequoyah Nuclear Plant. One is also in operation on the intake of the first potable water supply on the Tennessee River downstream from SQN. A sampler is installed on an observation well between the plant and the river.

Samples collected from all of the stations discussed above are returned to TVA's Radioanalytical Laboratories at Muscle Shoals, Alabama, or Vonore, Tennessee, for detailed analysis.

The following equipment is on standby for accident monitoring. It is routinely inspected, checked, and calibrated to ensure that it will be ready to use when needed.

Four portable electric high-volume air samplers.

Four portable electric low-volume air samplers with charcoal canisters.

1808 198

Seven gasoline-powered electric generators.

Six GM survey meters.

Six Cutie Pie survey meters.

Five pressurized ionization chambers (PIC's).

Approximately 200 TLD's and a reader.

Three scalers with GM and sodium iodide detectors.

Three vehicles equipped with radio communications equipment and power converters.

Aircraft are also available for rapid response of Radiological Hygiene Branch personnel in Muscle Shoals, Alabama. These aircraft can also be equipped for monitoring of the plume.

Additional equipment would be available within a few hours from other TVA facilities.

b. Personnel

The following personnel are available for environmental surveillance in response to an accident or emergency situation:

Four people are committed to initial environmental surveillance from the SQN Health Physics Section.

Approximately four people are committed from the Watts Bar Nuclear Plant Health Physics Section (approximately 50 miles away).

Four people are available from Muscle Shoals, by aircraft in approximately 2 hours.

An additional 16 people are available from Muscle Shoals by automobile in 4-6 hours.

1808 199

Approximately four individuals are available from Chattanooga (approximately 20 miles away) for reservoir sampling.

Key personnel have pagers so that they may be reached quickly at any time.

2. Inplant Health Physics Monitoring

In addition to a professional staff of health physicists, TVA has a large qualified work force of health physics technicians available for monitoring of routine inplant operations and inplant accident conditions at Sequoyah. These personnel could very quickly be organized so that 15 health physics technicians would be on duty at all times for health physics monitoring of plant conditions, operations, and workers. Additional personnel could be obtained from other TVA facilities if needed. TVA also has existing contracts with vendors who could supply additional personnel within 24 hours if needed.

b. The emergency control center for health physics operations and the analytical laboratory to be used in emergencies should be located in a well-shielded area supplied with uncontaminated air.

Response

In the event an emergency situation at the Sequoyah Nuclear Plant causes the health physics laboratory and/or analytical laboratory to become unusable due to radiation levels or airborne radioactivity, a small, but

1808 200

functional, laboratory and health physics operations center will be quickly established in the Technical Support Center of the plant control bay.

The following backup laboratory facilities are also available for use as a functional laboratory and/or health physics operations center. Plans have been established for their use.

1. The TVA Sequoyah Nuclear Training Center located adjacent to SQN has a radioanalytical laboratory similar to a TVA nuclear plant laboratory.

2. The TVA Watts Bar Nuclear Plant (50 miles from SQN) and Browns Ferry Nuclear Plant (150 miles from SQN) have radioanalytical laboratory facilities identical to SQN's and can be used in an emergency using helicopter or local transportation for moving samples.

3. The SQN Health Physics Unit mobile emergency van is equipped to provide analysis of air samples and contamination smear surveys.

4. TVA's mobile whole body counter is equipped so that it can be converted to a mobile laboratory. If the unit is not located at SQN it can be moved to that location within five hours.

5. The Environmental Protection Agency (EPA) has a mobile laboratory in Montgomery, Alabama, which can be used to provide laboratory radioanalytical services at SQN within six hours of a request. This

laboratory is designed primarily for emergency environmental sample analysis. The response time has been verified in the SQN emergency drill on October 28-29, 1979.

6. The Department of Energy (DOE) has a mobile laboratory in Oak Ridge, Tennessee, which can be used to provide laboratory radioanalytical services at SQN within three hours of a request. This laboratory is designed primarily for emergency environmental sample analysis. The response time has been verified in the SQN emergency drill on October 28-29, 1979.

7. TVA will have in operation in March 1980 two radioanalytical laboratories. One is located approximately 60 miles from SQN and the other is about 180 miles from SQN. If needed, aircraft can be utilized to transport samples to these locations. Aircraft are available or under contract.

8. In the event there are samples containing very high levels of radioactivity, Oak Ridge National Laboratory will provide for processing and analyzing the samples.

c. There must be a sufficient health-related supply of instruments, respirators, and other necessary equipment for both routine and emergency conditions.

d. There should be an adequate maintenance program for all such health-related equipment.

1808 202

Response

The Sequoyah Nuclear Plant health physics unit has a very large supply of portable health physics radiation survey instruments, laboratory counting equipment, respiratory protection devices, dosimetry devices, and portable health physics air sampling equipment for use in both routine and emergency situations. This equipment is regularly maintained and calibrated.

The types, quantities, and uses of this equipment are listed in Appendix 1.

E.5 An adequate supply of the radiation protective (thyroid blocking) agent, potassium iodide for human use, should be available regionally for distribution to the general population and workers affected by a radiological emergency.

Response

The Food and Drug Administration (FDA) approved the use of potassium iodide for this purpose on November 9, 1979. Potassium iodide will be stockpiled in selected locations for distribution to the public, as determined by the Commissioner of Public in Tennessee. TVA and the State of Tennessee have determined that supplies of potassium iodide for human use can be obtained on an emergency basis within 24 hours for distribution to the general public if additional amounts are needed.

1808 203

COMMISSION RECOMMENDATION F. EMERGENCY PLANNING AND RESPONSE

1. Emergency plans must detail clearly and consistently the actions public officials and utilities should take in the event of off-site radiation doses resulting from release of radioactivity. Therefore, the Commission recommends that:

a. Before a utility is granted an operating license for a new nuclear power plant, the state within which that plant is to be sited must have an emergency response plan reviewed and approved by the Federal Emergency Management Agency (FEMA). The agency should assess the criteria and procedures now used for evaluating state and local government plans and for determining their ability to activate the plans. FEMA must assure adequate provision, where necessary, for multi-state planning.

Response to a

FEMA personnel have had the opportunity to review the Tennessee annex to the Sequoyah Nuclear Plant emergency plan. Before FEMA was formed, NRC was given the Sequoyah emergency plan. NRC distributed it to the agencies which were later incorporated under FEMA. Multi-state planning is covered in the plan. Thirteen states have agreed to provide mutual radiological assistance upon request of the governor of the state needing assistance. Upon notification that an incident has occurred, the adjacent states' radiological health officials will be alerted immediately.

Concurrence in the Tennessee portion of the Sequoyah emergency plan has not yet been given by the NRC. However, it is our understanding that NRC will do so in the near future.

1808 204

b. The responsibility at the federal level for radiological emergency planning, including planning for coping with radiological releases, should rest with FEMA. In this process, FEMA should consult with other agencies, including the restructured NRC and the appropriate health and environmental agencies. (See recommendation A.4.)

Response to b

We agree that one agency should have responsibility for the Federal response to an emergency. TVA will work with whichever agency is designated.

TVA has had cooperation from Federal agencies in Sequoyah emergency plan exercises. During an actual radiation incident, a spokesperson from each Federal agency, including DOE, NRC, EPA, HEW, and FEMA, will assist the State Emergency Operations Center in Nashville and act as "Advisors to the Governor." Actual radiological assistance to the State is provided under the Interagency Radiological Assistance Plan (IRAP) with on-the-scene Federal activities coordinated by DOE as specified in the Tennessee annex to the SQN emergency plan. This does not preclude FEMA control of the preincident planning of how the various federal agencies interface. Additionally, TVA has the "Radiological Emergency Mutual Assistance Agreement Between U.S. Department of Energy Oak Ridge Operations Office and Tennessee Valley Authority" under which the two agencies will provide personnel and equipment to one another in the event of an emergency.

During the October 28-29, 1979, Sequoyah Nuclear Plant drill, various Federal agencies, including FEMA, were represented. John Heard (FEMA) was a participant at the State Control Center in Chattanooga, and Ray Boyett (FEMA) was a participant at the State EOC in Nashville. Those portions of the plan describing Federal agency participation and interaction worked well:

1808 205

1. Several "Advisors to the Governor," E. A. Belvin (TVA) and Dr. Bernard Schleier (HEW), were called and gave advice in accordance with the Tennessee annex to SQN emergency plan.

2. IRAP was activated.

3. TVA was contacted by the State and gave assistance.

c. The state must effectively coordinate its planning with the utility and with local officials in the area where the plant is to be located.

Response to c

The State of Tennessee effectively coordinates its planning with TVA. The TVA Board of Directors and the Governor of the State have met on several occasions and held public meetings to assure that all are involved in the planning effort and that emergency planning is kept as a top priority. The Tennessee annex to the Sequoyah emergency plan describes the mechanism by which TVA will provide radiological assistance to the State. TVA has assigned a health physicist to the State to assist in emergency planning.

The Tennessee plan describes in detail local government activity during a radiological emergency.

State, local, and TVA responses were verified in the Sequoyah emergency response drill on October 28 and 29, the third drill to be conducted.

1808 206

The following is a list of the local agencies and a summary of their planned activities during a radiological incident:

1. Chattanooga-Hamilton County Civil Defense:
   - Notify various local agencies as needed.
   - Establish local EOC.

2. Tennessee Department of Safety, Chattanooga District:
   - Stand ready to help the Sheriff warn residents, secure homes in the affected area, and block roads.

3. Hamilton County Department of Education:
   - Provide school buses for evacuation purposes.
   - Provide facilities for immediate housing of residents.

4. Hamilton County Sheriff's Department:
   - Provide directions and assistance for orderly evacuation.
   - Safeguard homes and property during the incident, assisted by the Tennessee Unit of the National Guard, if necessary.

5. Region III A, Tennessee Department of Human Services:
   - Assist the American Red Cross in providing mass care services to evacuees.

6. Local Department of Agriculture:
   - Advise and assist local agencies and individuals regarding

care of livestock and utilization of food and crops in the event of radioactive contamination.

7. Tennessee Wildlife Resources Agency, Regional Office, Crossville, Tennessee:
   - Block the flow of river traffic as needed.
   - Send boats to evacuate watercraft.

8. Chattanooga-Hamilton County Health Department:
   - Coordinate medical assistance necessary to the evacuation.
   - Provide sanitation control at reception and mass care centers.
   - Maintain personnel decontamination at the above centers.

9. Tennessee Department of Conservation, Harrison Bay State Park, Harrison, Tennessee:
   - Evacuate all persons from Harrison Bay State Park (affected areas).

10. Hamilton County Highway Department:
   - Establish roadblocks.
   - Provide signs necessary to the evacuation.

d. States with plants already operating must upgrade their plans to the requirements to be set by FEMA. Strict deadlines must be established to accomplish this goal.

Response to d

The emergency plans for the Sequoyah plant have been concurred with by FEMA.

1808 208

F.2 Plans for protecting the public in the event of off-site radiation releases should be based on technical assessment of various classes of accidents that can take place at a given plant.

a. No single plan based on a fixed set of distances and a fixed set of responses can be adequate. Planning should involve the identification of several different kinds of accidents with different possible radiation consequences. For each such scenario, there should be clearly identified criteria for the appropriate responses at various distances, including instructing individuals to stay indoors for a period of time, providing special medications, or ordering an evacuation.

b. Similarly, response plans should be keyed to various possible scenarios and activated when the nature and potential hazard of a given accident has been identified.

c. Plans should exist for protecting the public at radiation levels lower than those currently used in NRC-prescribed plans.

Response

The Tennessee annex to the Sequoyah emergency plan enables State officials to classify an incident by severity of dose levels in accordance with EPA guidelines. This classification system encompasses all levels including the lower levels of radiation.

The above plan has capability for great flexibility for adjusting to changing parameters, such as plant status, meteorological conditions, and release rates. For this purpose, TVA has supplied the State with procedures for estimating potential radiation doses from accidental releases of radioactivity to the atmosphere, which is to be used immediately when TVA reports the nature and potential hazard of the incident to the State. The models used have been discussed with and approved by EPA and can be used to ascertain dose rates, dose commitments, and time of plume arrival for any distance, rather than a fixed distance, from the site. The classification system enables State officials to decide which areas require which actions based on the dose levels in different areas

of the emergency planning zone. For the two most severe classifications, several options for protective action are specified in the plan, giving the decisionmakers good flexibility.

If evacuation procedures are implemented based on a total integrated dose as defined in the State emergency plan, persons will receive much lower levels of exposure than those actually stipulated in the NRC-prescribed plans.

d. All local communities should have funds and technical support adequate for preparing the kinds of plans described above.

Response to d

The State and local response plans for the Sequoyah Nuclear Plant are adequate to cope with radiological emergencies which might occur. This was amply demonstrated in the drill of October 28-29, 1979. The Sequoyah portion of the State of Tennessee radiological emergency plan is well written and functional.

TVA has accepted the responsibility to provide aid where there is not sufficient capability to develop an adequate emergency plan, and is presently coordinating this effort with the State Civil Defense Agency. TVA will continue to provide aid to assure that proper emergency response exists.

Because of the excellent civil defense program in Hamilton County, where Sequoyah is located, it was not necessary for TVA to provide aid. Resources such as manpower and equipment are available.

1808 210

F.3 Research should be expanded on medical means of protecting the public against various levels and types of radiation. This research should include exploration of appropriate medications that can protect against or counteract radiation.

Response

This recommendation is directed toward fundamental medical research which, while TVA is not equipped to do, is being carried out by other agencies.

F.4 If emergency planning and response to a radiation-related emergency is to be effective, the public must be better informed about nuclear power. The Commission recommends a program to educate the public on how nuclear power plants operate, on radiation and its health effects, and on protective actions against radiation. Those who would be affected by such emergency planning must have clear information on actions they would be required to take in an emergency.

Response

We agree that the public needs to be better informed about nuclear power.

TVA conducts a program to educate the public. This program includes speeches to civic clubs and school groups, brochures about TVA nuclear plants and related subjects, and support of the energy education program conducted for DOE by Oak Ridge Associated Universities. TVA's program does not try to promote nuclear power; rather, it provides a realistic assessment of the benefits and risks in light of the Nation's energy problems and other energy options.

TVA, State, and local officials have addressed public concerns on nuclear power plants and radiation effects. The Office of Emergency Preparedness (OEP), Chattanooga, Tennessee, has provided written evacuation instructions to all households inside the Sequoyah Nuclear Plant

low population zone. The OEP obtained the address of each resident from county records and mailed a map and instructions in February 1977 (the instructions are in the SQN Hamilton County plan) to each household. The mailout requested questionnaires be returned and those with transportation or other needs to indicate this. A 47-percent return rate for the questionnaire was obtained.

F.5 Commission studies suggest that decision-makers may have overestimated the human costs, in injury and loss of life, in many mass evacuation situations. The Commission recommends study into the human costs of radiation-related mass evacuation and the extent, if any, to which the risks in radiation-related evacuations differ from other types of evacuations. Such studies should take into account the effects of improving emergency planning, public awareness of such planning, and costs involved in mass evacuations.

Response

Much experience has been gained through the years with mass evacuations in the case of natural disasters, such as hurricanes and floods and/or dam failures. This information should be applicable in large measure to a radiation-related evacuation. An EPA[1] study of historical data involving evacuations concludes that the risk by car of death per person-mile would be four times higher during an evacuation than the death rate during normal driving conditions. This study, done in 1974, also provides economic costs associated with evacuations. Evacuation costs are highly area-dependent and should be computed based on grouped local demographic, economic, and geographic conditions. While we believe that both the injury and economic cost data should be updated to

---

(1) Evacuation Rules - An Evaluation, EPA-520/6-74-002, June 1974. Joseph M. Hans, Jr., and Thomas C. Sell.

1808 212

include recent evacuation data, including that of Three Mile Island and the Canadian incident of November 11, 1979, sufficient information currently exists to allow decisionmakers to make rational judgments.

F.6 Plans for providing federal technical support, such as radiological monitoring, should clearly specify the responsibilities of the various support agencies and the procedures by which those agencies provide assistance. Existing plans for the provision of federal assistance, particularly the Interagency Radiological Assistance Plan and the various memoranda of understanding among the agencies, should be reexamined and revised by the appropriate federal authorities in the light of the experiences of the TMI accident, to provide for better coordination and more efficient federal support capability.

Response

Because of the TMI experience, the Tennessee Department of Public Health, Division of Radiological Health, officials have requested from DOE Oak Ridge Operations Office a specific list of functions each Interagency Radiological Assistance Plan (IRAP) agency could be called upon to perform during an incident. Tennessee can request such assistance by agency and function, still allowing DOE to administer the Federal agency interaction in accordance with the plan and the Tennessee portion of the Sequoyah emergency plan.

1808 213

COMMISSION RECOMMENDATION G. THE PUBLIC'S RIGHT TO INFORMATION

1. Federal and state agencies, as well as the utility, should make adequate preparation for a systematic public information program so that in time of a radiation-related emergency, they can provide timely and accurate information to the news media and the public in a form that is understandable. There should be sufficient division of briefing responsibilities as well as availability of informed sources to reduce confused and inaccurate information. The Commission therefore recommends:

a. Since the utility must be responsible for the management of the accident, it should also be primarily responsible for providing information on the status of the plant to the news media and to the public; but the restructured NRC should also play a supporting role and be available to provide background information and technical briefings.

Response to a

TVA takes the lead as the primary source of information for the news media and the public in a nuclear plant emergency with regard to the status at the plant. We would expect to receive assistance from the NRC, as appropriate, in handling the public information aspects of a nuclear emergency.

b. Since the state government is responsible for decisions concerning protective actions, including evacuations, a designated state agency should be charged with issuing all information on this subject. This agency is also charged with the development of and dissemination of accurate and timely information on off-site radiation doses resulting from releases of radioactivity. This information should be derived from appropriate sources. (See recommendation F.1.) This agency should also set up the machinery to keep local officials fully informed of developments and to coordinate briefings to discuss any federal involvement in evacuation matters.

Response to b

TVA has worked closely with the State of Tennessee in developing a plan for issuing public statements concerning nuclear emergencies. The Governor's office has designated the Department of Public Health as the appropriate State agency to handle release of information concerning protective actions involving the health and safety of the public, including evacuations.

1808 214

Communication procedures between TVA and the State of Tennessee are detailed in the Sequoyah Nuclear Plant radiological emergency plan.

G.2. The provision of accurate and timely information places special responsibilities on the official sources of this information. The effort must meet the needs of the news media for information but without compromising the ability of operational personnel to manage the accident. The Commission therefore recommends that:

a. Those who brief the news media must have direct access to informed sources of information.

Response to a

As a result of a recent comprehensive emergency drill at TVA's Sequoyah Nuclear Plant, TVA determined that the Manager of Power will be the single public spokesperson for TVA with regard to the status of the plant.

The Manager of Power will be in direct contact with the director of the Central Emergency Control Center and will have up-to-date and accurate information about the status of the plant. He will also have direct access to the agency's General Manager and Board of Directors.

b. Technical liaison people should be designated to inform the briefers and to serve as a resource for the news media.

Response to b

A member of the Central Emergency Control Center is designated as the technical liaison to assist the Manager of Power. The extensive resources of TVA's Division of Engineering Design are on call to provide expert information to the Manager of Power and the news media.

c. The primary official news sources should have plans for the prompt establishment of press centers reasonably close to the site. These must be properly equipped, have appropriate visual aids and reference materials, and be staffed with individuals who are knowledgeable in dealing with the news media. These press centers must be operational promptly upon the declaration of a general emergency or its equivalent.

Response to c

The Power Operations Training Center is designated as the primary press center for release of TVA information during an emergency at Sequoyah Nuclear Plant. The training center is adjacent to the plant site. It contains a large briefing area, a duplicate of the Sequoyah control room and numerous visual aids, and can be quickly staffed. A well-equipped State of Tennessee press center is available in Chattanooga at Lovell Field (airport) and will be used if the training center must be evacuated.

G.3. The coverage of nuclear emergencies places special responsibilities on the news media to provide accurate and timely information. The Commission therefore recommends that:

a. All major media outlets (wire services, broadcast networks, news magazines, and metropolitan daily newspapers) hire and train specialists who have more than a passing familiarity with reactors and the language of radiation. All other news media, regardless of their size, located near nuclear power plants should attempt to acquire similar knowledge or make plans to secure it during an emergency.

b. Reporters discipline themselves to place complex information in a context that is understandable to the public and that allows members of the public to make decisions regarding their health and safety.

c. Reporters educate themselves to understand the pitfalls in interpreting answers to "what if" questions. Those covering an accident should have the ability to understand uncertainties expressed by sources of information and probabilities assigned to various possible dangers.

Response

In conjunction with appropriate State agencies, TVA will sponsor briefings for news media prior to Sequoyah startup to discuss the mechanics of information flow during a nuclear emergency. This will include a description of TVA's three emergency operations centers (radiological monitoring in Muscle Shoals, Alabama; engineering and design in Knoxville, Tennessee; and the Central Emergency Control Center in Chattanooga, Tennessee). The purpose of these briefings is to ensure

1808 216

the media understand our plan for using a central dissemination point and single spokesperson. We also will urge, both in these briefings and in discussions with individual editors, that the various media develop personnel with enough perspective and background in nuclear matters to accurately report on nuclear emergencies and to help the public put events in context. TVA will offer to assist the media in training these reporters.

G.4. State emergency plans should include provision for creation of local broadcast media networks for emergencies that will supply timely and accurate information. Arrangements should be made to make available knowledgeable briefers to go on the air to clear up rumors and explain conditions at the plant. Communications between state officials, the utility, and the network should be prearranged to handle the possibility of an evacuation announcement.

Response

TVA public information officials in Knoxville, Chattanooga, and Muscle Shoals are connected within TVA and to public information officials with the State of Tennessee in Nashville by dedicated phone lines. During actual emergency conditions, these officials would pass on information and formulate periodic press releases that would keep the public informed of plant conditions and protective actions. The news media would be supplied these coordinated releases for immediate publication from either of the locations indicated above.

Through the Citizens Action Office, TVA plans to set up public meetings in areas around nuclear plants to provide information about how nuclear plants operate, radiation and its health effects, and protective actions against radiation. These sessions will be tailored to meet the needs and desires of the local communities and will be supplemented by similar activities to inform the public through the news media.

1808 217

G.5. The Commission recommends that the public in the vicinity of a nuclear power plant be routinely informed of local radiation measurements that depart appreciably from normal background radiation, whether from normal or abnormal operation of the nuclear power plant, from a radioactivity cleanup operation such as that at TMI-2, or from other sources.

Response

It is TVA's policy to inform news media promptly, fully, and as soon as possible of any unusual events at nuclear plants considered to have potential significance to safety, even though their significance in some cases may be minor.

Any event that would be "news" is made public. This would include any abnormal radiation levels resulting from plant operations.

The Division of Nuclear Power in the Office of Power is responsible for notifying the Director of Information when a problem occurs at an operating TVA nuclear plant. The Director of Information informs the General Manager and the Board of Directors and prepares a news release, if needed.

At a minimum, a public announcement will be issued whenever one of the following events occurs:

1. Nonscheduled unit shutdowns regardless of cause.
2. Shutdowns resulting from failure of or damage to safety-related equipment.
3. Failure of, or damage to, safety-related equipment.
4. Any unusual discharge of radioactive materials from the plant.

5. Within the plant, any unusual exposure of plant personnel.
6. Any severe personal injury or fatality, whether related to nuclear operations or not.
7. Any accident involving a carrier transporting spent fuel or radioactive waste materials from a TVA nuclear plant. The announcement will be coordinated with state radiological hygiene agencies as necessary.
8. Reporting effect--or no effect--from flood, earthquake, tornado, or other natural event in the plant vicinity that could produce public concern.
9. Any incident such as fire or explosion causing damage at the plant.
10. Any abnormal event involving environmental concern, such as significant chemical release.
11. Any significant curtailment of operations required to meet environmental requirements.

This list is not all-inclusive, and other abnormal events will also be announced.

In addition to the above, each plant will have a resident information officer.

Through attendance at the daily plant planning meetings, the information officer will be kept abreast of plant activities. The information officer will serve both the plant superintendent and the Information Office, and will be responsible for coordinating information releases

1808 219

about plant activities, arranging for all visitors to the plant, and communicating with plant employees as well as the public concerning TVA programs and policies.

In addition, the resident information officer will be available during plant emergencies to disseminate information to the press and assist the plant superintendent in handling inquiries from the news media, the public, state and local agencies, and others.

1808 220

Respiratory Protection Devices

Type	Quantity	Use
Full Face, Cannister Type	300***	Radioactive Particulates
Full Face, Air Line Type	50	Radioactive Iodine and Particulates
Full Face, Self-contained*	50**	Radioactive Iodine and Particulates

*Two air tanks are available for each self-contained breathing apparatus. Eight of these SCBA and 24 of the 30-minute air tanks are reserved for emergency use only and are kept in the plant control bay. Compressors which can recharge 12 air tanks per hour each are located at SQN, WBN, and BFN.

**An additional 75 of these units and 175 air tanks can be made available at SQN within two hours of the request. These additional units could be obtained from WBN and BFN.

***An additional 750 of these units can be made available at SQN within two hours of the request. These additional units could be obtained from WBN and BFN.

Portable Health Physics Air Sampling Equipment

Type	Quantity	Use
Staplex, High Volume (25 cfm)	5	Sample Radioactive Particulates
Radeco, Low Volume (HD-28 B)	6	Sample Radioactive Particulates and Iodine
Radeco, Low Volume	12	Sample Radioactive Particulates and Iodine

In addition to the portable health physics radiation survey instruments, health physics laboratory counting equipment, dosimetry devices, and portable health physics air sampling equipment located at SQN, TVA has identical inventories of such equipment located at WBN and BFN and a similar inventory currently being purchased for backup instrumentation purposes in the central calibration and maintenance facilities. Should it become necessary during an emergency at SQN, the quantities of these types of health physics instruments could be doubled within four hours of the request.