FIRE PROTECTION REPORT SUPPLEMENT

BROWNS FERRY NUCLEAR PLANT

OFFICE OF NUCLEAR POWER
TENNESSEE VALLEY AUTHORITY

FIRE PROTECTION REPORT

SUPPLEMENT

BROWNS FERRY NUCLEAR PLANT

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FIRE PROTECTION REPORT SUPPLEMENT

I. INTRODUCTION

The Fire Protection Report Supplement provides information related to the Browns Ferry Nuclear Plant (BFN) fire protection program in addition to that presented in the Fire Protection Report. This information is provided to help the NRC assess TVA compliance with the NRC's requirements and guidelines. The supplement provides information on the current status of the BFN fire protection program and the planned changes to which TVA has committed. In addition to the planned changes, this supplement identifies other changes to which TVA has not committed but is in the process of evaluating. Information is also provided on the transition from the BFN fire protection program commitments TVA has previously made to those TVA has determined to be appropriate at this time. TVA will be submitting a licensing amendment to the NRC reflecting this transition in commitments. These documents provide a one-time assessment of the program and are not a part of the material which will be referenced in the FSAR.

This supplement includes documents fulfilling Browns Ferry Nuclear Performance Plan (Volume 3) commitments. The Branch Technical Position CMEB 9.5-1 Comparison fulfills TVA's commitment to compare the BFN fire protection program to the NRC guidelines. The Fire Protection Upgrade Program fulfills TVA's commitment to identify TVA's plans to upgrade the fire protection systems.

A synopsis of each document follows:

1. Branch Technical Position CMEB 9.5-1 Comparison

   This comparison documents the degree of BFN fire protection program conformance with the guidelines of Branch Technical Position CMEB 9.5-1. Deviations are being evaluated for modifications under the BFN fire protection upgrade program.

2. Fire Protection Upgrade Program

   The fire protection upgrade program compiles the changes to the fire protection systems to which TVA has committed and other changes which TVA is in the process of evaluating.

3. Prior Commitments Evaluation

   Prior regulatory commitments have been evaluated to assess their validity and applicability to current BFN fire protection commitments. This evaluation supports the Fire Protection Report which is the new basis for meeting the NRC's regulatory requirements for fire protection.

This supplement is written to reflect the projected plant configuration and operations at the time of Unit 2 restart. As such, this supplement reflects completion of modifications to plant configuration and operations which are currently in progress and committed to in previous submittals.

COMPARISON OF BROWNS FERRY NUCLEAR PLANT

FIRE PROTECTION PROGRAM

TO

NRC BRANCH TECHNICAL POSITION CMEB 9.5-1

COMPARISON OF BROWNS FERRY NUCLEAR PLANT

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PREFACE

In Volume III of the Nuclear Performance Plan, the Tennessee Valley Authority (TVA) committed to the NRC to perform a comparison of the Browns Ferry Nuclear Plant (BFN) fire protection program to the guidelines of Nuclear Regulatory Commission (NRC) Branch Technical Position CMEB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants", dated July 1981. This report documents the results of the comparison and will serve as a basis for the BFN fire protection upgrade program.

Throughout the report, the NRC guidelines are quoted verbatim from the Branch Technical Position in the left column of each page and TVA's response is stated in the right column. Titles and section numbers are consistent with the Branch Technical Position.

The attachments provide additional information to aid in review of the comparison. Specifically, Attachment C provides a summarization of identified deviations from NFPA codes and standards present in BFN's fixed fire protection systems.

PREFACE

In Volume III of the Nuclear Performance Plan, the Tennessee Valley Authority (TVA) committed to the NRC to perform a comparison of the Browns Ferry Nuclear Plant (BFN) fire protection program to the guidelines of Nuclear Regulatory Commission (NRC) Branch Technical Position CMEB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants", dated July 1981. This report documents the results of the comparison and will serve as a basis for the BFN fire protection upgrade program.

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COMPARISON OF BROWNS FERRY NUCLEAR PLANT

FIRE PROTECTION PROGRAM

TO

NRC BRANCH TECHNICAL POSITION CMEB 9.5-1

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TO

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A. INTRODUCTION General Design Criterion 3, "Fire Protection," of Appendix A "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities," requires that structures, systems, and components important to safety be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. Noncombustible and heat-resistant materials are required to be used wherever practical throughout the unit, particularly in locations such as the containment and control room. Criterion 3 also requires that fire detection and suppression systems of appropriate capacity and capability be provided and designed to ensure that their failure, rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components. This Branch Technical Position (BTP) presents guidelines acceptable to the NRC staff for implementing this criterion in the development of a fire protection program for nuclear power plants. These revised guidelines include the acceptance criteria listed in a number of documents, including Appendix R to 10 CFR Part 50 and 10 CFR Part 50, section 50.48. The purpose of the fire protection program is to ensure the capability to shut down the reactor and maintain it in a safe shutdown condition and to minimize radioactive releases to the environment in the event of a fire. It implements the philosophy of defense-in-depth protection against the hazards of fire and its associated effects on safety-related equipment.	A. INTRODUCTION No assessment required.

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If designs or methods different from the guidelines recommended herein are used they must provide equivalent fire protection. Suitable bases and justification should be provided for alternative approaches to establish acceptable implementation of General Design Criterion 3. This BTP addresses fire protection programs for safety-related systems and equipment and for other plant areas containing fire hazards that could adversely affect safety-related systems. It does not give guidance for protecting the life or safety of the site personnel or for protection against economic or property loss. This document supplements Regulatory Guide 1.75, "Physical Independence of Electrical Systems," in determining the fire protection for redundant cable systems.	
B. DISCUSSION There have been numerous fires in operating U.S. nuclear power plants through December 1975 of which 32 were important enough to report. Of these, the fire on March 22, 1975 at Browns Ferry Nuclear Plant was the most severe. With approximately 250 operating reactor years of experience, one may infer a frequency on the order of one per 10 reactor years. Thus, on the average, a nuclear power plant may experience one or more fires of varying severity during its operating life. Although WASH-1400 "Reactor Safety Study - An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," dated October 1975, concluded that the Browns Ferry fire did not affect the validity of the overall risk assessment, the staff concluded that cost-effective fire protection measures should be instituted to significantly decrease the frequency and severity of fire and consequently initiated the development of this BTP.	B. DISCUSSION No assessment required.

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In this development, the staff made use of many national standards and other publications related to fire protection. The documents discussed below were particularly useful.

A document entitled "The International Guidelines for the Fire Protection of Nuclear Power Plants" (IGL), 1974 Edition, Second Reprint, published on behalf of the National Nuclear Risks Insurance Pools and Association, provides a step-by-step approach to assessing the fire risk in a nuclear power plant and describes protective measures to be taken as a part of the fire protection of these plants. It provides useful guidance in this important area. The Nuclear Energy Liability and Property Insurance Association (NELPIA) and the Mutual Atomic Energy Reinsurance Pool (MAERP) have prepared a document entitled "Specifications for Fire Protection of New Plants," which gives general conditions and valuable criteria. A special review group organized by NRC under Dr. Stephen H. Hanauer, Technical Advisor to the Executive Director for Operations, to study the Browns Ferry fire, issued a report, NUREG-0050, "Recommendations Related to Browns Ferry Fire," in February 1976, which contains recommendations applicable to all nuclear plants. This BTP uses the applicable information contained in these documents.

The fire protection program for a nuclear power plant presented in this BTP consists of design features, personnel, equipment, and procedures that provide the defense-in-depth protection of the public health and safety. The purpose of the program is to prevent significant fires, to ensure the capability to shut down the reactor and maintain it in a safe shutdown condition, and to minimize radioactive releases to the environment in the event of a significant fire.

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To meet these objectives, it is essential that management participation continue through plant operation and that a qualified staff be responsible for annunciation, confinement, and suppression for the plant. The staff should also be responsible for fire prevention activities, maintenance of fire protection systems, training, and manual fire fighting activities. It is the combination of all these that provides the needed defense-in-depth protection of the public health and safety.

Some of the major conclusions that emerged from the Browns Ferry fire investigations warrant emphasis and are discussed below.

1. Defense-in-Depth

Nuclear power plants use the concept of defense-in-depth to achieve the required high degree of safety by using echelons of safety systems. This concept is also applicable to fire safety in nuclear power plants. With respect to the fire protection the program defense-in-depth principle is aimed at achieving an adequate balance in:

a. Preventing fires from starting;

b. Detecting fires quickly, suppressing those fires that occur putting them out quickly, and limiting their damage; and

c. Designing plant safety systems so that a fire that starts in spite of the fire prevention program and burns for a considerable time in spite of fire protection activities will not prevent essential plant safety functions from being performed.

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No one of these echelons can be perfect or complete by itself. Each echelon should meet certain minimum requirements; however, strengthening any one can compensate in some measure for weaknessess, known or unknown, in the others.

The primary objective of the fire protection program is to minimize both the probability and consequences of postulated fires. In spite of steps taken to reduce the probability of fire, fires are expected to occur. Therefore, means are needed to detect and suppress fires with particular emphasis on providing passive and active fire protection of appropriate capability and adequate capacity for the systems necessary to achieve and maintain safe plant shutdown with or without offsite power. For other safety-related systems, the fire protection should ensure that a fire will not cause the loss of function of such systems, even though loss of redundancy within the system may occur as a result of the fire. Generally, in plant areas where the potential fire damage may jeopardize safe plant shutdown, the primary means of fire protection should consist of fire barriers and fixed automatic fire detection and suppression systems. Also, a backup manual fire fighting capability should be provided throughout the plant to limit the extent of fire damage. Portable equipment consisting of hoses, nozzles, portable extinguishers, complete personnel protective equipment, and air breathing equipment should be provided for use by properly trained fire fighting personnel. Access for effective manual application of fire extinguishing agents to combustibles should be provided.

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The adequacy of fire protection for any particular plant safety system or area should be determined by analysis of the effects of the postulated fire relative to maintaining the ability to safely shut down the plant and minimize radioactive releases to the environment in the event of a fire. Fire protection starts with design and must be carried through all phases of construction and operation. A Quality Assurance (QA) program is needed to identify and rectify errors in design, construction, and operation and is an essential part of defense-in-depth.

2. Use of Water on Electrical Cable Fires

Experience with major electrical cable fires shows that water will promptly extinguish such fires. Since prompt extinguishing of the fire is vital to reactor safety, fire and water damage to safety systems is reduced by the more efficient application of water from fixed systems spraying directly on the fire rather than by manual application with fire hoses. Appropriate fire fighting procedures and fire training should provide the techniques, equipment, and skills for the use of water in fighting electrical cable fires in nuclear plants, particularly in areas containing a high concentration of electric cables with plastic insulation.

This is not to say that fixed water systems should be installed everywhere. Equipment that may be damaged by water should be shielded or relocated away from the fire hazard and the water.

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Drains should be provided to remove any water used for fire suppression and extinguishment to ensure that water accumulation does not incapacitate safety-related equipment.

3. Establishment and Use of Fire Areas

Separate fire areas for each division of safety-related systems will reduce the possibility of fire-related damage to redundant safety-related equipment. Fire areas should be established to separate redundant safety divisions and isolate safety-related systems from fire hazards in nonsafety- related areas. Particular design attention to the use of separate isolated fire areas for redundant cables will help to avoid loss of redundant safety-related cables. Separate fire areas should also be employed to limit the spread of fires between components that are major fire hazards within a safety division. Where redundant systems cannot be separated by fire barriers, as in containment and the control room, it is necessary to employ other measures to prevent a fire from causing the loss of function of safety-related systems. Within fire areas containing components of a safety-related system, special attention should be given to detecting and suppressing fires that may adversely affect the system. Measures that may be taken to reduce the effects of a postulated fire in a given fire area include limiting the amount of combustible materials, installing fire-resistant construction, providing fire rated barriers for cable trays, installing fire detection systems and fixed fire suppression systems, or providing other protection suitable to the installation.

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The fire hazard analysis will be the mechanism to determine that fire areas have been properly selected.

Suitable design of the ventilation systems can limit the consequences of a fire by preventing the spread of the products of combustion to other fire areas. It is important that means be provided to ventilate, exhaust, or isolate the fire area as required and that consideration be given to the consequences of failure of ventilation systems due to fire causing loss of control for ventilating, exhausting, or isolating a given fire area. The capability to ventilate, exhaust, or isolate is particularly important to ensure the habitability of rooms or spaces that must be attended in an emergency. In the design, provision should be made for personnel access to and escape routes from each fire area.

4. Definitions

For the user's convenience, some of the terms related to fire protection are presented below with their definitions as used in this BTP.

Approved -- tested and accepted for a specific purpose or application by a nationally recognized testing laboratory.

Automatic - self-acting, operating by its own mechanism when actuated by some impersonal influence such as a change in current, pressure, temperature, or mechanical configuration.

Combustible Material - material that does not meet the definition of noncombustible.

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Control Room Complex - the zone served by the control room emergency ventilation system (see SRP Section 6.4, "Habitability Systems").

Exposure Fire - An exposure fire is a fire in a given area that involves either in situ or transient combustibles and is external to any structures, systems, or components located in or adjacent to that same area. The effects of such fire (e.g., smoke, heat, or ignition) can adversely affect those structures, systems, or components important to safety. Thus, a fire involving one train of safe shutdown equipment may constitute an exposure fire for the redundant train located in the same area, and a fire involving combustibles other than either redundant train may constitute an exposure fire to both redundant trains located in the same area.

Fire Area - that portion of a building or plant that is separated from other areas by boundary fire barriers.

Fire Barrier - those components of construction (walls, floors, and their supports), including beams, joists, columns, penetration seals or closures, fire doors, and fire dampers that are rated by approving laboratories in hours of resistance to fire and are used to prevent the spread of fire.

Fire Stop - a feature of construction that prevents fire propagation along the length of cables or prevents spreading of fire to nearby combustibles within a given fire area or fire zone.

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Fire Brigade - the team of plant personnel assigned to fire fighting and who are equipped for and trained in the fighting of fires.

Fire Detectors - a device designed to automatically detect the presence of fire and initiate an alarm system and other appropriate action (see NFPA 72E, "Automatic Fire Detectors"). Some typical fire detectors are classified as follows:

Heat Detector - a device that detects a predetermined (fixed) temperature or rate of temperature rise.

Smoke Detector - a device that detects the visible or invisible products of combustion.

Flame Detector - a device that detects the infrared, ultra- violet, or visible radiation produced by a fire.

Line-Type Detector - a device in which detection is continuous along a path, e.g., fixed-temperature, heat sensitive cable and rate-of- rise pneumatic tubing detectors.

Fire Protection Program - the integrated effort involving components, procedures, and personnel utilized in carrying out all activities of fire protection.

It includes system and facility design, fire prevention, fire detection, annunciation, confinement, suppression, administrative controls, fire brigade organization, inspection and maintenance, training, quality assurance, and testing.

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Fire Resistance Rating - the time that materials or assemblies have withstood a fire exposure as established in accordance with the test procedures of "Standard Methods of Fire Tests of Building Construction and Materials" (NFPA 251).

Fire Suppression - control and extinguishing of fires (fire fighting). Manual fire suppression is the use of hoses, portable extinguishers, or manually-actuated fixed systems by plant personnel. Automatic fire suppression is the use of automatically actuated fixed systems such as water, Halon, or carbon dioxide systems.

Fire Zones - the subdivisions of fire areas in which the fire suppression systems are designed to combat particular types of fires.

Noncombustible Material

a. A material which in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.

b. Material having a structural base of noncombustible material as defined in a., above, with a surfacing not over 1/8-inch thick that has a flame spread rating not higher than 50 when measured using ASTM E-84 Test "Surface Burning Characteristics of Building Materials".

Raceway - refer to Regulatory Guide 1.75.

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Restricted Area - any area to which access is controlled by the licensee for purposes of protecting individuals from exposure to radiation and radioactive materials.

Safety-Related Systems and Components - systems and components required to shut down the reactor, mitigate the consequences of postulated accidents, or maintain the reactor in a safe shutdown condition.

Secondary Containment - a structure that completely encloses primary containment, used for controlling containment leakage.

Sprinkler System - a network of piping connected to a reliable water supply that will distribute the water throughout the area protected and will discharge the water through sprinklers in sufficient quantity either to extinguish the fire entirely or to prevent its spread. The system, usually activated by heat, includes a controlling valve and a device for actuating an alarm when the system is in operation. The following categories of sprinkler systems are defined in NFPA 13, "Standard for the Installation of Sprinkler Systems":

- Wet-Pipe System
- Dry-Pipe System
- Preaction System
- Deluge System
- Combined Dry-Pipe and Pre-action System
- On-Off System

Standpipe and Hose Systems - a fixed piping system with hose outlets, hose, and nozzles connected to a reliable water supply to provide effective fire hose streams to specific areas inside the building.

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Water Spray System - a network of piping similar to a sprinkler system except that it utilizes open-head spray nozzles. NFPA 15, "Water Spray Fixed Systems," provides guidance on these systems.	
C. POSITION	C. POSITION
1. Fire Protection Program Requirements	1. Fire Protection Program Requirements
a. Fire Protection Program	a. Fire Protection Program
A fire protection program should be established at each nuclear power plant. The program should establish the fire protection policy for the protection of structures, systems, and components important to safety at each plant and the procedures, equipment, and personnel required to implement the program at the plant site.	The Browns Ferry Nuclear Plant Fire Protection Plan (FPP) Section 1.2, details the methodology for minimizing the fire hazard and damage to structures, systems, and components important to safety.
(1) The fire protection program should be under the direction of an individual who has been delegated authority commensurate with the responsibilities of the position and who has available staff personnel knowledgeable in both fire protection and nuclear safety.	(1) As stated in Section 3.0 of the FPP, the Manager of Nuclear Power has the overall responsibility for establishing programs and policies related to fire protection, and assessing the effectiveness of the Browns Ferry fire protection program. This authority has been delegated to the Site Director and then further delegated through the BFN organization to the Fire Protection Manager and his staff.
(2) The fire protection program should extend the concept of defense-in-depth to fire protection in fire areas important to safety with the following objectives:	(2) The stated objectives are being met as detailed in Section 1.2 of the FPP.

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o to prevent fires from starting o to detect rapidly, control, and extinguish promptly those fires that do occur; o to provide protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.	
(3) Responsibility for the overall fire protection program should be assigned to a person who has management control over all organizations involved in fire protection activities. Formulation and assurance of program implementation may be delegated to a staff composed of personnel prepared by training and experience in fire protection and personnel prepared by training and experience in nuclear plant safety to provide a balanced approach in directing the fire protection program for the nuclear power plant. The staff should be responsible for: (a) Fire protection program requirements, including consideration of potential hazards associated with postulated fires, with knowledge of building layout and systems design. (b) Post-fire shutdown capability (c) Design, maintenance, surveillance, and quality assurance of all fire protection features (e.g., detection systems, suppression systems, barriers, dampers, doors, penetration seals, and fire brigade equipment).	(3) The Manager of Nuclear Power, who has management control over all organizations involved in fire protection activities for TVA's nuclear plants, has final responsibility for the BFN fire protection program. This responsibility has been delegated to the BFN Site Director who has management control over all organizations involved in fire protection activities for his facility. The day to day implementation of the fire protection program has been delegated to the Fire Protection Manager and his staff. The responsibilities of the staff are outlined in Section 3.4 of the FPP. The engineering of fire protection projects is performed by the Division of Nuclear Engineering. Maintenance organizations perform the maintenance and the portion of the surveillance the fire protection staff does not perform. The quality assurance function is the responsibility of the quality assurance organization. The fire protection staff integrates the activities of the other organizations to assure a coherent, focused program.

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(d) Fire prevention activities (administrative controls and training).	
(e) Fire brigade organization and training.	
(f) Pre-fire planning.	
(4) The organizational responsibilities and lines of communication pertaining to fire protection should be defined between the various positions through the use of organizational charts and functional descriptions of each position's responsibilities. The following positions/organizations should be designated.	
(a) The upper level offsite management position which has management responsibility for the formulation, implementation and assessment of the effectiveness of the nuclear plant fire protection program.	(a) The Manager of Nuclear Power has management responsibility for the formulation, implementation and assessment of the effectiveness of the nuclear plant fire protection programs.
(b) The offsite management position(s) directly responsible for formulating, implementing, and periodically assessing the effectiveness of the fire protection program for the licensee's nuclear power plant including fire drills and training conducted by the fire brigade and plant personnel. The results of these assessments should be reported to the upper level management position responsible for fire protection with recommendations for improvements or corrective actions as deemed necessary.	(b) The Office of Nuclear Power Division of Nuclear Services (DNS) establishes the policies and basic guidelines for formulating and implementing the fire protection program at BFN. These guidelines are contained in the Office of Nuclear Power Fire Protection Manual (Reference 2). The responsibility for annual, biennial, and triennial assessments of the fire protection program including fire drills and training is placed with the Division of Nuclear Quality Assurance.

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	Results of the assessments and audits are sent to the BFN Site Director for corrective action.
(c) The onsite management position responsible for the overall administration of the plant operations and emergency plans which include the fire protection and prevention program and which provide a single point of control and contact for all contingencies.	(c) The Site Director is responsible for all activities at the plant. The shift engineer on duty is the Site Director's designee as the overall emergency coordinator and is the single point of control for all contingencies. Fire emergency plans are developed and administered by the fire protection staff, in coordination with the Radiological Emergency Preparedness Section.
(d) The onsite position(s) which: i. Implements periodic inspections to: minimize the amount of combustibles in safety-related areas; determine the effectiveness of housekeeping practices; assure the availability and acceptable condition of all fire protection systems/equipment, emergency breathing apparatus, emergency lighting, communication equipment, fire stops, penetration seals, and fire retardant coatings; and assures the prompt and effective corrective actions are taken to correct conditions adverse to fire protection and preclude their recurrence.	(d)i. The site Fire Protection Manager and his staff are responsible for implementing the required administrative controls, as outlined in Sections 7 and 9 of the FPP.
ii. Is responsible for the fire fighting training for operating plant personnel and the plant's fire brigade; design and selection of equipment; periodic inspection and testing of fire protection systems and equipment in accordance with established procedures, and evaluate test results and determine the acceptability of the systems under test.	ii. The responsibility for the fire fighting training of the plant's fire brigade is delegated to the Division of Nuclear Training (DNT), Fire Protection and Emergency Services Training Section. The training is monitored by the BFN fire protection staff.

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	DNE has the responsibility for the design and selection of installed equipment. Other equipment, periodic inspection, and testing of fire protection systems and equipment, evaluation of test results and acceptability of system under test is the responsibility of the Fire Protection Manager and his staff.
iii. Assists in the critique of all fire drills to determine how well the training objectives have been met.	iii. The Fire Brigade Leader and site Fire Marshal assist in the critique of all fire drills to determine that the training objectives are being met.
iv. Reviews and evaluates proposed work activities to identify potential transient fire loads.	iv. Each supervisor is responsible to ensure that transient combustibles are handled in accordance with a procedural attachment to the FPP entitled "Control of Transient Combustibles". These guidelines apply to all areas of the site containing safety-related cable and equipment and to other areas the Plant Manager, Shift Engineer or Fire Protection Staff may designate as requiring control of transient fire loads to reduce the fire potential.
v. Implements a program for indoctrination of all plant contractor personnel in appropriate administrative procedures which implement the fire protection program, and a the emergency procedures relative to fire protection.	v. The Division of Nuclear Training teaches General Employee Training (GET-7), which details how to report fire emergencies, fire prevention requirements, plant fire brigade functions, and an overall description of the Browns Ferry fire protection program. All personnel working onsite are required to take GET-7 when initially coming onsite and updates biennially.

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vi. Implements a program for instruction of personnel on the proper handling of accidental events such as leaks or spills of flammable materials that are related to fire protection.	vi. The Division of Nuclear Training conducts a hazardous materials course which each employee and all contractor personnel working onsite must take. This course specifies the actions that should be taken when a leak or spill of flammable materials occurs.
(e) The onsite position responsible for fire protection quality assurance. This position should be responsible for assuring the effective implementation of the fire protection program by planned inspections, scheduled audits, and verification that the results of these inspections or audits are promptly reported to cognizant management personnel.	(e) The Site Director has responsibility for all aspects of the fire protection program. Both the Fire Protection Manager and the site Quality Assurance organization monitors the effectiveness of the program. Day to day implementation of the policies is a line supervisory responsibility.
(f) The positions which are part of the plant fire brigade:	
i. The plant fire brigade positions should be responsible for fighting fires. The authority and responsibility of each fire brigade position relative to fire protection should be clearly defined.	i. The Shift Engineer assumes overall responsibility for all plant fire emergencies. The fire brigade leader reports to the Shift Engineer and is designated for each shift by the operator's schedule or the shift engineer. Reporting to the fire brigade leader are the fire brigade Level I members, which consists of assistant unit operators. Level II response fire brigade members also report to the fire brigade leader and consists of RADCON technicians, chemical laboratory analysts and Public Safety Officers.

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	The fire brigade also has Level II support personnel who respond to the fire equipment cage locations and remain at the equipment cages until the fire emergency is over. The fire brigade also has available on a call-in list. Level III members consisting of on- or off-shift Level I, Level II, or any employee that the shift engineer deems necessary to support any fire emergency. Public Safety has the primary responsibility for responding to all fire emergencies outside the protected area, and provides backup support to the plant fire brigade inside the protected area when requested by the brigade leader.
ii. The responsibilities of each fire brigade position should correspond with the actions required by the fire fighting procedures.	ii. The responsibilities of the fire brigade positions are defined in procedural attachment to the FPP entitled "Fire Emergency Procedures and Prefire Plans", and do correspond with the actions required by the fire fighting procedures.
iii. The responsibilities of the fire brigade members under normal plant conditions should not conflict with their responsibilities during a fire emergency.	iii. The responsibilities of the fire brigade members under normal plant conditions do not conflict with their responsibilities during a fire emergency.
iv. The minimum number of trained fire brigade members available onsite for each operating shift should be consistent with the activities required to combat the most significant fire. The size of the fire brigade should be based upon the functions required to fight fires with with adequate allowance for injuries.	iv. The minimum number of trained fire brigade members available onsite for each operating shift is a leader and four members. In most cases additional members will also be available onsite.

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v. The recommendations for organization, training, and equipment of "Private Fire Brigades" as specified in NFPA No. 27-1975, including the applicable NFPA publications listed in the appendix to NFPA No. 27, are considered appropriate criteria for organizing, training, and operating a plant fire brigade.	v. The basic recommendations of NFPA "Private Fire Brigades", currently NFPA 600 were used in formulating the guidelines for the organization and training and operating of the fire brigade.
(5) Personnel Qualifications	(5) Personnel Qualifications
(a) The position responsible for formulation and implementation of the fire protection program should have within his organization or as a consultant a fire protection engineer who is a graduate of an engineering curriculum of accepted standing and shall have completed not less than 6 years of engineering attainment indicative of growth in engineering competency and achievement 3 years of which shall have been in responsible charge of fire protection engineering work. These requirements are the eligibility requirements as a member in the Society of Fire Protection Engineers.	(a) The position responsible for formulation and implementation of the fire protection program is the Fire Protection Manager. As a minimum, the Fire Protection Manager will have available for consultation a degreed fire protection engineer who meets the eligibility requirements of a full member of the Society of Fire Protection Engineers.
(b) The fire brigade members' qualifications should include satisfactory completion of a physical examination for performing strenuous activity, and of the fire brigade training described in Position C.3.d.	(b) Fire brigade members are medically evaluated to assure they can perform strenuous activities and obtain a medical clearance without restrictions for fire brigade duty and training. Fire brigade members are trained and qualified as fire brigade members in accordance with a procedural attachment to the FPP entitled, " Fire Training and Drills."

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(c) The personnel responsible for the maintenance and testing of the fire protection systems should be qualified by training and experience for such work.	(c) The personnel responsible for the maintenance and testing of the fire protection systems have been trained in the basics of their crafts and are qualified by training and experience for maintenance and testing of fire protection systems. These personnel attend periodic specialized training courses to maintain their proficiency.
(d) The personnel responsible for the training of the fire brigade should be qualified by training and experience for such work.	(d) Minimum training and experience standards have been established for the personnel within the Division of Nuclear Training responsible for training of the fire brigade. The training program personnel have been evaluated by the NFPA. The NFPA determined that the training personnel were qualified for the positions they held as of January 1988.
(6) The following NFPA publications should be used for guidance to develop the fire protection program: No. 4 - "Organization for Fire Services" No. 4A - "Organization of a Fire Department" No. 6 - "Industrial Fire Loss Prevention" No. 7 - "Management of Fire Emergencies" No. 8 - "Management Responsibilities for Effects of Fire on Operations" No. 27 - "Private Fire Brigades"	(6) Of the six NFPA standards referenced, three have been cancelled and two others are applicable to municipal fire departments, not to industrial fire brigades. NFPA 600 "Private Fire Brigades" (which superseded NFPA 27) provides only general guidance and no specific criteria. The guidance of NFPA 600 was used in the formulation of BFN's fire brigade program. With the cancellation of the other NFPA standards, no NFPA guidance was available for other program areas. Therefore, OSHA regulations (29CFR1910.156), 10CFR50.48, and BTP CMEB 9.5-1 were used to formulate the BFN fire protection program.

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(7) On sites where there is an operating reactor and construction or modification of other units is underway, the superintendent of the operating plant should have the lead responsibility for site fire protection.	(7) At BFN the FPP and the supporting procedures establish the requirements and controls necessary to ensure proper fire protection practices are followed. All work performed onsite must be in accordance with the FPP and the supporting procedures. The FPP and supporting procedures and changes to them are approved by the Plant Operations Review Committee (PORC) before they are implemented. PORC is made up of the senior managers of various plant organizations including Operations. PORC is charged with assuring safe operations in the plant.
b. Fire Hazards Analysis	b. Fire Hazards Analysis
The fire hazards analysis should demonstrate that the plant will maintain the ability to perform safe shutdown functions and minimize radioactive releases to the environment in the event of a fire.	Complete fire hazards and safe shutdown analyses have been performed for BFN to demonstrate compliance with applicable portions of Appendix R as required by 10CFR50.48. These analyses meet the requirements of Appendix R, Section IIB. The guidelines for a fire hazards analysis (FHA) in Branch Technical Position CMEB 9.5-1 exceed those required under Appendix R, Section IIB. The analyses do not address the areas in excess of the Appendix R requirements. Summaries of the analyses are documented in the BFN Fire Protection Report. The fire hazards analysis does not address radiological emergencies. The BFN Radiological Emergency Plan establishes the methods to be used to minimize contamination in the event of a fire which may release radioactive materials.
The fire hazards analysis should be performed by qualified fire protection and reactor systems engineers to (1) consider potential in situ and transient fire hazards (2) determine the consequences of fire in any location in the plant on the ability to safely shut down the reactor or on the ability to minimize and control the release of radioactivity to the environment;	The FHA addressed common transient fuel loads, and transient combustibles not identified in the FHA are governed by Section 7.2 of the FPP.

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and (3) specify measures for fire prevention, fire detection, fire suppression, and fire containment and alternative shutdown capability as required for each fire area containing structures, system and components important to safety that are in conformance with NRC guidelines and regulations.

"Worst case" fires need not be postulated to be simultaneous with nonfire-related failures in safety systems, plant accidents, or the most severe natural phenomena.

On multiple-reactor sites, unrelated fires in two or more units need not be postulated to occur simultaneously. Fires involving facilities shared between units and fires due to man-made site-related events that have a reasonable probability of occurring and affecting more than one reactor unit (such as an aircraft crash) should be considered.

Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under postfire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents. Three levels of fire damage limits are established according to the safety function of the structure, system, or component:

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Safety Function Fire Damage Limit

Hot Shutdown - One train of equipment necessary to achieve hot shutdown from either the control room or emergency control station(s) must be maintained free of fire damage by a single fire, including an exposure fire.

Cold Shutdown - Both trains of equipment necessary to achieve cold shutdown may be damaged by a single fire, including an exposure fire, but damage must be limited so that at least one train can be repaired or made operable within 72 hours using onsite capability.

Design Basis - Both trains of accident equipment necessary for mitigation of consequenses following design basis accidents may be damaged by a single exposure fire.

The most stringent fire damage limit should apply for those systems that fall into more than one category. Redundant systems used to mitigate the consequences of other design basis accidents but not necessary for safe shutdown may be lost to a single exposure fire. However, protection shall be provided so that a fire within only one such system will not damage the redundant system.

The fire hazards analysis should separately identify hazards and provide appropriate protection in locations where safety-related losses can occur as a result of:

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(1) Concentrations of combustible contents, including transient fire loads due to combustibles expected to be used in normal operations such as refueling, maintenance, and modifications;	
(2) Continuity of combustible contents, furnishings, building materials, or combinations thereof in configurations conducive to fire spread;	
(3) Exposure fire, heat, smoke, or water exposure, including those that may necessitate evacuation from areas that are required to be attended for safe shutdown;	
(4) Fire in control rooms or other locations having critical safety-related functions;	
(5) Lack of adequate access or smoke removal facilities that impede fire extinguishment in safety-related areas;	
(6) Lack of explosion-prevention measures;	
(7) Loss of electric power or control circuits;	
(8) Inadvertent operation of fire suppression systems.	
The fire hazards analysis should verify that the NRC fire protection program guidelines have been met. The analysis should list applicable elements of the program, with explanatory statements as needed to identify location, type of system, and design criteria. The analysis should identify and justify any deviations from the regulatory guidelines. Justification for deviations from the regulatory guidelines should show that an equivalent level of protection will be achieved.	

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Deletion of a protective feature without compensating alternative protection measures will not be acceptable, unless it is clearly demonstrated that the protective measure is not needed because of the design and arrangement of the particular plant.	
c. Fire Suppression System Design Basis	c. Fire Suppression System Design Basis
(1) Total reliance should not be placed on a single fire suppression system. Appropriate backup fire suppression capability should be provided.	(1) Backup fire suppression capability is provided for all automatic and manually operated fixed suppression systems by trained fire brigades with hose standpipe systems and portable extinguishers.
(2) A single active failure or a crack in a moderate-energy line (pipe) in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, neither the failure of a fire pump, its power supply or controls, nor a crack in a moderate-energy line in the fire suppression system, should result in loss of function of both sprinkler and hose standpipe systems in an area protected by such primary and backup systems.	(2) The fire protection systems are designed so the following single impairments will not degrade or disable both primary and backup fire suppression capabilities: 1) Loss of electric power to fire protection equipment, detectors and electrically actuated valves. 2) Valve failures, i.e. spurious operation and failure to operate when required. 3) Loss of flow in a section of pipe for reasons other than valve failures. The design of fire suppression systems has not considered cracks in moderate energy lines. The BFN impairment analysis methodology was reviewed and approved by the NRC as part of the 1975 Fire Recovery Plan.

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	The Appendix R analysis demonstrated that at least one fire pump can be manually started for a fire in any postulated location.
(3) As a minimum, the fire suppression system should be capable of delivering water to manual hose stations located within hose reach of areas containing equipment required for safe plant shutdown following the safe shutdown earthquake (SSE). In areas of high seismic activity, the staff will consider on a case-by-case basis the need to design the fire detection and suppression systems to be functional following the SSE.	(3) The BFN design basis does not require that manual hose stations and standpipes be designed to remain functional during and after a safe shutdown earthquake. This has not been a backfit requirement for plants of BFN's vintage. It is anticipated that most fires could be extinguished using portable fire extinguishing equipment. The portable extinguishing equipment can be used if fixed suppression systems are not available. During or after a seismic event, fire trucks are available as a backup in the event of HPFP failures.
(4) The fire protection systems should retain their original design capability for (a) natural phenomena of less severity and greater frequency than the most severe natural phenomena (approximately once in 10 years) such as tornadoes hurricanes, floods, ice storms or small-intensity earthquakes that are characteristic of the geographic region, and (b) potential man-made site-related events such as oil barge collisions or aircraft crashes that have a reasonable probability of occurring at a specific plant site. The effects of lightning strikes should be included in the overall plant fire protection program.	(4) Natural phenomena (such as tornadoes, floods, and ice storms) and potential man made site-related events (such as oil barge collisions and aircraft crashes) were not a specific criteria in the design of fire protection systems. However, the fire protection systems are likely to withstand these phenomena, as the majority of the components are located within safety related structures that are designed to withstand the natural phenomena and man-made events. Physical separation of the diesel fire pump from the electrical fire pumps and looped design of the fire mains with isolation capability minimize the possibility of total loss of the system due to physical damage.

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	Lightning protection has been addressed in the design of the plant. The top of the powerhouse structures are of metal construction which connects to the buried ground mat via the building structural steel. The switchyard has an overhead ground wire system which is wired to the ground mat. Ground wires are run above the transmission lines and grounded via the transmission line towers. The other major structures onsite also have lightning protection. Additionally, lightning arrestors are provided adjacent to all major electrical equipment.
(5) The consequences of inadvertent operation of or a crack in a moderate energy line in the fire suppression system should meet the guidelines specified for moderate-energy systems outside containment in SRP, section 3.6.1.	(5) See TVA response to guideline C.5.c(2).
d. Alternative or Dedicated Shutdown Alternative or dedicated shutdown capability should be provided where the protection of systems whose functions are required for safe shutdown is not provided by established fire suppression method or by Position C.5.6.	d. Alternative or Dedicated Shutdown Alternative shutdown capability requirements are being met as documented in NEDC 31119 and supplement submittals.
e. Implementation of Fire Protection Programs (1) The fire protection program (plans, personnel, and equipment) for buildings storing new reactor fuel and for adjacent fire areas that could affect the fuel storage area should be fully operational before fuel is received at the site.	e. Implementation of Fire Protection Programs (1) A fire protection program has been implemented.

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Such adjacent areas include those whose flames, hot gases, and fire-generated toxic and corrosive products may jeopardize safety and surveillance of the stored fuel.	
(2) The fire protection program for an entire reactor unit should be fully operational prior to initial fuel loading in that reactor unit.	(2) A fire protection program has been implemented.
(3) On reactor sites where there is an operating reactor and construction or modification of other units is under way, the fire protection program should provide for continuing evaluation of fire hazards. Additional fire barriers, fire protection capability, and administrative controls should be provided as necessary to protect the operating unit from construction fire hazards.	(3) The procedural attachments to the FPP provide the measures necessary to assure plant fire protection commitments are met. These procedures require review of the proposed work by the site fire protection staff prior to performing work which will breech fire barriers, create sparks or other ignition sources, remove fire protection systems from service or otherwise degrade the fire protectio The fire protection staff determines what, if any, compensatory measures are necessary to address transient fire hazards and combustibles.
2. Administrative Controls Administrative controls should be used to maintain the performance of the fire protection system and personnel. These controls should establish procedures to:	2. Administrative Controls
a. Prohibit bulk storage of combustible materials inside or adjacent to safety-related buildings or systems during operation or maintenance periods. Regulatory Guide 1.39 provides guidance on housekeeping, including the disposal of combustible materials.	a. A procedural attachment to the FPP entitled "Control of Transient Combustibles" establishes controls for the bulk storage of combustible materials inside or adjacent to safety related buildings or systems during operation or maintenance periods.

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	Good housekeeping requirements and controls are established in Site Director's Standard Practice (SDSP) 14.6, Building and Facilities Housekeeping and Cleanliness.
b. Govern the handling and limitation of the use of ordinary combustible materials, and flammable gases and liquids, high efficiency particulate air and charcoal filters, dry ion exchange resins, or other combustible supplies in safety-related areas.	b. When installed in systems or equipment, combustibles have been evaluated in the Fire Hazards Analysis and fire detection and suppression has been installed as appropriate. Uninstalled combustibles are treated as transient combustibles in accordance with C.2.c.
c. Govern the handling of and limit transient fire loads such as combustible and flammable liquids, wood and plastic products, or other combustible materials in buildings containing safety-related systems or equipment during all phases of operating, and especially during maintenance, modification, or refueling operations.	c. Control of transient combustibles is established by procedural attachments to the FPP entitled "Control of Transient Combustibles" and "Storage and Labeling of Hazardous Chemicals, Flammable or Combustible Liquids and Compressed Gas Cylinders." These procedures are in effect during all phases of plant activity.
d. Designate the onsite staff member responsible for the inplant fire protection review of proposed work activities to identify potential transient fire hazards and specify required additional fire protection in the work activity procedure.	d. The BFN fire protection staff examines workplans of proposed work activities to identify potential transient fire hazards and specifies additional fire protection measures to be taken as appropriate for the additional hazard.

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e. Govern the use of ignition sources by use of a flame permit system to control welding, flame cutting, brazing, or soldering operations. A separate permit should be issued for each area where work is to be done. If work continues over more than one shift, the permit should be valid for not more than 24 hours when the plant is operating or for the duration of a particular job during plant shutdown.	e. Torch cutting, welding, open-flame, grinding and spark producing work are covered in a procedural attachment to the FPP entitled "Torch Cutting, Welding, Open-flame Grinding, and Spark Producing Work Requirements and Precautions" which governs the use of ignition sources. A separate permit is required for each job. The permits are valid for one eight hour shift and can only be extended for one additional shift.
f. Control the removal from the area of all waste, debris, scrap, oil spills, or other combustibles resulting from the work activity immediately following completion of the activity, or at the end of each work shift, whichever comes first.	f. Prompt removal of combustibles is mandated by the Site Director's Standard Practice (SDSP) 14.6 entitled "Building and Facilities Housekeeping and Cleanliness" which requires that where excess waste is generated by the work being performed, waste should be removed while the maintenance is being performed; otherwise, after each shift or at the completion of the job, whichever comes first.
g. Govern leak testing; similar procedures such as airflow determination should use one of the commercially available techniques. Open flames or combustion-generated smoke should not be permitted.	g. Section 7.3 of the FPP prohibits the use of open flames or combustion-generated smoke for leak testing.
h. Maintain the periodic housekeeping inspections to ensure continued compliance with these administrative controls.	h. Weekly fire inspections are performed and documented in a report. The inspection verifies that fire safety methods are implemented in plant work activities through the control of transient fire loads and general housekeeping.

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	Inadequacies in housekeeping, transient fire loads, impairment permits, and "hot work" procedures are documented in the reports. The completed inspection report is reviewed and approved by the Fire Protection Manager.
i. Control the use of specific combustibles in safety-related areas. All wood used in safety-related areas during maintenance, modification, or refueling operation (such as lay-down blocks or scaffolding should be treated with a flame retardant. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all combustible materials should be removed from the area immediately following unpacking. Such transient combustible material, unless stored in approved containers, should not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior, or polyethylene sheeting should be placed in metal containers with tight-fitting self-closing metal covers.	i. A procedural attachment to the FPP entitled "Control of Transient Combustibles" establishes controls to ensure that the fire protection staff is aware of transient combustibles and can put compensatory measures in place where necessary. The procedure allows the use of fire-retardant treated lumber only in areas containing safety-related equipment. Untreated lumber is not permitted in these areas. The procedure requires that shipping crates or combustible containers be removed from equipment or material prior to taking these items into areas housing safety-related equipment when feasible. If removal is not feasible, the containers are to be removed from the area as soon as uncrating is completed. Such material cannot at any time be left unattended while in such areas.
j. Disarming of fire detection or fire suppression systems should be controlled by a permit system. Fire watches should be established in areas where systems are so disarmed.	j. Fire detection or fire suppression systems may be removed from service or otherwise impaired only after a permit to do so has been approved by the fire protection staff based on the minimum operating requirements of Section 9.1 of the FPP entitled "Fire Protection Equipment Operating and Surveillance Requirements".

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	Section 7.4 of the FPP entitled "Fire Protection Equipment and Fire Barrier Removal from Service" establishes the permit system. Fire watches or other compensatory measures are established in areas where systems are inoperable.
k. Successful fire protection requires testing and maintenance of the fire protection equipment and the emergency lighting and communication. A test plan that lists the individuals and their responsibilities in connection with routine tests and inspections of the fire detection and protection systems should be developed. The test plan should contain the types, frequency, and detailed procedures for testing. Procedures should also contain instructions on maintaining fire protection during those periods when the fire protection system is impaired or during periods of plant maintenance, e.g., fire watches or temporary hose connections to water systems.	k. Testing and maintenance of the fire protection systems and equipment are performed in accordance with Section 9 of the FPP entitled "Periodic Inspections and Testing of Fire Protection Systems and Equipment". This section of the FPP details the type and frequency of inspections and tests and any needed compensatory measures during impairment of the fire protection systems. Detailed instructions are prepared to implement the specified testing and inspection requirements. These instructions include responsibilities of the individuals conducting the tests and inspections, and the instructions for maintaining plant fire protection during the test or inspection.
l. Control actions to be taken by an individual discovering a fire, for example, notification of control room, attempt to extinguish fire, and actuation of local fire suppression systems.	l. A procedural attachment to the FPP entitled "Fire Emergency Procedures and Prefire Plans" defines the actions of the individual who discovers a fire, the control room operator who receives the alarm, and the fire brigade. Each employee on-site receives biennial fire reporting training and direction in actions to perform when a fire is discovered as part of a general employee training (GET) course in fire protection.

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m. Control actions to be taken by the control room operator to determine the need for brigade assistance upon report of a fire or receipt of alarm on control room annunciator panel for example, announcing location of fire over PA system, sounding fire alarms, and notifying the shift supervisor and the fire brigade leader of the type, size, and locations of the fire.	m. The control room operator initiates fire brigade response immediately upon receipt of all fire alarms. All available information on the fire emergency is immediately conveyed to the brigade leader. This action is dictated by procedural attachment to the FPP entitled "Fire Emergency Procedures and Prefire Plans". The control room operator immediately announces the location of the fire emergency over the public address system and periodically thereafter. The control room operator discontinues the fire alarm and announces the end of the emergency when notified by the fire brigade that the emergency is over.
n. Control actions to be taken by the fire brigade after notification by the control room operator of a fire, for example, assembling in a designated location, receiving directions from the fire brigade leader, and discharging specific fire fighting responsibilities, including selection and transportation of fire fighting equipment to fire location, selection of protective equipment, operating instructions for use of fire suppression systems, and use of pre-planned strategies for fighting fires in specific areas.	n. A procedural attachment to the FPP entitled, "Fire Emergency Procedures and Prefire Plans" identifies the responsibilities and actions of all parties involved in the fire fighting activities.
o. Define the strategies for fighting fires in all safety-related areas and areas presenting a hazard to safety-related equipment. These strategies should designate:	o.. Prefire plans for each of the areas which could effect safety-related equipment are attached to the FPP. The prefire plans include:

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(1) Fire hazards in each area covered by the specific pre-fire plans.	(1) The prefire plans provide information on the fire potential in each of the areas and generally the quantities and class of combustibles present in these areas.
(2) Fire extinguishants best suited for controlling the fires associated with the fire hazards in that area and the nearest location of these extinguishants.	(2) The prefire plans provide detailed information on the fire extinguishants available and where they are located.
(3) Most favorable direction from which to attack a fire in each area in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be free of fire, and the best station or elevation for fighting the fire. All access and egress routes that involve locked doors should be specifically identified in the procedure with the appropriate precautions and methods for access specified.	(3) Each prefire plan describes the primary and secondary access from which to attack a fire. Key card or locked doors and availability of keys are also identified.
(4) Plant systems that should be managed to reduce the damage potential during a local fire and the location of local and remote controls for such management (e.g., any hydraulic or electrical systems in the zone covered by the specific fire fighting procedure that could increase the hazards in the area because of over-pressurization or electrical hazards).	(4) The prefire plans provide operational considerations for pumps, electrical equipment and similar equipment that should be removed from service to aid in extinguishing the fire.
(5) Vital heat-sensitive system components that need to be kept cool while fighting a local fire. Particularly hazardous combustibles that need cooling should be designated.	(5) The prefire plans identify hazardous materials and safety-related equipment that is particularly heat-sensitive.

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(6) Organization of fire fighting brigades and the assignment of special duties according to job title so that all fire fighting functions are covered by any complete shift personnel complement. These duties include command control of the brigade, transporting fire suppression and support equipment to the fire scenes, applying the extinguishant to the fire, communication with the control room and coordination with outside fire departments.	(6) The prefire plans detail assignment of special duties, command control of the brigade, support equipment, communications and possible coordination with outside fire departments.
(7) Potential radiological and toxic hazards in fire zones.	(7) The prefire plans provides detailed survey information for potential radiological and toxic hazards.
(8) Ventilation system operation that ensures desired plant air distribution when the ventilation flow is modified for fire containment or smoke clearing operation.	(8) Ventilation system operation requirements are provided in the prefire plans.
(9) Operations requiring control room and shift engineer coordination or authorization.	(9) The prefire plans provide guidance on any operations that would require control room and shift engineer coordination or authorizations.
(10) Instructions for plant operators and general plant personnel during fire.	(10) The only responsibility of general site personnel is to report a fire and evacuate the area. A procedural attachment to the FPP entitled "Fire Emergency Procedures and Prefire Plans" identifies the responsibilities of operators and general site personnel.

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3. Fire Brigade	3. Fire Brigade
a. The need for good organization training, and equiping of fire brigades at nuclear power plant sites requires that effective measures be implemented to ensure proper discharge of these functions. The guidance in Regulatory Guide 1.101 "Emergency Planning for Nuclear Power Plants," should be followed as applicable.	a. See previous sections C.1.a.(3), C.1.a.(4)(d)ii, C.1.a.(4)(d)iii, C.1.a.(4)(f) i through v, C.1.a.(5)(b), C.1.a.(5)(d), C.1.a.(6), C.2.m, C.2.n, C.2.o.(1) through (10).
b. A site fire brigade trained and equipped for fire fighting should be established to ensure adequate manual fire fighting capability for all areas of the plant containing structures, systems, or components important to safety. The fire brigade should be at least five members on each shift. The brigade leader and at least two brigade members should have sufficient training in or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability. The qualification of fire brigade members should include an annual physical examination to determine their ability to perform strenuous fire fighting activities. The shift supervisor should not be a member of the fire brigade. The brigade leader shall be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant safety-related systems.	b. A plant fire brigade has been established. The brigade leader is one of the assistant shift engineers who will be competent to assess the potential safety consequences of a fire and advise control room personnel. Three of the brigade members are assistant unit operators. Also, see C.3.a and previous sections.

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c. The minimum equipment provided for the brigade should consist of personal protective equipment such as turnout coats, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment, and portable extinguishers. Self-contained breathing apparatus using full-face positive-pressure masks approved by NIOSH (National Institute for Occupational Safety and Health approval formerly given by the U.S. Bureau of Mines) should be provided for fire brigade, damage control, and control room personnel. At least 10 masks shall be available for fire brigade personnel. Control room personnel may be furnished breathing air by a manifold system piped from a storage reservoir if practical. Service or rated operating life shall be a minimum of one-half hour for the self-contained units. At least two extra air bottles should be located onsite for each self-contained breathing unit. In addition, an onsite 6-hour supply of reserve air should be provided and arranged to permit quick and complete replenishment of exhausted supply air bottles as they are returned. If compressors are used as a source of breathing air, only units approved for breathing air shall be used; compressors shall be operable assuming a loss of offsite power. Special care must be taken to locate the compressor in areas free of dust and contaminants.	c. The minimum equipment for the fire brigade meets the NRC guidelines. Well in excess of 10 self-contained breathing apparatus and 30 air bottles are available for use by the fire brigade. A six hour supply of reserve air is provided. The air compressor for breathing air is an acceptable unit and will remain operable with a loss of offsite power.

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d. The fire brigade training program shall ensure that the capability to fight potential fires is established and maintained. The program shall consist of an initial classroom instruction program followed by periodic classroom instruction, fire fighting practice, and fire drills.	
(1) The initial classroom instruction should include:	
(a) Indoctrination of the plant fire fighting plan with specific identification of each individual's responsibilities.	(a) through (j). These items are all covered in initial and annual classroom training.
(b) Identification of the type and location of fire hazards and associated types of fires that could occur in the plant.	
(c) The toxic and corrosive characteristics of expected products of combustion.	
(d) Identification of the location of fire fighting equipment for each fire area and familiarization with the layout of the plant, including access and egress routes to each area.	
(e) The proper use of available fire fighting equipment and the corrective method of fighting each type of fire. The types of fires covered should include fires in energized electrical equipment, fires in cables and cable trays, hydrogen fires, fires involving flammable and combustible liquids or hazardous process chemicals, fires resulting from construction or modification (welding), and record file fires.	

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(f) The proper use of communication lighting, ventilation, and emergency breathing equipment.	
(g) The proper method for fighting fires inside buildings and confined spaces.	
(h) The direction and coordination of the fire fighting activities (fire brigade leaders only).	
(i) Detailed review of fire fighting strategies and procedures.	
(j) Review of the latest plant modifications and corresponding changes in fire fighting plans	
(k) Training of the plant fire brigade should be coordinated with the local fire department so that responsibilities and duties are delineated in advance. This coordination should be part of the training course and should be included in the training of the local fire department staff.	(k) and (l). Arrangements have been made with the local fire department to provide assistance. The fire brigade leader outlines to the local fire department the potential radiation hazards and potential equipment danger. Annual briefings are conducted for the local fire department officers and fire fighters to assure their continued understanding of their role in the event of a fire emergency at the plant.
(l) Local fire departments should be provided training in operational precautions when fighting fires on nuclear power plant sites and should be made aware of the need for radiological protection of personnel and the special hazards associated with a nuclear power plant site. Note: Items (i) and (j) may be deleted from the training of no more than two of the nonoperations personnel who may be assigned to the fire brigade.	

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(2) The instruction should be provided by qualified individuals who are knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plant and in using the types of equipment available in the nuclear power plant.	(2) The Division of Nuclear Training (DNT) is responsible for providing the training for fire fighting. The NFPA has evaluated the training program and determined that the instructors have the proper qualifications. The National Professional Qualification Board (NPQB) has approved DNT's Fire Protection and Emergency Services Training Section as a national certification agency for Fire Fighter I, II, and III, Fire Instructor I and II, Fire Officer I and Fire Apparatus Driver Operator.
(3) Instruction should be provided to all fire brigade members and fire brigade leaders.	(3) Instruction is provided to all fire brigade members and fire brigade leaders.
(4) Regular planned meetings should be held at least every 3 months for all brigade members to review changes in the fire protection program and other subjects as necessary.	(4) Quarterly meetings are held for all brigade members which includes a review of changes in the fire protection program and other subjects as necessary.
(5) Periodic refresher training sessions shall be held to repeat the classroom instruction program for all brigade members over a 2-year period. These sessions may be concurrent with the regular planned meetings.	(5) The quarterly meeting of the fire brigade includes refresher training. Refresher training is also given annually and quadrennially.
(6) Practice	(6) Practice
(a) Practice sessions should be held for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant.	(a) An annual eight hour refresher course is performed for classroom review and "hands on" exercises. Specific skills such as use of SCBA, hoselines, and extinguishers are polished while training at a slower pace than would be experienced in a drill.

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These sessions shall provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions encountered in fire fighting.	The classroom percentage is approximately 40 percent and field work is approximately 60 percent.
(b) These practice sessions should be provided at least once per year for each fire brigade member.	(b) Practice sessions are annual.
(7) Drills	(7) Drills
(a) Fire brigade drills should be performed in the plant so that the fire brigade can practice as a team. (b) Drills should be performed at regular intervals not to exceed 3 months for each shift fire brigade. Each fire brigade member should participate in each drill, but must participate in at least two drills per year. A sufficient number of these drills, but not less than one for each shift fire brigade per year, should be unannounced to determine the fire fighting readiness of the plant fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill should ensure that the responding shift fire brigade members are not aware that a drill is being planned until it is begun. Unannounced drills should not be scheduled closer than 4 weeks.	(7)(a), (b), and (c). Periodic drills are conducted which meet all of these requirements.

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At least one drill per year should be performed on a "back shift" for each shift fire brigade.	
(c) . The drills should be preplanned to establish the training objectives of the drill and should be critiqued to determine how well the training objectives have been met. Unannounced drills should be planned and critiqued by members of the management staff responsible for plant safety and fire protection. Performance deficiencies of a fire brigade or of individual fire brigade members should be remedied by scheduling additional training for the brigade or members. Unsatisfactory drill performance should be followed by a repeat drill within 30 days.	
(d) These drills should provide for local fire department participation periodically (at least annually).	(d) The local fire department is briefed on plant activities, and participates in an annual drill.
(e) At 3-year intervals, a randomly selected unannounced drill should be critiqued by qualified individuals independent of the licensee's staff. A copy of the written report from such individuals should be available for NRC review.	(e) This drill is a portion of the three-year fire protection audit conducted by a qualified outside consultant under contract to DNQA. The drill observers include individuals who are not TVA employees.
(f) Drills should as a minimum include the following: i. Assessment of fire alarm effectiveness, time required to notify and assemble fire brigade, and selection, placement, and use of equipment and fire fighting strategies.	(f) i through iv. A procedural attachment to the FPP entitled "Fire Training and Fire Drills" establishes the BFN fire drill program. The BFN program complies with these guidelines.
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ii. Assessment of each brigade member's knowledge of his or her role in the fire fighting strategy for the area assumed to contain the fire. Assessment of the brigade members' conformance with established plant fire fighting procedures and use of fire fighting equipment, including self-contained emergency breathing apparatus, communication equipment, and ventilation equipment, to the extent practicable.	
iii. The simulated use of fire fighting equipment required to cope with the situation and type of fire selected for the drill. The area and the type of fire chosen for the drill should differ from those used in the previous drills so that brigade members are trained in fighting fires in various plant areas. The situation selected should simulate the size and arrangement of a fire that could reasonably occur in the area selected, allowing for fire development due to the time required to respond, to obtain equipment, and organize for the fire, assuming loss of automatic suppression capability.	
iv. Assessment of brigade leader's direction of the fire fighting effort as to thoroughness, accuracy, and effectiveness.	

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(8) Records Individual records of training provided to each fire brigade member, including drill critiques, should be maintained for at least 3 years to ensure that each member receive training in all parts of the training program. These records of training should be available for NRC review. Retraining or broadened training for fire fighting within buildings should be scheduled for all those brigade members whose performance records show deficiencies.	(8) Records Individual training records, including drill critiques, are maintained by Document Control and retained for three years. Retraining or broadened training for fire fighting within buildings are scheduled for all those brigade members whose performance records show deficiencies.
(9) Guidance Documents NFPA 27, "Private Fire Brigade," should be followed in organization, training, and fire drills. This standard also is applicable for the inspection and maintenance of fire fighting equipment. Among the standards referenced in this document, NFPA 197, "Training Standard on Initial Fire Attacks," should be utilized as applicable. NFPA booklets and pamphlets listed" in NFPA 27 may be used as applicable for training references In addition, courses in fire prevention and fire suppression that are recognized or sponsored by the fire protection industry should be utilized.	(9) Guidance Documents The fire brigade is organized, trained and drilled following the guidelines of "Private Fire Brigades", currently NFPA 600. TVA's training program has been reviewed by the National Professional Qualification Board and accredited as a national certifying agency within the National Professional Qualification System for the Fire Service for the following levels: Fire Fighter I, II, and III Fire Instructor I and II Fire Officer I Fire Apparatus Driver Operator Fire fighting equipment maintenance and inspection is performed by the fire protection staff, following the guidance of NFPA 600.

NRC GUIDELINES

4. Quality Assurance Program

The quality assurance (QA) program of applicants and contractors should ensure that the guidelines for design, procurement, installation, and testing and the administrative controls for the fire protection systems for safety-related areas are satisfied.

The QA program should be under the management control of the QA organization. This control consists of (1) formulating fire protection QA program that incorporates suitable requirements and is acceptable to the management responsible for fire protection or verifying that the program incorporates suitable requirements and is acceptable to the management responsible for fire protection, and (2) verifying the effectiveness of the QA program for fire protection through review, surveillance, and audits. Performance of other QA program functions for meeting the fire protection program requirements may be performed by personnel outside of the QA organization. The QA program for fire protection should be part of the overall plant QA program. It should satisfy the specific criteria listed below.

a. Design and Procurement Document Control

Measures should be established to ensure that the guidelines of the regulatory position of this guide are included in design and procurement documents and that deviations therefore are controlled.

TVA RESPONSE

4. Quality Assurance Program

The Quality Assurance program is administered by the Division of Nuclear Quality Assurance (DNQA) in accordance with TVA's QA Topical Report (reference 44) and part I, section 1.3 of the Nuclear Quality Assurance Manual (NQAM) (Reference 45). Site implementation of the QA program for fire protection is in accordance with paragraph 3.8 of the FPP. The program meets the NRC guidelines as a minimum.

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b. Instructions, Procedures, and Drawings

Inspections, tests, administrative controls, fire drills, and training that govern the fire protection program should be prescribed by documented instructions, procedures, or drawings and should be accomplished in accordance with these documents.

c. Control of Purchased Material Equipment, and Services

Measures should be established to ensure that purchased material, equipment, and services conform to the procurement documents.

d. Inspection

A program for independent inspection of activities affecting fire protection should be established and executed by or for the organization performing the activity to verify conformance with documented installation drawings and test procedures for accomplishing the activities.

e. Test and Test Control

A test program should be established and implemented to ensure that testing is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. The tests should be performed in accordance with written test procedures; test results should be properly evaluated and acted on.

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f. Inspection, Test, and Operating Status Measures should be established to provide for the identification of items that have satisfactorily passed required test and inspections.	
g. Nonconforming Items Measures should be established to control items that do not conform to specified requirements to prevent inadvertent use or installation.	
h. Corrective Action Measures should be established to ensure that conditions adverse to fire protection, such as failures, malfunctions deficiencies, deviations, defective components, uncontrolled combustible material and nonconformances, are promptly identified, reported, and corrected.	
i. Records Records should be prepared and maintained to furnish evidence that the criteria enumerated above are being met for activities affecting the fire protection program.	
j. Audits Audits should be conducted and documented to verify compliance with the fire protection program, including design and procurement documents, instructions, procedures and drawings and inspection and test activities.	

NRC GUIDELINES	TVA RESPONSE
5. General Plant Guidelines	5. General Plant Guidelines
a. Building Design	a. Building Design
(1) Fire barriers with a minimum fire resistance rating of 3 hours should be provided to:	(1)(a)(b) and (c) BFN does not specifically meet these NRC guidelines. Fire rated compartmentation will be provided prior to restart of the affected unit as outlined in Section 7.2 of the Appendix R Submittal (NEDC 31119). This will ensure that redundant equipment and cables are adequately separated to maintain safe shutdown capability during and after a fire.
(a) Separate safety-related systems from any potential fire in non safety-related areas that could affect their ability to perform their safety function;	
(b) Separate redundant divisions or trains of safety-related systems from each other so that both are not subject to damage from a single fire;	
(c) Separate individual units on a a multiple-unit site unless the requirements of General Design Criterion 5 are met with respect to fires.	
(2) Appropriate fire barriers should be provided within a single safety division to separate components that present a fire hazard to other safety-related components or high concentrations of safety-related cables within that division.	(2) See answer to C.5.a (1) (a),(b), and (c).
(3) Openings through fire barriers for pipe, conduit, and cable trays which separate fire areas should be sealed or closed to provide a fire resistance rating at least equal to that required of the barrier itself. Openings inside conduit larger than 4 inches in diameter should be sealed at the the fire barrier penetration.	(3)(a)(b) and (c) All fire barrier seals will be reviewed to assure compliance. Unsealed penetrations will be sealed and penetrations with unqualified seals will be resealed as required to maintain fire barrier integrity. Seals will be determined to meet fire barrier integrity requirements by one of the following methods:

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Openings inside conduit 4 inches or less in diameter should be sealed at the fire barrier unless the conduit extends at least 5 feet on each side of the fire barrier and is sealed either at both ends or at the fire barrier with noncombustible material to prevent the passage of smoke and hot gases. Fire barrier penetrations that must maintain environmental isolation or pressure differentials should be qualified by test to maintain the barrier integrity under such conditions.

Penetration designs should utilize only noncombustible materials and should be qualified by tests. The penetration qualification tests should use the time-temperature exposure curve specified by ASTM E-119, "Fire Test of Building Construction and Materials." The acceptance criteria for the test should require that:

(a) The fire barrier penetration has withstood the fire endurance test without passage of flame or ignition of cables on the unexposed side for a period of time equivalent to the fire resistance rating required of the barrier.

(b) The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperature does not exceed 325°F.

(c) The fire barrier penetration remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test.

TVA RESPONSE

Method 1

The penetration seal is UL listed or approved by a recognized independent testing facility. The rating of the penetration seal is either equivalent to or exceeds the requirement for the structure it is installed in. The penetrations which have been qualification tested meet these NRC guidelines.

Method 2

The penetration seal design and installation has been previously approved by the NRC. This would include the penetration seals described in the TVA Recovery Plan, Revision 6, April 9, 1976, Part X-Section A; 4.0 Fire Stop Penetration Design and Tests (Reference 39).

Method 3

The penetration seal designs were evaluated and approved by a qualified fire protection engineer per NRC guidelines in Generic Letter 86-10.

The penetration seal design for pipe, conduits and cable trays are further detailed as follows:

Pipe and Conduit Penetrations - Pipe and conduit penetrations through fire area barriers will be sealed to provide a fire resistance rating at least equal to that required of the barrier itself. (Method 1). Some existing seals will be evaluated by qualified fire protection engineer and approved (Methods 2 and 3).

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The stream shall be delivered through a 1-1/2-inch nozzle set at a discharge angle of 30 percent with a nozzle pressure of 75 psi and a minimum discharge of 75 gpm with the tip of the nozzle a maximum of 5 ft from the exposed face; or the stream shall be delivered through a 1-1/2-inch nozzle set at a discharge angle of 15 percent with a nozzle pressure of 75 psi and a minimum discharge of 75 gpm with the tip of the nozzle a maximum of 10 ft from the exposed face; or the stream shall be delivered through a 2-1/2-inch national standard playpipe equipped with 1-1/8 inch tip, nozzle pressure of 30 psi, located 20 ft from the exposed face.	Internal Conduit Seals - Openings inside conduits larger than four inches will be sealed with a fire-rated seal at the fire barrier penetration. Openings inside conduits four inches or less in diameter will be sealed at the fire barrier with a fire-rated seal unless the conduit extends five feet on each side of the fire barrier and will be sealed either at both ends or at the fire barrier with a caulk or other material to prevent the passage of smoke and gas. Cable Tray Penetrations - Cable tray penetrations through fire area barriers are qualified by pre-approved design by NRC. (Method 2)
(4) Penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier (see NFPA-90A, "Air Conditioning and Ventilating Systems"). Flexible air duct coupling in ventilation and filter systems should be noncombustible.	(4) Ventilation system penetrations through fire barriers were evaluated assure compliance. Where penetrations did not meet current NRC guidelines, modifications will be made prior to restart of the affected unit. (See Appendix R Submittal, NEDC 31119, Reference 5). Combustible flexible air duct couplings have been used in some ventilation and filter systems.
(5) Door openings in fire barriers should be protected with equivalently rated doors, frames, and hardware that have been tested and approved by a nationally recognized laboratory. Such doors should be self-closing or provided with closing mechanisms and should be inspected semiannually to verify that automatic hold-open, release, and closing mechanisms and latches are operable. (See NFPA 80, "Fire Doors and Windows"). One of the following measures should be provided to ensure they will protect the opening as required in case of fire:	(5)(a)(b)(c) and (d): Door openings in fire barriers will be protected prior to restart of the affected unit with equivalently rated doors, frames, and hardware except as outlined in Section 10e on the Appendix R Submittal (NEDC 31119). The integrity of the fire doors in the fire barriers will be maintained through one or more of the methods outlined in the response to guidelines C.5.a(5) (a),(b),(c), and (d). The fire doors located in required fire barriers will be inspected in accordance with Section 9.1.1 of the FPP which satisfies the NRC guidelines.

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(a) Fire doors should be kept closed and electrically supervised at a continuously manned location;	The areas protected by automatic carbon dioxide suppression systems have electrically supervised self-closing doors or satisfy option (a), except the doors into the individual diesel generator compartments in the two diesel generator buildings.
(b) Fire doors should be locked, closed, and inspected weekly to verify that the doors are in the closed position;	The doors into the individual diesel generator compartments are self-closing fire doors but are not electrically supervised.
(c) Fire doors should be provided with automatic hold-open and and release mechanisms and inspected daily to verify that doorways are free of obstructions; or	
(d) Fire doors should be kept closed and inspected daily to verify that they are in the closed position.	
The fire brigade leader should have ready access to keys for any locked fire doors.	
Areas protected by automatic total flooding gas suppression systems should have electrically supervised self-closing fire doors or should satisfy option (a) above.	
(6) Personnel access routes and escape routes should be provided for each fire area. Stairwells outside primary containment serving as escape routes, access routes for fire fighting, or access routes to areas containing equipment necessary for safe shutdown should be enclosed in masonry or concrete towers with a minimum fire rating of 2 hours and self-closing Class B fire doors.	(6) Personnel access routes are defined for each fire area in the prefire plans. Stairwells outside primary containment and access routes to areas containing equipment necessary for safe shutdown are not in two hour rated towers with self-closing fire doors. This is justified because of the multiple access and escape routes within the various elevations of the Control Building and the three Reactor Buildings.

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(7) Fire exit routes should be clearly marked.	(7) Exit routes have been marked with painted signs reading "To Assembly Area". For proposed corrective action, see description sheet for project number 45 in the Fire Protection Upgrade Report.
(8) Each cable spreading room should contain only one redundant safety division. Cable spreading rooms should not be shared between reactors. Cable spreading rooms should be separated from each other and from other areas of the plant by barriers having a minimum fire resistance of 3 hours.	(8) The cable spreading rooms contain multiple divisions and serve multiple reactors, and are not separated from each other or other portions of the Control Building by 3-hour rated barriers. The Appendix R Submittal (NEDC 31119) (Reference 5) documents the safe shutdown systems analyses and justification for this based on the availability of alternative shutdown capability. A preaction sprinkler system in each of the cable spreading rooms is backed up by a manually actuated CO_2 system. Both smoke detectors and heat detectors are installed.
(9) Interior wall and structural components, thermal insulation materials, radiation shielding materials, and soundproofing should be noncombustible. Interior finishes should be noncombustible. Materials that are acceptable for use as interior finish without evidence of test and listing by a nationally recognized laboratory are the following: o Plaster, acoustic plaster, gypsum plasterboard (gypsum wallboard), either plain, wallpapered, or painted with oil or water-basepaint;	(9) Interior wall and structural components, radiation shielding materials, and sound proofing materials are noncombustible. Plastic thermal insulation is discussed in the response to NRC guideline C.5.d.(3). Other thermal insulation materials used in the plant are noncombustible. Interior finishes are noncombustible except for plastic light covers in suspended celings in various rooms in the Control Building and carpet in the shift engineer's office. For proposed corrective action see the description sheet for Project Number 21C in the Fire Protection Upgrade Report.

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o Ceramic tile, ceramic panels; o Glass, glass blocks; o Brick, stone, concrete blocks, plain or painted; o Steel and aluminum panels, plain, painted, or enameled; o Vinyl tile, vinyl-asbestos tile, linoleum, or asphalt tile on concrete floors.	The drywell gap between the steel pressure vessel and the reinforced concrete shield wall is filled with polyurethane foam to a maximum thickness of 2-1/4-inches (BFN FSAR 5.2-3). Administrative controls to prevent combustion of polyurethane foam are contained in a procedural attachment to the FPP entitled "Torch Cutting, Welding, Open-Flame, Grinding and Spark-producing Work Requirements and Precautions" (Reference 1).
(10) Metal deck roof construction should be noncombustible and listed as "acceptable for fire" in the UL Building Materials Directory, or listed as Class I in the Factory Mutual System Approval Guide.	(10) Turbine and Reactor Building roof construction meets the Factory Mutual (FM) approval guide requirements for Class I constructions as of May 1969.
(11) Suspended ceiling and their supports should be of noncombustible construction. Concealed spaces should be devoid of combustibles except as noted in Position C.6.b.	(11) Suspended ceilings and their supports are of noncombustible construction except for the plastic light covers discussed in the response to NRC guideline C.5.a.(9). Concealed spaces have limited amounts of combustibles, mainly cable insulation. These cables have been accounted for in the Fire Hazards Analysis.
(12) Transformers installed inside fire areas containing safety-related systems should be of the dry type or insulated and cooled with noncombustible liquid. Transformers filled with combustible fluid that are located indoors should be enclosed in a transformer vault (see Section 450[c] of NFPA 70, "National Electrical Code").	(12) Transformers located inside buildings containing safety-related equipment are of the dry type or are insulated and cooled with noncombustible liquid.

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(13) Outdoor oil-filled transformers should have oil spill confinement features or drainage away from the buildings. Such transformers should be located at least 50 feet distant from the building, or by ensuring that such building walls within 50 feet of oil-filled transformers are without openings and have a fire resistance rating of at least 3 hours.	(13) The outdoor oil-filled transformers are located at least 50 feet from structures containing safety-related equipment, except for the north wall of the Turbine Building. This reduced spacing is acceptable since the only safety-related equipment in the Turbine Building is cabling located along the south wall, over 300 feet from the exposed north wall. The transformers are protected by automatic water spray systems which reduces the exposure to the Turbine Building. Oil spills from the transformers would be collected in the gravel filled drainage area surrounding the transformers and directed away from the building. For proposed corrective action, see description sheets for project numbers 42 and 47 in the Fire Protection Upgrade Report.
(14) Floor drains sized to remove expected fire fighting waterflow without flooding safety-related equipment should be provided in those areas where fixed water fire suppression systems are installed. Floor drains should also be provided in other areas where hand hose lines may be used if such fire fighting water could cause unacceptable damage to safety-related equipment in the area (see NFPA-92, "Waterproofing and Draining of Floors").	(14) Floor drains have generally been provided throughout the plant areas where fixed water suppression systems are installed. Plant wide evaluation of drain sizes to remove expected fire fighting water flow has not been conducted. A study of the adequacy of drains and possibility of flooding damage to safety-related equipment upon actuation of sprinklers in the Control Building showed that the accumulation of water on floors was minimal and would not cause any damage to safety-related equipment or prohibit safe operation of the plant.

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Where gas suppression systems are installed, the drains should be provided with adequate seals or the gas suppression system should be sized to compensate for the loss of the suppression agent through the drains. Drains in areas containing combustible liquids should have provisions for preventing the backflow of combustible liquids to safety-related areas through the interconnected drain systems. Water drainage from areas that may contain radioactivity should be collected, sampled, and analyzed before discharge to the environment.

TVA RESPONSE

The Reactor and Turbine Buildings are provided with floor drains and consist of large open floor areas. Sprinkler discharge or manual hose streams is not expected to cause flooding problems. Safety-related pumps (RHRSW pumps) are located in the Intake Pumping Station. Drains are provided throughout the Intake Pumping Station. The primary fire protection in the Diesel Generator Buildings are the CO_2 suppression systems. Where water based suppression is used in the Diesel Generator Building, it is not expected to cause flooding problems as drains are provided in the area.

Drains for all plant areas, where water based suppression is used, will be assessed for their adequacy as part of the fire protection upgrade program.

The floor drains in the cable spreading rooms of the Control Building have liquid seal connections to retain the carbon dioxide in these rooms in the event the system is actuated.

The turbine oil tank emergency drain sump pump system with the discharge routed to the outside of the building controls the possibility of backflow of combustible liquids to safety-related areas. Control Room annunciation of a sump overflow reduces the likelihood that overflow of the sump might create an unnoticed fire hazard.

The diesel generator rooms have curbs to assist in control of possible combustible liquid spills between the other diesel generator rooms in the same building.

NRC GUIDELINES

TVA RESPONSE

The curbs with floor drains around the recirculating pump MG sets on elevation 639 of the Reactor Buildings are arranged to prevent possible back flow of spilled oil to other areas containing safety-related equipment. These floor drains are also routed to the emergency drain sump pump system.

Drains from the Reactor Building are collected, sampled, and analyzed before discharge to the environment. Diesel Building sump is sampled before discharge. Turbine Building drains are also sampled on a regular basis.

Water drainage from areas that may contain radioactivity is collected and analyzed before discharge to the environment.

b. Safe Shutdown Capability

(1) Fire protection features should be provided for structures, systems, and components important to safe shutdown. These features should be capable of limiting fire damage so that:

(a) One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and

(b) Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

b. Safe Shutdown Capability

(1) (a) (b), (2) (a) (b) (c) and (3) A complete fire hazards and safe shutdown analysis has been performed for BFN to demonstrate compliance with applicable portions of 10CFR50 Appendix R as required by 10CFR50.48. See response to C.1.b for details of documentation.

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(2) To meet the guidelines of Position C5.b.1, one of the following means of ensuring that one of the redundant trains is free of fire damage should be provided:

(a) Separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3 hour rating. Structural steel forming a part of or supporting such fire barriers should be protected to provide fire resistance equivalent to that required of the barrier;

(b) Separation of cables and equipment and associated circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area; or

(c) Enclosure of cable and equipment and associated circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.

(3) If the guidelines of Positions C5.b.1 and C5.b.2 cannot be met, then alternative or dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, or zone under consideration should be provided.

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c. Alternative or Dedicated Shutdown Capability	c. Alternative or Dedicated Shutdown Capability
(1) Alternative or dedicated shutdown capability provided for a specific fire area should be able to achieve and maintain subcritical reactivity conditions in the reactor, maintain reactor coolant inventory, achieve and maintain hot standby* conditions for a PWR (hot shutdown* for a BWR) and achieve cold shutdown* conditions within 72 hours and maintain cold shutdown conditions thereafter. During the post fire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal ac power, and the fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage, rupture, or any primary coolant boundary, or rupture of the containment boundary. (*As defined in the Standard Technical Specification)	(1) Alternative shutdown capability will be provided prior to restart of the affected unit for specific fire locations as outlined in the Appendix R Submittal (NEDC 31119). The alternative shutdown capability satisfies the NRC guidelines.
(2) The performance goals for the shutdown functions should be: (a) The reactivity control function should be capable of achieving and maintaining cold shutdown reactivity conditions. (b) The reactor coolant makeup function should be capable of maintaining the reactor coolant level above the top of the core for BWRs and be within the level indication in the pressurizer for PWRs.	(2) The performance goals for the safe shutdown functions will be met as stated in Appendix R Submittal (NEDC 31119), Section 3.3.

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(c) The reactor heat removal function should be capable of achieving and maintaining decay heat removal.	
(d) The process monitoring function should be capable of providing direct readings of the process variables necessary to perform and control the above functions.	
(e) The supporting functions should be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.	
(3) The shutdown capability for specific fire areas may be unique for each such area, or it may be one unique combination of systems for all such areas. In either case, the alternative shutdown capability shall be independent of the specific fire area(s) and shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72 hours. Procedures shall be in effect to implement this capability.	(3) The Appendix R Submittal (NEDC 31119) documents the systematic evaluation of each fire area to perform safe shutdown functions. The capability of the systems to function with either onsite or offsite power availability was assumed in the evaluation. Site procedures will be established to ensure that the capability exists to function on power from either source.

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(4) If the capability to achieve and maintain cold shutdown will not be available because of the fire damage the equipment and systems comprising the means to achieve and maintain the hot standby or hot shutdown condition shall be capable of maintaining such conditions until cold shutdown can be achieved. If such equipment and systems will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system shall be provided. The number of operating shift personnel, exclusive of fire brigade members, required to operate such equipment and systems shall be onsite at all times.	(4) Equipment and systems used to achieve and maintain the hot shutdown conditions will be capable of maintaining such conditions until cold shutdown can be achieved. The Appendix R Submittal (NEDC 31119) identifies the independent onsite power supplies that will be available with the diesel generators. An Appendix R emergency operating procedure will identify the number of operating shift personnel that will be required onsite at all times.
(5) Equipment and systems comprising the means to achieve and maintain cold shutdown conditions should not be damaged by fire; or the fire damage to such equipment and systems should be limited so that the systems can be made operable and cold shutdown achieved within 72 hours. Materials for such repairs shall be readily available onsite and procedures shall be in effect to implement such repairs. If such equipment and systems used prior to 72 hours after the fire will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system should be provided. Equipment and systems used after 72 hours may be powered by offsite power only.	(5) The safe shutdown analysis documented in the Appendix R Submittal (NEDC 31119) does not require equipment repairs to assure safe shutdown capability. Systems, components, and circuits taken credit for in the safe shutdown of a fire area will be free of fire damage in the fire area. The SSDS will be capable of operation with either offsite power available or unavailable for up to 72 hours.

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(6) Shutdown systems installed to ensure postfire shutdown capability need not be designed to meet seismic Category I criteria, single failure criteria, or other design basis accident criteria, except where required for other reasons, e.g., because of interface with or impact on existing safety systems, or because of adverse valve action due to fire damage.	(6) The safe shutdown analysis documented in the Appendix R Submittal (NEDC 31119) is consistent with these guidelines.
(7) The safe shutdown equipment and systems for each fire area should be known to be isolated from associated circuits in the fire area so that hot shorts, open circuits, or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. The separation and barriers between trays and conduit containing associated circuits of one safe shutdown division and trays and conduits containing associated circuits or safe shutdown cables from the redundant division, or the isolation of these associated circuits from the safe shutdown equipment, should be such that a postulated fire involving associated circuits will not prevent safe shutdown.	(7) Upon completion of modifications identified in the Appendix R Submittal (NEDC 31119), associated circuits will not defeat the shutdown capability assuming the following fire-induced faults: (1) All associated circuits may experience circuit failures such as hot shorts (three phase hot shorts are not credible), open circuits, or shorts to ground; and (a) one circuit failure resulting in a spurious operation of a non-high-low pressure interface valve or component; or (b) two or more circuit failures resulting in spurious operations of two or more valves in series in a high-low pressure interface.
d. Control of Combustibles	d. Control of Combustibles
(1) Safety-related systems should be isolated or separated from combustible materials. When this is not possible because of the nature of the safety system or the combustible material, special protection should be provided to prevent a fire from defeating the safety system function.	(1) Emergency diesel generators are protected by an automatic carbon dioxide fire suppression system, so that a fuel oil fire should cause only limited damage. Further, the wide separation between the two diesel buildings assures that no fire in a single fuel oil day tank will expose all diesel generator units.

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Such protection may involve a combination of automatic fire suppression; and construction capable of withstanding and containing a fire that consumes all combustibles present. Examples of such combustible materials that may not be separable from the remainder of its system are:	The turbine-generator lube oil tanks expose a single train of safety-related cables along the south wall of the Turbine Building. The lube oil tanks are protected by non-standard water spray systems. Other turbine lube oil and hydraulic control fluid systems do not expose safety-related systems.
(a) Emergency diesel generator fuel oil day tanks.	The recirculation pumps are located in primary containment, which is inerted during unit operation. The associated motor-generator sets also contain large quantities of oil, but they are protected by automatic AFFF fire suppression systems.
(b) Turbine-generator oil and hydraulic control fluid systems.	For proposed corrective action, see description sheets for project numbers 23, 24, and 29 in the Fire Protection Upgrade Report.
(c) Reactor coolant pump lube oil system.	
(2) Bulk gas storage (either compressed or cryogenic), should not be permitted inside structures housing safety-related equipment. Storage of flammable gas such as hydrogen should be located outdoor or in separate detached buildings so that a fire or explosion will not adversely affect any safety-related systems or equipment. (Refer to NFPA 50A, "Gaseous Hydrogen Systems"). Care should be taken to locate high pressure gas storage containers with the long axis parallel to building walls. This will minimize the possibility of wall penetration in the event of a container failure. Use of compressed gases (especially flammable and fuel gases) inside buildings should be controlled. (Refer to NFPA 6, "Industrial Fire Loss Prevention")	(2) No bulk storage of gas is permitted inside structures housing safety-related equipment. Hydrogen is stored outside and well detached from the east wall of the Unit 3 Turbine Building. The hydrogen storage area is protected with an automatic water spray system inside the partial, open-sided, noncombustible storage building. The spacing and general arrangement of the hydrogen storage is in accordance with NFPA 50A, Standard for Gaseous Hydrogen at Consumer Sites, 1984 Edition. The hydrogen trailers are oriented with the long axis of the cylinders pointed toward the northeast corner of the Turbine Building. The concrete west wall of the trailer port reduces the possibility of a hydrogen container striking the Turbine Building wall. Even if such an event did occur, the only safety-related equipment in the Turbine Building is a single tray of cables along the south wall, over 200 feet south of the hydrogen trailer port

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	Use of compressed gases inside buildings is controlled by a procedural attachment in the FPP entitled "Storages and Labelling of Hazardous Chemicals, Flammable or Combustible Liquids, and Compressed Gas Cylinders". For proposed corrective action, see description sheet for project number 46 in the Fire Protection Upgrade Report.
(3) The use of plastic materials should be minimized. In particular, halogenated plastics such as polyvinyl chloride (PVC) and neoprene should be used only when substitute noncombustible materials are not available. All plastic materials, including flame and fire retardant materials, will burn with an intensity and BTU production in a range similar to that of ordinary hydrocarbons. When burning, they produce heavy smoke that obscures visibility and can plug air filters, especially charcoal and HEPA. The halogenated plastics also release free chlorine and hydrogen chloride when burning which are toxic to humans and corrosive to equipment.	(3) The use of plastic materials inside buildings is controlled by procedure in Section 7.2 of the FPP. Plastic materials used at Browns Ferry include pipe insulation (Foam Plastic), cable insulation (PVC etc.), light covers etc. The combustible hazards of these materials have been considered in the Fire Hazards Analysis, Section IV of the Fire Protection Report. The use of cables which are qualified to the flame retardant requirements of IEEE-383 or the use of fire retardant coating (i.e. Flamemastic) on non-IEEE 383 cables limits the fire hazards of the cable insulation. Availability of automatic or manual fire suppression means provides additional protection.
(4) Storage of flammable liquids should, as a minimum, comply with the requirements of NFPA 30, "Flammable and Combustible Liquids Code."	(4) Flammable and combustible liquid storage inside structures containing safety-related equipment is strictly controlled. Flammable liquids are stored only in designated areas of the plant. Outdoor storage of flammable and combustible liquids is well removed from structures containing safety-related equipment and generally follows the basic guidelines of NFPA 30, "Flammable and Combustible Liquids Code".

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(5) Hydrogen lines in safety-related areas should be either designed to seismic Class I requirements, or sleeved such that the water pipe is directly vented to the outside, or should be equipped with excess flow valves so that in case of a line break, the hydrogen concentration in the affected areas will not exceed 2 percent.	(5) The hydrogen lines used for generator cooling are routed from the hydrogen trailer port and enter the Turbine Building at column T-6 and T-14 1/2 and run to column B. There is no safety-related equipment in the vicinity of the hydrogen cooling lines. The concentration of H_2 in the main condenser and off-gas system piping is maintained below 4 percent as discussed in FSAR Section 9.5.
e. Electrical Cable Construction, Cable Trays, and Cable Penetrations	e. Electrical Cable Construction, Cable Trays, and Cable Penetrations
(1) Only metal should be used for cable trays. Only metallic tubing should be used for conduit. Thin-wall metallic tubing should not be used. Flexible metallic tubing should only be used in short lengths to connect components to equipment. Other raceways should be made of noncombustible material.	(1) Only metal cable tray and conduit construction is used.
(2) Redundant safety-related cable systems outside the cable spreading room should be separated from each other and from potential fire exposure hazards in nonsafety-related areas by fire barriers with a minimum fire rating of 3 hours. These cable trays should be provided with continuous line-type heat detectors and should be accessible for manual fire fighting. Cables should be designed to allow wetting down with fire suppression water without electrical faulting.	(2) Redundant safety-related cable systems outside the cable spreading room have not been separated from each other by 3 hour fire rated barriers. Upon completion of modifications identified in the Appendix R Submittal (NEDC 31119), the separation and fire protection features for those cables required to achieve and maintain safe shutdown will be in compliance with the requirements of Section III G of Appendix R. Cables are designed to allow wetting down with fire suppression water without electrical faulting.

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Manual hose stations and portable hand extinguishers should be provided.

Safety-related cable trays of a single-division that are separated from redundant divisions by a fire barrier with a minimum rating of 3 hours and are normally accessible for manual fire fighting should be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur. Automatic area protection, where provided, should consider cable tray arrangements and possible transient combustibles to ensure adequate water coverage for areas that could present an exposure hazard to the cable system. Manual hose standpipe systems may be relied upon to provide the primary fire suppression (in lieu of automatic water suppression systems) for safety-related cable trays of a single division that are separated from redundant safety divisions by a fire barrier with a minimum rating of 3 hours and are normally accessible for manual fire fighting if all of the following conditions are met:

(a) The number of equivalent* standard 24-inch-wide cable trays (both safety-related and nonsafety-related) in a given fire area is six or less;

(*Trays exceeding 24 inches should be counted as two trays; trays exceeding 48 inches should be counted as three trays, regardless of tray fill.)

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The Turbine Building cable systems consist of two banks of four trays each, for a total of eight 18-inch trays. Eight 18-inch trays provides an equivalent cross section area to six 24-inch trays. The major potential fire exposure is from the turbine lubricating oil tanks, which are protected by non-standard automatic water spray systems. There are also water spray systems protecting three of the penetrations into the cable spreading room. Because of reduced congestion and improved access for manual fire fighting, the remaining penetrations do not have water spray protection. Smoke detectors are provided in the area, and line-type heat detectors are provided as needed to actuate the three water spray systems protecting penetrations.

Cable systems in the portions of the Unit 3 Diesel Generator Building which do not have automatic fire suppression consist of a single bank of six 18-inch trays in Shutdown Board Rooms 3EB and 3ED and the Bus Tie Board Room. The rooms are protected by smoke detectors, and are accessible for manual fire fighting but there are no line-type heat detectors in the cable trays.

There are two sets of cable systems in the Intake Pump Station. One set is in an area containing redundant power cables for RHRSW system. Division I cables will be provided prior to restart of Unit 2 with 1 hour fire resistance wraps. Additionally the

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(b) The cabling does not provide instrumentation, control or power to systems required to achieve and maintain hot shutdown; and

(c) Smoke detectors are provided in the area of these cable routings, and continuous line-type heat detectors are provided in the cable trays.

Safety-related cable trays that are not accessible for manual fire fighting should be protected by a zoned automatic water system with open-head deluge or open directional spray nozzles arranged so that adequate water coverage is provided for each cable tray. Such cable trays should also be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur.

In other areas where it may not be possible because of other over-riding design features necessary for reasons of nuclear safety to separate redundant safety-related cable systems by 3-hour-rated fire barriers, cable trays should be protected by an automatic water system with open-head deluge or open directional spray nozzles arranged so that adequate water coverage is provided for each cable tray. Such cable trays should also be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur.

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area is protected by automatic sprinklers. The other set consists of four 18-inch cable trays. The area is accessible for manual fire fighting, but is not protected by smoke detectors or line-type heat detectors. The cable tunnel leading to the Intake Pump Station contains eight 18-inch trays. There is no fixed suppression in the cable tunnel, but the area is adequately accessible for manual fire suppression. There are smoke detectors in the tunnel, but there are no line-type heat detectors in the trays.

For proposed corrective action, see description sheets for project numbers 23, 24, 28, and 29 in the Fire Protection Upgrade Report.

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The capability to achieve and maintain safe shutdown considering the effects of a fire involving fixed and potential transient combustibles should be evaluated with and without actuation of the automatic suppression system and should be justified on a suitably defined basis.	
(3) Electric cable construction should, as a minimum, pass the flame test in the current IEEE Std 383. (This does not imply that cables passing this test will not require fire protection).	(3) Cables installed after 1977 have been qualified in accordance with the flame test requirements of IEEE 383. Cables installed prior to this date may not meet this guideline. However, all non-IEEE 383 qualified cables in open cable trays in the secondary containment area of the Reactor Buildings, cable spreading rooms, Diesel Generator Buildings, Intake Pumping Station, and cable tunnel to the Intake Pumping Station have been coated with a flame retardant coating to reduce their combustibility to a comparable level as provided by IEEE 383 qualified cables.
(4) Cable raceways should be used only for cables.	(4) Cable raceways are used only for cables.
(5) Miscellaneous storage and piping for flammable or combustible liquids or gases should not create a potential exposure hazard to safety-related systems.	(5) Transient combustibles are controlled by procedural attachments to the FPP entitled "Control of Transient Combustibles" and "Storage and Labelling of Hazardous Chemicals, Flammable or Combustible Liquids and Compressed Gas Cylinders". Fixed storage and piping for flammable or combustible liquids located inside structures containing safety-related equipment have been evaluated as part of the fire hazards and safe shutdown analyses and do not effect redundant safe shutdown systems. Refer to C.5.d.(2) and C.5.d.(5) for discussion on flammable or combustible gases hazards.

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f. Ventilation	f. Ventilation
(1) The products of combustion and the means by which they will be removed from each fire area should be established during the initial stages of plant design. Consideration should be given to the installation of automatic suppression systems as a means of limiting smoke and end heat generation. Smoke and corrosive gases should generally be discharged directly outside to an area that will not affect safety-related plant areas. The normal plant ventilation system may be used for this purpose if capable and available. To facilitate manual fire fighting, separate smoke and heat vents should be provided in specific areas such as cable spreading rooms, diesel fuel oil storage areas, switchgear rooms, and other areas where the potential exists for heavy smoke conditions (see NFPA 204 for additional guidance on smoke control).	(1) Smoke removal can be accomplished by using the existing HVAC exhaust systems in the Reactor, Turbine and Diesel Buildings, shutdown board rooms, and cable spreading rooms. The Standby Gas Treatment System (SBGT) can also be utilized to remove smoke from the Reactor Building during emergency situations. Portable smoke ejectors and portable generators are available to supplement fixed exhaust systems or to function as backup if the fixed systems are not available due to direct fire damage or loss of off-site power. For proposed corrective action, see description sheet for project number 25 in the Fire Protection Upgrade Report.
(2) Release of smoke and gases containing radioactive materials to the environment should be monitored in accordance with emergency plans as described in the guidelines of Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants." Any ventilation system designed to exhaust potentially radioactive smoke or gases should be evaluated to ensure that inadvertent operation or single failures will not violate the radiologically controlled areas of the plant design. This requirement includes containment functions for protecting the public and maintaining habitability for operations personnel.	(2) The BFN Radiological Emergency Plan (REP) establishes measures for protection of TVA personnel and protection of the health and safety of the public in the event of a radiological emergency at BFN. The REP was developed in accordance with the current guidelines in NUREG 0654 "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." NUREG 0654 supercedes Regulatory Guide 1.101 refered to in this guideline. The Radiation Monitoring System monitors all releases to the environment through a network of process and area monitors. The monitors provide readout both locally and in the control room.

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(3) Special protection for ventilation power and control cables may be required. The power supply and controls for mechanical ventilation systems should be run outside the fire area served by the system where practical.	(3) BFN safe shutdown analysis has concluded that ventilation systems will not be required and that habitable conditions will be maintained in areas required for safe shutdown. Functions such as smoke removal (see response to C.5.f.1) can be accomplished by normal ventilation systems if available or portable smoke ejectors. Hence special protection for ventilation power and control cables has not been provided.
(4) Engineered safety feature filters should be protected in accordance with the guidelines of Regulatory Guide 1.52. Any filter that includes combustible materials and is a potential exposure fire hazard that may affect safety-related components should be protected as determined by the fire hazards analysis.	(4) BFN is not committed to meeting the requirements of NRC Regulatory Guide 1.52. ESF air filtering units at BFN are part of the Standby Gas Treatment System (SBGTS). Combustible material present in the units includes charcoal in metal cabinets. A continuous decay heat removal capability is available in the filter units to prevent buildup of heat in the charcoal beds due to radiolytic heating. Additionally, indication and alarms are provided in the main control room for high moisture content and temperature in the filter units. The 3 redundant SBGT units are located in a separate building outside the main powerhouse complex. The SBGT units are not required for safe shutdown during a fire event. The safety-related equipment located in the other plant areas of the powerhouse complex will not be affected by a fire in any of the SBGT filter units. No fixed suppression systems are provided in the filter units. Portable fire extinguishers are available in the SBGT building and fire hose protection is available from yard hydrants. For proposed corrective action, see description sheets for project numbers 19 and 26 in the Fire Protection Upgrade Report.

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(5) The fresh air supply intakes to areas containing safety-related equipment or systems should be located remote from the exhaust air outlets and smoke vents of other fire areas to minimize the possibility of contaminating the intake air with the products of combustion.	(5) Safety related areas provided with fresh air intakes are the Reactor, Control, and Diesel Generator Buildings. The air intakes for these buildings are either widely separated from any other ventilation smoke exhaust openings or the arrangement of the air intakes is such that smoke contamination from the nearby exhaust openings is highly unlikely.
(6) Stairwells should be designed to minimize smoke infiltration during a fire.	(6) Those stairways that are enclosed will provide some measure of smoke shelter for personnel traveling either up or down the stairs since the doors are normally closed. Enclosed stairwells at BFN were not specifically designed to minimize smoke infiltration. A number of stairs in the Reactor and Turbine Buildings are not enclosed.
(7) Where total flooding gas extinguishing systems are used, area intake and exhaust ventilation dampers should be controlled in accordance with NFPA 12, Carbon Dioxide Systems," and NFPA 12A, "Halon 1301 Systems," to maintain the necessary gas concentration.	(7) The areas protected by the low pressure carbon dioxide systems either have intake and exhaust dampers controlled to maintain the necessary gas concentration, or such dampers are not deemed necessary, due to their location or size. There are no Halon 1301 systems installed in safety-related areas.
g. Lighting and Communication	g. Lighting and Communication
Lighting and two-way voice communication are vital to safe shutdown and emergency response in the event of fire. Suitable fixed and portable emergency lighting and communication devices should be provided as follows:	

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(1) Fixed self-contained lighting consisting of fluorescent or sealed beam units with individual 8 hour minimum battery power supplies should be provided in areas that must be manned for safe shutdown and for access and egress routes to and from all fire areas. Safe shutdown areas include those required to be manned if the control room must be evacuated.	(1) Fixed self-contained lighting consisting of sealed beam units with individual 8 hour minimum battery power supplies will be provided in areas prior to restart of Unit 2 that must be manned for safe shutdown and for access and egress routes to and from those areas.
(2) Suitable sealed-beam battery-powered portable hand lights should be provided for emergency use by the fire brigade and other operations personnel required to achieve safe plant shutdown.	(2) Suitable sealed-beam, battery-powered, portable hand lights are provided for emergency use by the fire brigade and other operations personnel.
(3) Fixed emergency communications independent of the normal plant communication system should be installed at pre-selected stations.	(3) Normal and emergency communications systems have been provided throughout the plant. These systems have been evaluated as part of the Appendix R analysis to ensure that adequate communications capability will be available for controlling plant operations and fire fighting activities during a fire located anywhere in the plant. A sound powered telephone system is also provided throughout the safety-related area.
(4) A portable radio communication system should be provided for use by the fire brigade and other operations personnel required to achieve safe plant shutdown. This system should not interfere with the communications capabilities of the plant security force. Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure fire damage.	(4) A portable radio communication system is provided for use of the fire brigade and operational personnel. The radio system for the fire brigade and plant operations will not interfere with the radio system for the plant security force.

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Preoperational and periodic testing should demonstrate that the frequencies used for portable radio communication will not affect the actuation of protective relays.	A plant radio repeater system has been provided so that portable radio communications capability will be available for all areas of the plant. The radio repeater system may be disabled due to an exposure fire. However, other means of communications will remain available to the fire brigade and operations personnel to support safe plant shutdown. Preoperational and periodic testing of the portable radio communication equipment has not been conducted. False actuation of protective relays due to the use of portable communication equipment has not been a problem.
6. Fire Detection and Suppression	6. Fire Detection and Suppression
a. Fire Detection	a. Fire Detection
(1) Detection systems should be provided for all areas that contain or present a fire exposure to safety-related equipment.	(1) Detection systems have not been provided for all areas containing safety-related equipment. Detection systems will be provided prior to restart of he affected unit when required to meet the separation requirements of 10CFR50 Appendix R, Section III G. For proposed corrective action, see description sheets for project numbers 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 21, 33, 38, 41, 47, and 50 in the Fire Protection Upgrade Report.
(2) Fire detection systems should comply with the requirements of Class A systems as defined in NFPA 72D, "Standard for the Installation Maintenance, and Use of Proprietary Protective Signaling Systems," and Class I circuits as defined in NFPA 70, "National Electrical Code."	(2) Fire detection systems do not comply with all requirements of Class A systems as defined in NFPA 72D, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signalling Systems," and Class I circuits as defined in NFPA 70, "National Electrical Code."

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	For proposed corrective action, see the description sheets for the projects identified in C.6.a. Specific deviations from the standards of NFPA 72D are identified in Attachment C.
(3) Fire detectors should be selected and installed in accordance with NFPA 72E, "Automatic Fire Detectors." Preoperational and periodic testing of pulsed line-type heat detectors should demonstrate that the frequencies used will not affect the actuation of protective relays in other plant systems.	(3) Thermal and smoke detectors are UL-listed and generally installed in accordance with the requirements of NFPA 72E, "Standard on Automatic Fire Detectors," 1984 Edition. Detector spacing deficiencies do exist in some areas. The line-type thermal detectors that are in use are not of the pulsed type. For proposed corrective action, see the description sheets for projects identified in C.6.a.
(4) Fire detection systems should give audible and visual alarm and annunciation in the control room. Where zoned detection systems are used in a given fire area, local means should be provided to identify which detector zone has actuated. Local audible alarms should sound in the fire area.	(4) All detection systems give audible and visual alarm and annunciation in the control room, with the exception of thermal detectors used to actuate CO_2 systems. These systems will not alarm in the control room for a detector actuation, but will alarm upon CO_2 flow. All detection systems having more than one zone have a local alarm panel which identifies the fire affected zone. Detection systems installed prior to the 1975 BFN fire are not provided with local alarms. All systems installed during and after the 1975 fire recovery efforts are provided with alarm bells in the fire area.
(5) Fire alarms should be distinctive and unique so they will not be confused with any other plant system alarms.	(5) Where provided the fire alarm bells at local panels are distinct from other plant alarms. The audible alarm notification in the control room is not distinctive from other plant alarms.

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The plant-wide fire alarm transmitted from the control room for personnel notification is not distinctive. It is also used for medical emergencies. The alarm signals are followed by verbal communications over the public address system.

(6) Primary and secondary power supplies should be provided for the fire detection system and for electrically operated control valves for automatic suppression systems. Such primary and secondary power supplies should satisfy provisions of Section 2220 of NFPA 72D.

This can be accomplished by using normal offsite power as the primary supply with a 4 hour battery supply as secondary supply; and by providing capability for manual connection to the Class IE emergency power bus within 4 hours of loss of offsite power. Such connection should follow the applicable guidelines in Regulatory Guides 1.6, 1.32, and 1.75.

(6) The primary power supply to the fire detection system panels is provided by the 120V AC Instrument and Control bus A. On-site diesel generators or batteries provide backup to the primary supply.

Secondary power supplies are provided for local detection panels except for those monitoring line-type thermal detectors or for the carbon dioxide system. The secondary sources are either dedicated batteries located in the panels or a central 24V battery. Primary and secondary power supplies, where provided, meet the minimum provisions of NFPA 72D (Reference 34).

b. Fire Protection Water Supply Systems

b. Fire Protection Water Supply Systems

(1) An underground yard fire main loop should be installed to furnish anticipated water requirements. NFPA 24, "Standard for Outside Protection", gives necessary guidance for such installation. It references other design codes and standards developed by such organizations as the American National Standards Institute (ANSI) and the American Water Works Association (AWWA). Type of pipe and water treatment should be design considerations with tuberculation as one of the parameters. Means for inspecting and flushing the system should be provided.

(1) The underground yard fire main system is looped around the main powerhouse and is sized to furnish the anticipated water requirements. Fire hydrants are of an approved type, and are installed at approximately 275 foot intervals around the powerhouse. Underground installation details, such as thrust blocks, clamps, etc, have not been reviewed as a part of this comparison. However, the performance history of the underground piping has shown no unusual problems with system integrity. Periodic flow testing in accordance with technical specifications has indicated continued adequacy of the flow capability.

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	The system can be flushed through the yard hydrants and through the inside hose connections.
(2) Approved visually indicating sectional control valves such as post-indicator valves should be provided to isolate portions of the main for maintenance or repair without shutting off the supply to primary and backup fire suppression systems serving areas that contain or expose safety-related equipment.	(2) The valves are approximately 65 percent non-indicating underground gate valves and approximately 35 percent indicating type valves. Non-indicating valves are being replaced as required. Valving and underground yard mains are arranged so that a single impairment should not simultaneously remove both the primary and secondary suppression systems from service. For proposed corrective action, see description sheet for project number 51 in the Fire Protection Upgrade Report.
(3) Valves should be installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.	(3) Each fire hydrant has a gate valve which will permit isolation of individual hydrants.
(4) The fire main system piping should be separate from service or sanitary water system piping, except as described in Position C.5.c.(4).	(4) The fire main system piping is a shared piping system with the raw service water system. The shared features of the two systems are described in Section 10.11 of the FSAR and have previously been accepted by the NRC. In addition, the separation of these systems is not a requirement of NFPA 24. For proposed corrective action, see description sheets for project numbers 17 and 18 in the Fire Protection Upgrade Report.

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(5) A common yard fire main loop may serve multi-unit nuclear power plant sites if cross-connected between units. Sectional control valves should permit maintaining independence of the individual loop around each unit. For such installations, common water supplies may also be utilized for multiple reactor sites with widely separated plants (approaching 1 mile or more), separate yard fire main loops should be used.	5) The underground yard fire main system loops all three units but not the individual units since they are adjacent to each other. The distribution system extends into the Turbine and Reactor Buildings where additional looping exists. Sectional control valves permit the isolation of the fire main system to any one unit, while still maintaining the fire main system availability to any other two units.
(6) If pumps are required to meet system pressure or flow requirements, a sufficient number of pumps should be provided to ensure that 100 percent capacity will be available assuming failure of the largest pump or loss of offsite power (e.g., three 50 percent pumps or two 100 percent pumps). This can be accomplished, for example, by providing either: (a) Electric motor-driven fire pump(s) and diesel-driven fire pump(s); or (b) Two or more seismic Category I Class IE electric motor-driven fire pumps connected to redundant Class IE emergency power buses (see Regulatory Guides 1.6, 1.32, and 1.75). Individual fire pump connections to the yard fire main loop should be separated with sectionalizing valves between connections. Each pump and its driver and controls should be located in a room separated from the remaining fire pump by a fire wall with a minimum rating of 3 hours.	(6) Three electrical fire pumps are located inside the Intake Pumping Station. These pumps are not separated from each other by fire walls, and in general, are not in conformance with NFPA 20, Standard for the Installation of Centrifugal Fire Pumps. The diesel engine driven fire pump is separated from the electric fire pumps and is located in a building adjacent to gate structure 2 on the cold water channel. This pump generally conforms to NFPA 20. Separate yard fire main connections with sectional control valves between connections are provided for the electric fire pumps (common header for the three pumps) and diesel fire pump. Only one fire pump is necessary to supply the water requirements for a fire in one of the safety-related areas. Additional pumps may be required to supply the maximum demand in non-safety-related area.

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The fuel for the diesel fire pump(s) should be separated so that it does not provide a fire source exposing safety-related equipment. Alarms indicating pump running, driver availability, failure to start, and low fire-main pressure should be provided in the control room. The fire pump installation should conform to NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps."	For proposed corrective action, see description sheets for project numbers 17 and 18 in the Fire Protection Upgrade Report.
(7) Outside manual hose installation should be sufficient to provide an effective hose stream to any onsite location where fixed or transient combustibles could jeopardize safety-related equipment. Hydrants should be installed approximately every 250 ft on the yard main system. A hose house equipped with hose and combination nozzle and other auxiliary equipment recommended in NFPA 24, "Outside Protection," should be provided as needed, but at least every 1,000 ft. Alternatively, mobile means of providing hose and associated equipment, such as hose carts or trucks, may be used. When provided, such mobile equipment should be equivalent to the equipment supplied by three hose houses.	(7) Outside yard hydrants are spaced at approximately 275 foot intervals with the actual spacing depending upon other equipment and underground yard main locations. Fire equipment houses are located throughout the plant area and are equipped with hose, nozzles and other minor auxiliary equipment. Some of them also include wheeled dry chemical fire extinguishers. The fire equipment houses inside the plant protected area are located within 1000 ft. of each other. Fire truck, equipped with adequate hose and other auxiliary equipment, is also available.
(8) Threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings, and standpipe risers.	(8) Threads are compatible with those used by the local fire departments.

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NRC GUIDELINES	TVA RESPONSE
(9) Two separate, reliable freshwater supplies should be provided. Saltwater or brackish water should not be used unless all freshwater supplies have been exhausted. If tanks are used, two 100 percent (minimum of 300,000 gallons each) system capacity tanks should be installed. They should be so inter-connected that pumps can take suction from either or both. However a failure in one tank or its piping should not cause both tanks to drain. Water supply capacity should be capable of refilling either tank in 8 hours or less.	(9) The electric driven fire pumps take suction from the Wheeler Reservoir. The existing diesel driven fire pump takes suction from the cold water channel which is supplied from the Wheeler Reservoir. See description sheet for project number 17 in the Fire Protection Upgrade Report.
(10) Common tanks are permitted for fire and sanitary or service water storage. When this is done, however, minimum fire water storage requirements should be dedicated by passive means, for example, use of a vertical standpipe for other water services. Administrative controls, including locks for tank outlet valves, are unacceptable as the only means to ensure minimum water volume.	(10) Not applicable.
(11) The fire water supply should be calculated on the basis of the largest expected flow rate for a period of 2 hours, but not less than 300,000 gallons. This flow rate should be based (conservatively) on 500 gpm for manual hose streams plus the largest design demand of any sprinkler or deluge system as determined in accordance with NFPA 13 or NFPA 15. The fire water supply should be capable of delivering this design demand over the longest route of the water supply system.	(11) The fire water supply is unlimited from the Wheeler Reservoir. See description sheet for Project Number 18 in the Fire Protection Upgrade Program.

NRC GUIDELINES	TVA RESPONSE
(12) Fresh water lakes or ponds of sufficient size may qualify as sole source of water for fire protection but require separate redundant suctions in one or more intake structures. These supplies should be separated so that a failure of one supply will not result in a failure of the other supply.	(12) Wheeler Reservoir is the sole source of water for fire protection in safety-related areas of the plant. Each pump takes suction from a separate bay in the Intake Pumping Station. The diesel drive fire pump's intake structure is located on the cold water channel and is widely separated from the Intake Pumping Station. The failure of one pump's supply will not result in a failure of the other supplies. See description sheet for Project Number 18 in the Fire Protection Upgrade Program.
(13) When a common water supply is permitted for fire protection and the ultimate heat sink, the following conditions should also be satisfied: (a) The additional fire protection water requirements are designed into the total storage capacity; and (b) Failure of the fire protection system should not degrade the function of the ultimate heat sink.	(13) Wheeler Reservoir is a common water supply source for fire protection and the ultimate heat sink system. The Wheeler Reservoir provides an unlimited source of water for both systems. Failure of the fire protection system will not degrade the function of the ultimate heat sink.
(14) Other water systems that may be used as one of the two fire water supplies should be permanently connected to the fire main system and should be capable of automatic alignment to the fire main system. Pumps, controls, and power supplies in these systems should satisfy the requirements for the main fire pumps. The use of other water systems for fire protection should not be incompatible with their functions required for safe plant shutdown. Failure of the other system should not degrade the fire main system.	(14) Wheeler Reservoir provides the sole source of water for the fire main system. See description sheet for Project Number 17 in the Fire Protection Upgrade Program.

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NRC GUIDELINES

c. Water Sprinkler and Hose Standpipe Systems

(1) Sprinkler systems and manual hose station standpipes should have connections to the plant underground water main so that a single active failure or a crack in a moderate-energy line cannot impair both the primary and backup fire suppression systems. Alternatively headers fed from each end are permitted inside buildings to supply both sprinkler and standpipe systems, provided steel piping and fittings meeting the requirements of ANSI B31.1, "Power Piping," are used for the headers up to and including the first valve supplying the sprinkler systems where such headers are part of the seismically analyzed hose standpipe system. When provided, such headers are considered an extension of the yard main system. Each sprinkler and standpipe system should be equipped with OS and Y (outside screw and yoke) gate valve or other approved shutoff valve and waterflow alarm. Safety-related equipment that does not itself require sprinkler water fire protection but is subject to unacceptable damage if wet by sprinkler water discharge should be protected by water shields or baffles.

TVA RESPONSE

c. Water Sprinkler and Hose Standpipe System

(1) The sprinkler systems and manual hose station standpipes are connected to the plant underground water main and are designed so that the following single impairments will not degrade or disable both primary and backup fire suppression capability:

- The loss of electric power to equipment, detectors, and electrically actuated valves.

- Valve failures such as spurious operations, failures to operate when required, or misalignment of valves.

- Loss of flow in a section of pipe for reasons other than valve failures.

The design of these systems has not considered cracks in moderate-energy lines.

The BFN impairment analysis methodology was reviewed and approved by the NRC as part of the 1975 Fire Recovery Plan.

Each sprinkler system is provided with an approved indicating type shutoff valve. Waterflow alarms are provided for the sprinkler systems by pressure switches located downstream of the system control valves. Standpipe systems generally are not provided with shutoff valves or waterflow alarms.

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NRC GUIDELINES	TVA RESPONSE
	Safety-related equipment located in areas protected by sprinkler systems have not been protected against potentially damaging waterspray in all cases. However, as part of the safe shutdown analysis, a water spray study was conducted. It concluded that redundant safe shutdown equipment was sufficiently separated so safe shutdown capability would be maintained during a fire and subsequent release of fire suppression water.
(2) Control and sectionalizing valves in the fire water systems should be electrically supervised or administratively controlled. The electrical supervision signal should indicate in the control room. All valves in the fire protection system should be periodically checked to verify position (see NFPA 26, "Supervision of Valves").	(2) Valves are not electrically supervised, but are administratively controlled. Control and sectionalizing valves in safety-related areas will be checked monthly.
(3) Fixed water extinguishing systems should conform to requirements of appropriate standards such as NFPA 13, "Standard for the Installation of Sprinkler Systems, and NFPA 15, "Standard for Water Spray Fixed Systems."	(3) There are deviations from NFPA 13, "Standard for the Installation of Sprinkler Systems", and NFPA 15, "Standard for Water Spray Fixed Systems" in the present systems which have been identified in Attachment C. For proposed corrective action, see description sheets for Project Numbers 1, 2, 3, 20, 22, 23, 24, 27, 28, 29, 33, 35, and 36.
(4) Interior manual hose installation should be able to reach any location that contains, or could present a fire exposure hazard to, safety-related equipment with at least one effective hose stream.	(4) Inside the powerhouse complex, hose stations of 1-1/2 inch lined fire hose are provided to reach any safety-related equipment with at least one effective hose stream with the exception of the primary containment which is inerted during normal plant operation and the SBGT Building. Hose stations are provided with a maximum of 100 feet of hose when mounted on racks and a maximum of 300 feet of hose when mounted on reels.

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NRC GUIDELINES

To accomplish this, standpipes with hose connections equipped with a maximum of 100 feet of 1-1/2-inch woven-jacket, lined fire hose and suitable nozzles should be provided in all buildings on all floors. Individual standpipes should be at least 4 inches in diameter for multiple hose connections and 2-1/2 inches in diameter for single hose connections. These systems should follow the requirements of NFPA 14 "Standpipe and Hose Systems," for sizing, spacing, and pipe support requirements.

Hose stations should be located as dictated by the fire hazard analysis to facilitate access and use for fire fighting operations. Alternative hose stations should be provided for an area if the fire hazard could block access to a single hose station serving that area. Provisions should be made to supply water at least to standpipes and hose connections for manual fire fighting in areas containing equipment required for safe plant shut-down in the event of a safe shutdown earthquake. The piping system serving such hose stations should be analyzed for SSE loading and should be provided with supports to ensure system pressure integrity. The piping and valves for the portion of hose standpipe system affected by this functional requirement should, as a minimum, satisfy ANSI B31.1, "Power Piping".

The water supply for this condition may be obtained by manual operator actuation of valves in a connection to the hose standpipe header from a normal seismic Category I water system such as the essential service water system.

TVA RESPONSE

Individual hose connections are supplied from 1-1/2 inch standpipes and multiple hose connections are supplied from 3 inch standpipes. No hose stations are provided in the SBGT, but hydrants are available nearby.

Hose stations have been located to facilitate access and use for fire fighting operations. Alternative hose stations are available.

The standpipes in areas containing equipment required for safe plant shutdown have not been designed to remain functional after an earthquake. This has not been a backfit requirement for plants of BFN's vintage.

For proposed corrective action, see description sheet for Project Number 18 in the Fire Protection Upgrade Report.

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NRC GUIDELINES	TVA RESPONSE
The cross connection should be (a) capable of providing flow to at least two hose stations (approximately 75 gpm per hose station), and (b) designed to the same standards as the seismic Category I water system; it should not degrade the performance of the seismic category I water system.	
(5) The proper type of hose nozzle to be supplied to each area should be based on the fire hazard analysis. The usual combination spray/straight-stream nozzle should not be used in areas where the straight stream can cause unacceptable mechanical damage. Fixed fog nozzles should be provided at locations where high-voltage shock hazards exist. All hose nozzles should have shutoff capability. (Guidance on safe distances for water application to live electrical equipment may be found in the "NFPA Fire Protection Handbook.")	(5) All fire hose nozzles placed inside the building are of the electrically safe fog type with shut off capability, except that the refuel floor nozzles are the straight stream type. Exterior hose carts have nozzles which can be adjusted to a straight stream pattern. Inside the plant hose nozzles available only to the fire brigade can be adjusted to a straight stream pattern. Use is restricted because a relatively untrained employee could cause either mechanical damage or personnel injury with a straight stream nozzle, whereas the trained fire fighters assigned to the fire brigade need the flexibility to use straight streams when indicated by fire conditions.
(6) Fire hose should be hydrostatically tested in accordance with the recommendations of NFPA 1962,"Fire Hose - Care, Use, Maintenance." Hose stored in outside hose houses should be tested annually. Interior standpipe hose should be tested every 3 years.	(6) Fire hoses stored in outside hose houses are tested in accordance with MPI-0-026-INS005, Annual Hydrostatic Test Outside Fire Hoses (Reference 23). Fire hose inside buildings are tested in accordance with MPI-0-026-INS016, Triennial Hydrostatic Test of Inside Fire Hoses (Reference 24). These preventive maintenance procedures incorporate the recommendations of NFPA 1962.

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NRC GUIDELINES	TVA RESPONSE
(7) Certain fires, such as those involving flammable liquids, respond well to foam suppression. Consideration should be given to use of mechanical low-expansion foam systems, high-expansion foam generators, or aqueous film forming foam (AFFF) systems, including the AFFF deluge system. These systems should comply with the requirements of NFPA 11, NFPA 11A, NFPA 11B, and NFPA 16, as applicable.	(7) Aqueous film forming foam (AFFF) is available through the use of foam carts and eductor nozzles. AFFF preaction sprinkler systems complying with NFPA 11 and 16 are installed above the motor generator sets for the recirculation pumps. Hose stations are located in the two elevator and stair halls on elevation 639 for manual fire fighting at the motor generator sets.
d. Halon Suppression Systems	d. Halon Suppression Systems
Halon fire extinguishing systems should comply with the requirements of NFPA 12A and NFPA 12B, "Halogenated Fire Extinguishing Agent Systems - Halon 1301 and Halon 1211." Only UL-listed or FM-approved agents should be used. Provisions for locally disarming automatic Halon systems should be kept locked and under strict administrative control. Automatic Halon extinguishing systems should not be disarmed unless controls as described in Position C.2.c. are provided. In addition to the guidelines of NFPA 12A and 12B, preventive maintenance and testing of the systems including check-weighing of the Halon cylinders, should be done at least quarterly. Particular consideration should also be given to: (1). Minimum required Halon concentration, distribution, soak time, and ventilation control;	There are no Halon extinguishing systems installed in the powerhouse. Any systems that are installed in the future will comply with these guidelines.

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NRC GUIDELINES	TVA RESPONSE
(2) Toxicity of Halon; (3) Toxicity and corrosive characteristics of the thermal decomposition products of Halon; and (4) Location and selection of the activating detectors.	
e. Carbon Dioxide Suppression Systems	e. Carbon Dioxide Suppression Systems
Carbon dioxide extinguishing systems should comply with the requirements of NFPA 12, "Carbon Dioxide Extinguishing Systems." Where automatic carbon dioxide systems are used, they should be equipped with a predischarge alarm system and a discharge delay to permit personnel egress. Provisions for locally disarming automatic carbon dioxide systems should be key locked and under strict administrative control. Automatic carbon dioxide extinguishing systems should not be disarmed unless controls as described in Position C.2.c. are provided.	The carbon dioxide extinguishing systems were installed using the guidelines of NFPA 12, 1966, "Standard on Carbon Dioxide Extinguishing Systems". All automatic carbon dioxide systems sound an alarm horn in the protected area and are delayed for 20 seconds prior to agent discharge. The provisions for locally disarming the systems are locked and controlled administratively. Administrative controls required by Section C.2.c are provided.
Particular consideration should also be given to: (1) Minimum required CO_2 concentration, distribution, soak time, and ventilation control; (2) Anoxia and toxicity of CO_2; (3) Possibility of secondary thermal shock (cooling) damage; (4) Conflicting requirements for venting during CO_2 injection to prevent overpressurization versus sealing to prevent loss of agent; and	Minimum required carbon dioxide concentrations, distributions, and ventilation control have been adequately considered in the system designs. Minimum soak times were not required in the 1966 edition of NFPA 12 and have not been addressed. Anoxia, toxicity of carbon dioxide gas and the possibility of thermal shock damage are known factors and have been considered. The need for overpressure protection has been addressed in the system design. The location and selection of detectors is evaluated in response to guideline C.6.a.

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NRC GUIDELINES	TVA RESPONSE
(5) Location and selection of the activating detectors.	
f. Portable Extinguishers	f. Portable Extinguishers
Fire extinguishers should be provided in areas that contain, or could present a fire exposure hazard to, safety-related equipment in accordance with guidelines of NFPA 10, "Portable Fire Extinguishers, Installation, Maintenance and Use". Dry chemical extinguishers should be installed with due consideration given to possible adverse effects on safety-related equipment installed in the area.	Portable extinguishers have been provided throughout the plant in accordance with the guidelines of NFPA 10, "Standard for Portable Fire Extinguishers". Portable fire extinguishers are located throughout all plant areas. Class ABC dry chemical extinguishers are provided in most areas of the plant. Exceptions are made in areas occupied by electrical switchboards and control panels where carbon dioxide, dry chemical, or Halon extinguishers are used. Wheel-type extinguishers are used for large work areas where space for movement is available and where warranted by potential fire severity.
7. Guidelines for Specific Plan Areas	7. Guidelines for Specific Plant Areas
a. Primary and Secondary Containment	a. Primary and Secondary Containment
(1) Normal Operation	(1) Normal Operation
Fire protection requirements for the primary and secondary containment areas should be provided for hazards identified by the fire hazards analysis.	The primary containment is inerted with nitrogen during normal plant operation and a fire is not postulated to occur. Therefore, fire protection systems have not been provided inside primary containment.

NRC GUIDELINES	TVA RESPONSE
Examples of such hazards included lubricating oil or hydraulic fluid system for the primary coolant pumps, cable tray arrangements and cable penetrations, and charcoal filters. Because of the general inaccessibility of primary containment during normal plant operation protection should be provided by automatic fixed systems. The effects of postulated fires within the primary containment should be evaluated to ensure that the integrity of the primary coolant system and the containment is not jeopardized assuming no action is taken to fight the fire.	Fire protection for secondary containment areas has been provided as discussed in Section 4.0 of the FPP.
(a) Operation of the fire protection systems should not compromise the integrity of the containment or other safety-related systems. Fire protection activities in the containment areas should function in conjunction with total containment requirements such as ventilation and control of contaminated liquid and gaseous release.	(a) Since containment is inerted during normal operation, fire protection systems have not been provided inside primary containment. All fixed suppression systems provided in secondary containment areas are water based. Delivery and removal of water to and from these areas during suppression system operation will not violate containment integrity nor will safety-related systems be affected. However, application of water directly on safety-related equipment could result in its damage or spurious operation. The 10CFR50 Appendix R Submittal (NEDC 31119) for BFN has confirmed that such damage or spurious operations will not prevent the safe shutdown of the plant. For proposed corrective action, see description sheets for Project Numbers 1, 2, and 3 in the Fire Protection Upgrade Report.

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NRC GUIDELINES	TVA RESPONSE
(b) Inside noninerted containment one of the fire protection means stated in Positions C.5.b.1. and C.5.b.2. or the following fire protection means should be provided: separation of cables and equipment and associated nonsafety circuits of redundant trains by a noncombustible radiant energy shield having a minimum fire rating of one-half hour.	(b) Not applicable since containment is inerted.
(c) In primary containment, fire detection systems should be provided for each fire hazard. The type of detection used and the location of the detectors should be the most suitable for the particular type of fire hazard identified by the fire hazard analysis. A general area fire detection capability should be provided in the primary containment as backup for the above described hazard detection. To accomplish this, suitable smoke or heat detectors compatible with the radiation environment should be installed.	(c) Fire detection has not been provided inside primary containment since containment is inerted.
(d) Standpipe and hose stations should be inside PWR containments and BWR containments that are not inerted. Standpipe and hose stations inside containment may be connected to a high quality water supply of sufficient quantity and pressure other than the fire main loop if plant-specific features prevent extending the fire main supply inside containment.	(d) Standpipe and hose stations have not been provided inside primary containment since containment is inerted.

NRC GUIDELINES	TVA RESPONSE
For BWR drywells, standpipe and hose stations should be placed outside the drywell with adequate lengths of hose, no longer than 100 ft to reach any location inside the drywell with an effective hose stream. The containment penetration of the standpipe system should meet the isolation requirement of General Design Criterion 56 and should be seismic Category I and Quality Group B.	
(e) The reactor coolant pumps should be equipped with an oil collection system if the containment is not inerted during normal operation. The oil collection system should be so designed, engineered, and installed that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the safe shutdown earthquake. Such collection systems should be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil systems. Leakage should be collected and drained to a vented closed container that can hold the entire lube oil system inventory. A flame arrester is required in the vent if the flash point characteristics of the oil present the hazard of fire flashback.	(e) Reactor coolant pumps are not utilized on BFN. Oil containing pumps such as the recirculation system pumps do not require oil collection capability since primary containment is inerted during normal operation.

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NRC GUIDELINES	TVA RESPONSE
Leakage points to be protected should include lift pump and piping overflow lines, lube oil cooler, oil fill and drain lines and plugs flanged connections on oil lines, and lube oil reservoirs where such features exist on the reactor coolant pumps. The drain line should be large enough to accommodate the largest potential oil leak.	
(f) For secondary containment areas, cable fire hazards that could affect safety should be protected as described in Position C.5.e.(2). The type of detection system for other fire hazards identified by the fire hazards analysis should be the most suitable for the particular type of fire hazard.	(f) See response to guideline C.5.e.(2).
(2) Refueling and Maintenance Refueling and maintenance operations in containment may introduce additional hazards such as contamination control materials, decontamination supplies, wood planking, temporary wiring, welding, and flame cutting (with portable compressed-gas fuel supply). Possible fires would not necessarily be in the vicinity of fixed detection and suppression systems. Management procedures and controls necessary to ensure adequate fire protection for transient fire loads are discussed in Position C.1.	(2) Refueling and Maintenance Hazards in the containment during refueling and maintenance are administratively controlled by the procedural attachments to the FPP referenced in Section 7.0 of that document. Self contained breathing apparatus for emergency use in the containment area have been installed in the elevator-stairwell enclosures in Unit 1 and Unit 3.

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NRC GUIDELINES

Adequate self-contained breathing apparatus should be provided near the containment entrances for fire fighting and damage control personnel. These units should be independent of any breathing apparatus or air supply systems provided for general plant activities and should be clearly marked as emergency equipment.

b. Control Room Complex

The control room complex (including galleys, office spaces, etc.) should be protected against disabling fire damage and should be separated from other areas of the plant by floors, walls, and roof having minimum fire resistance ratings of 3 hours. Peripheral rooms in the control room complex should have automatic water suppression and should be separated from the control room by noncombustible construction with a fire resistance rating of 1 hour. Ventilation system openings between the control room and peripheral rooms should have automatic smoke dampers that close on operation of the fire detection or suppression system. If a halon flooding system is used for fire suppression, these dampers should be strong enough to support the pressure rise accompanying halon discharge and seal tightly against infiltration of halon into the control room. Carbon dioxide flooding systems are not acceptable for these areas.

TVA RESPONSE

b. Control Room Complex

The control room complex consists of all rooms on elevation 617 of the Control Building. The complex will be separated from the Reactor and Turbine Buildings prior to restart of unit 2 by barriers having 3-hour fire resistance ratings. The control room complex is separated by a non-fire rated reinforced concrete floor from Control Building rooms on elevation 606.

The peripheral rooms in the Control Room Complex (mechanical equipment rooms, relay room, offices, and housekeeping areas) are protected by automatic sprinkler systems except for the relay room.

These peripheral rooms are separated by non-fire rated concrete block walls from the main control room. Smoke dampers are not installed in ducts running between the peripheral rooms and the control room. Neither CO_2 nor Halon systems are used in peripheral rooms.

Class ABC Halon fire extinguishers are located in the control rooms. Hose stations are installed on the north wall inside the control rooms. The control valves for the hose stations are located in the Turbine Building and are operated by reach rods extending into the control rooms.

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NRC GUIDELINES	TVA RESPONSE
Manual fire fighting capability should be provided for both: (1) Fire originating within a cabinet, console, or connecting cables; and (2) Exposure fires involving combustibles in the general room area. Portable Class A and Class C fire extinguishers should be located in the control room. A hose station should be installed immediately outside the control room. Nozzles that are compatible with the hazards and equipment in the control room should be provided for the manual hose station. The nozzles chosen should satisfy actual fire fighting needs, satisfy electrical safety, and minimize physical damage to electrical equipment from hose stream impingement. Smoke detectors should be provided in the control room, cabinets, and consoles. If redundant safe shutdown equipment is located in the same control room cabinet or console, additional fire protection measures should be provided. Alarm and local indication should be provided in the control room. Breathing apparatus for control room operators should be readily available. The outside air intake(s) for the control room ventilation system should be provided with smoke detection capability to alarm in the control room to enable manual isolation of the control room ventilation system and thus prevent smoke from entering the control room.	These hose stations are normally dry with the valve on the opposite side of the wall opened only in an emergency. The nozzles for the hose stations are full shutoff, fog nozzles. Smoke detection is provided in selected panels and at the ceiling of both constantly attended control rooms. Smoke detection is provided only in two electrical panels in the relay room. All detectors provide alarm indication in the control room. Self contained breathing apparatus are available in the control rooms for the operators. The outside air intakes for the control room makeup air ventilation are not furnished with smoke detection capability to alarm in the control room; however, smoke detection capability provided in the control room complex will alarm in the event of smoke and indication is provided at the local panel. Capability is available to isolate the recirculation portion of the main control room normal ventilation system by means of a volume control damper. Manual smoke venting of the control room using the HVAC system is not available to the operator. However, portable exhaust fans will be used for smoke venting. Ceiling spaces are not used as air plenums for control room ventilation. Fire dampers are provided in all ventilation openings between the control room complex and adjacent fire areas. For proposed corrective action, see description sheets for Project Number 21B in the Fire Protection Upgrade Report.

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NRC GUIDELINES

Venting of smoke produced by fire in the control room by means of the normal ventilation system is acceptable; however, provision should be made to permit isolation of the recirculating portion of the normal ventilation system. Manually operated venting of the control room should be available to the operators.

All cables that enter the control room should terminate in the control room. That is, no cabling should be routed through the control room from one area to another. Cables in underfloor and ceiling spaces should meet the separation criteria necessary for fire protection.

Air-handling functions should be ducted separately from cable runs in such spaces; i.e., if cables are routed in underfloor or ceiling spaces, these spaces should not be used as air plenums for ventilation of the control room. Fully enclosed electrical raceways located in such underfloor and ceiling spaces, if over 1 square foot in cross-sectional area, should have automatic fire suppression inside. Area automatic fire suppression should be provided for underfloor and ceiling spaces if used for cable runs unless all cable is run in a 4-inch or smaller steel conduit or the cables are in fully enclosed raceways internally protected by automatic fire suppression. There should be no carpeting in the control room.

TVA RESPONSE

All cables entering each control room terminate in the control room. There are no underfloor spaces and no safety-related cables installed in ceiling spaces.

There is no carpeting in the control rooms.

A fire in any area of the Control Building, including the main control rooms or peripheral rooms in the control room complex will not defeat the plant's safe shutdown capability after completion of modifications identified in the Appendix R Submittal (NEDC 31119) . Required safe shutdown functions will be capable of being performed from remote shutdown panels located in separate fire areas.

For proposed corrective action, see description sheets for Project Numbers 4, 9, 13, 21, 25, 28, and 51.

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NRC GUIDELINES

c. Cable Spreading Room

The primary fire suppression in the cable spreading room should be an automatic water system such as closed-head sprinklers, open-head deluge system, or open directional water spray system. Deluge and open spray systems should have provisions for manual operation at a remote station; however, there should be provisions to preclude inadvertent operation. Location of sprinkler heads or spray nozzle should consider cable tray arrangements and possible transient combustibles to ensure adequate water coverage for areas that could present exposure hazards to the cable system. Cables should be designed to allow wetting down with water supplied by the fire suppression system without electrical faulting.

Open-head deluge and open directional spray systems should be zoned.

The use of foam is acceptable.

Cable spreading room should have:

(1) At least two remote and separate entrances for access by fire brigade personnel;

(2) An aisle separation between stacks at least 3 feet wide and 8 feet high;

(3) Hose stations and portable extinguishers installed immediately outside the room;

TVA RESPONSE

c. Cable Spreading Rooms

The primary suppression for the cable spreading room is provided by preaction sprinkler systems. Backup suppression is provided by manually operated carbon dioxide systems.

There are two remote and separate entrances to each spreading room. Aisles have not been provided between cable tray stacks and are not feasible to incorporate into the plant design as a backfit.

Portable extinguishers are located inside and immediately outside the spreading rooms.

Hose stations are installed nearby at the bottom of each stairway at elevation 593. Each hose station is equipped with 100 feet of 1-1/2 inch hose and fog nozzles.

Hose from fire hose stations located on elevation 621 could also be brought down the stairways and into the spreading rooms. If required additional hose is available from adjacent areas.

Both smoke detectors and rate compensated heat detectors are provided in the spreading rooms. These detectors are installed in a cross-zoned arrangement to actuate the preaction sprinkler system.

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NRC GUIDELINES

(4) Area smoke detection; and

(5) Continuous line-type heat detectors for cable trays inside the cable spreading room.

Drains to remove fire fighting water should be provided. When gas systems are installed, drains should have adequate seals or the gas extinguishing systems should be sized to compensate for losses through the drains.

A separate cable spreading room should be provided for each redundant division. Cable spreading rooms should not be shared between reactors. Each cable spreading room should be separated from the others and from other areas of the plant by barriers with a minimum fire rating of 3 hours. If this is not possible, a dedicated system should be provided.

The ventilation system to each cable spreading room should be designed to isolate the area upon actuation of any gas extinguishing system in the area. Separate manually actuated smoke venting that is operable from outside the room should be provided for the cable spreading room.

TVA RESPONSE

Continuous line-type heat detectors are not installed in the cable trays. Because of the redundancy of suppression systems and both smoke and heat detection at the ceiling, the absence of continuous line-type heat detectors is justified.

Drains are provided and have liquid traps to contain the carbon dioxide inside the rooms if the systems are actuated.

Separate cable spreading rooms are not provided for each redundant division. Spreading rooms are shared between units. The two spreading rooms are not separated from each other or from other areas of the Control Building by three hour barriers.

The spreading rooms will be separated prior to restart of Unit 2 by three hour barriers from the Reactor Buildings and Turbine Building.

A fire in any part of the Control Building, including the spreading room will not defeat the plant's safe shutdown capability after completion of modifications identified in the Appendix R Submittal (NEDC 31119): Required safe shutdown functions will be capable of being performed from remote shutdown panels located in separate fire areas.

The ventilation system to each cable spreading room is designed to isolate the area upon actuation of the carbon dioxide extinguishing system protecting the room. Two 100 percent capacity exhaust fans serve both spreading rooms.

For proposed corrective action, see description sheets for Project Numbers 14, 15, 20, 21B, and 22 in the Fire Protection Upgrade Report.

NRC GUIDELINES

d. Plant Computer Rooms

Computer rooms for computers performing safety-related functions that are not part of the control room complex should be separated from other areas of the plant by barriers having a minimum fire resistance rating of 3 hours and should be protected by automatic detection and fixed automatic suppression. Computers that are part of the control room complex but not in the control room should be separated and protected as described in Position C.7.b. Computer cabinets located in the control room should be protected as other control room equipment and cable runs therein. Nonsafety-related computers outside the control room complex should be separated from safety-related area by fire barriers with a minimum rating of 3 hours and should be protected as needed to prevent fire and smoke damage to safety-related equipment.

TVA RESPONSE

d. Plant Computer Rooms

The computer rooms are not part of the control room complex. They are located on elevation 593 of the Control Building. The computer equipment in these rooms does not perform safety-related functions.

The computer rooms are separated from other areas on Control Building elevation 593 by non-fire-rated concrete block walls and from rooms on Control Building elevation 606 by a non-fire rated reinforced concrete ceiling. The Control Building will be separated prior to restart of Unit 2 from the Reactor and Turbine Buildings by 3-hour fire rated-barriers.

The computer rooms have smoke detection with annunciation to the control rooms. Manually operated carbon dioxide extinguishing systems are installed in each computer room.

The equipment located in the computer rooms is not required for safe shutdown of the plant during or after a fire.

For proposed corrective action, see description sheets for Project Numbers 21 and 28 in the Fire Protection Upgrade Report.

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NRC GUIDELINES

e. Switchgear Rooms

Switchgear rooms containing safety-related equipment should be separated from the remainder of the plant by barriers with a minimum fire rating of 3 hours. Redundant switchgear safety divisions should be separated from each other by barriers with a 3 hour fire rating. Automatic fire detectors should alarm and annunciate in the control room and alarm locally. Cables entering the switchgear room that do not terminate or perform a function there should be kept at a minimum to minimize the combustible loading. These rooms should not be used for any other purpose. Fire hose stations and portable fire extinguishers should be readily available outside the area.

Equipment should be located to facilitate access for manual fire fighting. Drains should be provided to prevent water accumulation from damaging safety-related equipment (see NFPA 92M, "Waterproofing and Draining of Floors"). Remote manually actuated ventilation should be provided for venting smoke when manual fire suppression effort is needed (see Position C.5.f.).

TVA RESPONSE

e. Switchgear Rooms

Safety related switchgear is located in the shutdown board rooms on elevations 593 and 621 of the three Reactor Buildings and on elevations 565 and 583 of the Unit 3 Diesel Generator Building. The shutdown board rooms in the Reactor Buildings are not adjacent. They will be separated prior to restart of Unit 2 from other plant areas by barriers having 3-hour fire resistance ratings. The shutdown board rooms in the Unit 3 Diesel Generator Building are adjacent. They will be separated prior to restart of Unit 2 from other plant areas by 3-hour fire rated barriers and from each other by 1-1/2 hour fire rated barriers.

Cables entering the switchgear rooms and not terminating there have been analyzed for their effect on the safe shutdown analysis. Combustible loading from these cables has also been taken into account in the fire hazards analysis for the plant.

Fire hose stations and portable extinguishers are available outside the shutdown board rooms. Drains are provided inside the switchgear rooms.

The shutdown board rooms have separate exhaust fans which can be used for venting smoke. The fans can be controlled manually from a remote location.

Smoke detectors are mounted at the ceiling in the shutdown board rooms in the Unit 3 Diesel Generator Building and in ventilation ductwork for the shutdown board rooms in the Reactor Buildings. The detectors for the shutdown board rooms in the Unit 3 Diesel Generator Building alarm locally and in the control rooms. The detectors located in the Reactor Buildings board rooms alarm only in the control room.

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NRC GUIDELINES

TVA RESPONSE

Upon completion of modifications identified in the Appendix R Submittal (NEDC 31119), the fire-rated compartmentation and fire protection features provided will ensure that safe shutdown capability can be maintained during and after a fire.

For proposed corrective action, see description sheets for Project Numbers 21 and 28 in the Fire Protection Upgrade Report.

f. Remote Safety-Related Panels

Redundant safety-related panels remote from the control room complex should be separated from each other by barriers having a minimum fire rating of 3 hours. Panels providing remote shutdown capability should be separated from the control room complex by barriers having a minimum fire rating of 3 hours. Panels providing remote shutdown capability should be electrically isolated from the control room complex so that a fire in either area will not affect shutdown capability from the other area. The general area housing remote safety-related panels should be provided with automatic fire detectors that alarm locally and alarm and annunciate in the control room. Combustible materials should be controlled and limited to those required for operation. Portable extinguishers and manual hose stations should be readily available in the general area.

f. Remote Safety-Related Panels

In general, redundant safety-related panels located remote from the control room complex have not been separated by 3-hour fire-rated barriers. Those remote panels that are required for safe shutdown during and after a fire will be separated prior to restart of the affected unit in accordance with the requirements of 10CFR50 Appendix R sections IIIG or IIIL. When required by these sections, fire detection will be provided in the areas containing the remote panels. In other areas containing remote safety-related panels the BFN fire hazard analysis was used to determine the need for fire detection and suppression.

The panels providing remote shutdown capability are located in the shutdown board rooms on elevation 621 of the three Reactor Buildings. These panels will be separated prior to restart of the affected unit from the control room complex by barriers having a fire rating of 3 hours. The panels are electrically isolated from control room complex so that a fire in either area will not defeat shutdown capability from the other area.

NRC GUIDELINES

TVA RESPONSE

The shutdown board rooms containing the remote shutdown panels are provided with smoke detectors mounted in the room's ventilation ductwork. The detectors alarm locally and in the control rooms.

Transient combustibles in areas containing remote panels are controlled by a procedural attachment to the FPP entitled "Control of Transient Combustibles."

Portable extinguishers and hose stations are readily available in the areas containing remote panels.

g. Safety-Related Battery Rooms

Safety-related battery rooms should be protected against fires and explosions. Battery rooms should be separated from each other and other areas of the plant by barriers having a minimum fire rating of 3 hours inclusive of all penetrations and openings. DC switchgear and inverters should not be located in these battery rooms. Automatic fire detection should be provided to alarm and annunciate in the control room and alarm locally. Ventilation systems in the battery rooms should be capable of maintaining the hydrogen concentration well below 2 percent by volume. Loss of ventilation should be alarmed in the control room. Standpipe and hose and portable extinguishers should be readily available outside the room.

g. Safety-Related Battery Rooms

The three safety-related battery rooms are located on elevation 593 of the Control Building. They will be separated prior to restart of Unit 2 from each other and from other areas of the Control Building by barriers having minimum fire rating of 1 hour. The 1 hour fire rated barriers will be capable of withstanding the exposure fire involving the maximum anticipated combustible loading on either side of the barriers. The Control Building will be separated prior to restart of Unit 2 from the Reactor and Turbine Buildings by 3-hour fire-rated barriers.

There are no inverters or DC switchgear in the battery rooms. Inverters and DC switchgear are installed in battery board room adjacent to the battery rooms and are in the same fire areas.

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NRC GUIDELINES

TVA RESPONSE

Automatic smoke detection and manually operated sprinkler systems are provided in these rooms. These smoke detectors alarm in the control rooms, but do not alarm locally.

The ventilation systems are capable of maintaining the hydrogen concentration below 2 percent by volume. Loss of ventilation is alarmed in the control room providing status of the battery room exhaust fan.

Hose connections and portable extinguishers are readily available outside these rooms.

For proposed corrective action, see description sheets for Project Numbers 21 and 28 in the Fire Protection Upgrade Report.

h. Turbine Building

The Turbine Building should be separated from adjacent structures containing safety-related equipment by a fire barrier with a minimum rating of 3 hours. The fire barriers should be designed so as to maintain structural integrity even in the event of a complete collapse of the turbine structure. Openings and penetrations in the fire barrier should be minimized and should not be located where the turbine oil system or generator hydrogen cooling system creates a direct fire exposure hazard to the barrier. Considering the severity of the fire hazards, defense in depth may dictate additional protection to ensure barrier integrity.

h. Turbine Building

The walls separating the Turbine Building from the Control and Reactor Buildings will be upgraded to 3-hour fire-rated barriers prior to restart of Unit 2.

The Turbine Building, the cable tunnel to the Intake Pumping Station, and the Radwaste Building are separated from each other by non-fire-rated barriers and are treated as being in the same fire area in the safe shutdown analysis.

The fire barriers separating the Turbine Building from the Control and Reactor Buildings are designed to maintain structural integrity in event of complete collapse of the turbine structure. The fire barrier wall is constructed to act as a shear wall. Openings in these barriers are not located in the immediate vicinity of the turbine lube oil system or the hydrogen cooling system.

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NRC GUIDELINES

TVA RESPONSE

Fixed water spray systems are installed to protect the following hazards:

(1) Hydrogen seal oil units
(2) Reactor feed pump turbine oil tanks
(3) Turbine head ends
(4) Turbine oil reservoirs
(5) Cable penetrations from spreading rooms.

Carbon dioxide suppression systems are installed to protect the following hazard areas:

(1) Permanent record storage room
(2) Lube oil purification room

Fire detection is provided over the Auxiliary Boilers and in the cable tunnel to the Intake Pumping Station.

Portable extinguishers and hose connections are installed in various areas of the Turbine Building.

See also Sections C.5.d.(1) and C.5.e.(2).

For proposed corrective action, see description sheets for Project Numbers 23, 24, 29, 38, 41, 48, and 50 in the Fire Protection Upgrade Report.

i. Diesel Generator Areas

Diesel generators should be separated from each other and from other areas of the plant by fire barriers having a minimum fire resistance rating of 3 hours.

i. Diesel Generator Areas

There are two separate Diesel Generator Buildings containing four emergency diesel generators each. The Diesel Generator Building for Units 1 and 2 is located on the west side of the Unit 1 Reactor Building.

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NRC GUIDELINES

Automatic fire suppression should be installed to combat any diesel generator or lubricating oil fires; such systems should be designed for operation when the diesel is running without affecting the diesel. Automatic fire detection should be provided to alarm and annunciate in the control room and alarm locally. Hose stations and portable extinguishers should be readily available outside the area. Drainage for fire fighting water and means for local manual venting of smoke should be provided.

Day tanks with total capacity up to 1100 gallons are permitted in the diesel generator area under the following conditions:

(1) The day tank is located in a separate enclosure with a minimum fire resistance rating of 3 hours, including doors or penetrations. These enclosures should be capable of containing the entire contents of the day tanks and should be protected by an automatic fire suppression system, or

(2) The day tank is located inside the diesel generator room in a diked enclosure that has sufficient capacity to hold 110 percent of the contents of the day tank or is drained to a safe location.

TVA RESPONSE

The Diesel Generator Building for Unit 3 is located on the east side of the Unit 3 Reactor Building. The Diesel Generator Buildings will be separated prior to restart of Unit 2 from adjacent buildings by 3-hour fire-rated barriers.

The diesel generator rooms are separated from each other and from other rooms within the buildings by non fire-rated reinforced concrete walls. All rooms within a single Diesel Generator Building (except the Unit 3 shutdown board rooms) are part of the same fire area.

Automatic carbon dioxide suppression systems are installed in the diesel generator rooms and fuel oil transfer pump rooms. Pre-action sprinkler systems are installed in the pipe and electric tunnels outside the diesel generator rooms.

Automatic fire detection is provided in the diesel generator rooms, fuel oil transfer pump rooms, and pipe and electric tunnels for suppression system actuation. The fire alarm signal from the pipe and electric tunnels is transmitted to the control room and sounds a local alarm. The fire detection in the diesel generator rooms and fuel oil transfer pump rooms actuates the carbon dioxide system control logic. The control logic actuates pre-discharge alarms in the protected rooms. A carbon dioxide flow alarm provides control room annunciation.

The diesel engine combustion air intakes and exhausts are ducted to the engines and are not isolated when the carbon dioxide suppression systems are actuated. However, ventilation cooling air for the generator rooms is isolated on actuation of the suppression system and must be reinitiated to prevent overheating of the electrical generators and diesel auxiliary equipment.

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NRC GUIDELINES

TVA RESPONSE

Hose stations and portable extinguishers are available outside of the individual diesel generator rooms. Also, the diesel generator room doors to the outside could be opened to enable hose streams from hydrants to be used. These doors can also be used to drain water and vent smoke.

The diesel fuel oil day tanks are 550 gallon capacity. Curbs are provided at the entrance to each room from the pipe and electric tunnels.

Upon completion of modifications identified in the Appendix R Submittal (NEDC 31119), the fire-rated compartmentation and fire protection features provided for the Diesel Generator Buildings will assure that safe shutdown capability is maintained during and after a fire.

For proposed corrective action, see description sheets for Project Numbers 10, 11, 27A, 27B, 35A, and 35B in the Fire Protection Upgrade Report.

j. Diesel Fuel Oil Storage Areas

Diesel fuel oil tanks with a capacity greater than 1,100 gallons should not be located inside buildings containing safety-related equipment. If above-ground tanks are used, they should be located at least 50 feet from any building containing safety-related equipment or, if located within 50 feet, they should be housed in a separate building with construction having a minimum fire resistance rating of 3 hours.

j. Diesel Fuel Oil Storage Tanks

The diesel fuel oil storage tanks are embedded in the concrete floors beneath the two Diesel Generator Buildings. The tanks contain a seven day supply of fuel oil for the diesel generators.

Additional fuel storage is provided in the yard. Two 71,000 gallon tanks are located over 50 feet from the powerhouse complex. Oil spills from the tanks will be contained by a berm around the tanks. No automatic fire suppression is provided for these tanks.

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NRC GUIDELINES	TVA RESPONSE
Potential oil spills should be confined or directed away from buildings containing safety-related equipment. Totally buried tanks are acceptable outside or under buildings (see NFPA 30, "Flammable and Combustible Liquids Code," for additional guidance). Above-ground tanks should be protected by an automatic fire suppression system.	
k. Safety-Related Pumps Pump houses and rooms housing redundant safety-related pump trains should be separated from each other and from other areas of the plant by fire barriers having at least 3-hour ratings. These rooms should be protected by automatic fire detection and suppression unless a fire hazards analysis can demonstrate that a fire will not endanger other safety-related equipment required for safe plant shutdown. Fire detection should alarm and annunciate in the control room and alarm locally. Hose stations and portable extinguishers should be readily accessible. Floor drains should be provided to prevent water accumulation from damaging safety-related equipment (see Position C.5.a.(14)). Provisions should be made for manual control of the ventilation system to facilitate smoke removal if required for manual fire fighting operation (see Position C.5.f).	k. Safety-Related Pumps In general, safety-related pumps at BFN are not housed in separate rooms enclosed in 3-hour fire rated barriers. Those pumps that are required for safe shutdown during and after a fire will be separated prior to restart of the affected unit in accordance with the requirements in 10CFR50 Appendix R, Section III.G. When required by Section III.G., fire suppression and detection will be provided in the areas where the safe shutdown pumps are located. In other areas containing safety-related pumps the BFN fire hazard analysis was used to determine the need for fire detection and suppression. Hose stations and portable extinguishers are available in all areas containing safety-related pumps. See the response to sections C.5.a.(14) and C.5.f for discussions on drains and smoke removal respectively.

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NRC GUIDELINES	TVA RESPONSE
1. New Fuel Area Hand portable extinguishers should be located within this area. Also, hose stations should be located outside but within hose reach of this area. Automatic fire detection should alarm and annunciate in the control room and alarm locally. Combustibles should be limited to a minimum in the new fuel area. The storage area should be provided with a drainage system to preclude accumulation of water. The storage configuration of new fuel should always be so maintained as to preclude criticality for any water density that might occur during fire water application.	1. New Fuel Areas Portable extinguishers are located outside and near the new fuel storage vault hatches. Hose stations are also located outside, but within reach of these areas. There is no automatic fire detection for the new fuel areas. Combustibles are limited to a minimum and controlled by administrative procedures. The storage area drainage systems preclude the accumulation of water. The storage configuration is maintained to preclude criticality for any water density that might occur during fire fighting.
m. Spent Fuel Pool Area Protection for the spent fuel pool area should be provided by local hose stations and portable extinguishers. Automatic fire detection should be provided to alarm and annunciate in the control room and to alarm locally.	m. Spent Fuel Pool Areas Protection for the spent fuel pool areas is provided by local hose stations and portable extinguishers. There is no automatic fire detection for the spent fuel pool areas. However, there are no appreciable amount of in-situ combustibles nor any safe shutdown components in the area. The spent fuel pool area is also continuously monitored by security personnel.
n. Radwaste and Decontamination Areas Fire barriers, automatic fire suppression and detection, and ventilation controls should be provided.	n. Radwaste and Decontamination Areas Barriers with 3-hour fire ratings will be provided prior to restart of Unit 2 between the Radwaste Building and the Reactor, Control, and Unit 1 and 2 Diesel Generator Buildings. The Radwaste Building is separated from the Turbine and Service Buildings by non-fire rated barriers.

NRC GUIDELINES	TVA RESPONSE
	There are no automatic fire suppression or detection systems in these areas. However, there are portable extinguishers and hose stations throughout the Radwaste Building. The decontamination room at the northwest side of the Unit 1 Turbine Building does not have automatic fire suppression or detection systems in this area. Portable extinguishers and hose connections are available to this area. Neither the Radwaste Building nor the decontamination room contains any safety-related equipment. For proposed corrective action, see description sheets for Project Numbers 31 and 49 in the Fire Protection Upgrade Report.
o. Safety-Related Water Tanks Storage tanks that supply water for safe shutdown should be protected from the effects of an exposure fire. Combustible materials should not be stored next to outdoor tanks.	o. Safety-Related Water Tanks The condensate storage tanks located outside the east wall of Unit 3 are used as a suction path, if available, for the HPCI pump operation during safe shutdown. Otherwise, the torus (suppression pool) provides the required suction path. No combustible material is stored adjacent to these tanks.
p. Records Storage Areas Records storage areas should be so located and protected that a fire in these areas does not expose safety-related systems or equipment (see Regulatory Guide 1.88, "Collection, Storage, and Maintenance of Nuclear Power Quality Assurance Records").	p. Records Storage Areas Records storage complies with Regulatory Guide 1.88 with the exceptions noted in TVA's QA Topical Report (Table 17D-2).

NRC GUIDELINES	TVA RESPONSE
	See description sheet for Project Number 32 in the Fire Protection Upgrade Report.
q. Cooling Towers Cooling towers should be of noncombustible construction or so located and protected that a fire will not adversely affect any safety-related systems or equipment. Cooling towers should be of noncombustible construction when the basins are used for the ultimate heat sink or for the fire protection water supply.	q. Cooling Towers The cooling towers are of combustible construction, but are well separated from safety-related areas of the plant. A fire in any of the cooling towers would not adversely affect any safety-related systems or equipment. The basins of the cooling towers are not used for the ultimate heat sink or for the fire protection water supply.
r. Miscellaneous Areas Miscellaneous areas such as shops, warehouses, auxiliary boiler rooms, fuel oil tanks, and flammable and combustible liquid storage tanks should be so located and protected that a fire or effects of a fire, including smoke, will not adversely affect any safety-related systems or equipment.	r. Miscellaneous Areas Miscellaneous areas such as shops, warehouses, fuel oil tanks, and flammable and combustible liquid storage tanks are well separated from areas containing safety-related equipment. The auxiliary boilers are located in the Turbine Building near cable trays containing cables for a single train of safety-related equipment. A fire in the auxiliary boiler area will not prevent safe shutdown of the plant.

NRC GUIDELINES	TVA RESPONSE
	For proposed corrective action, see description sheets for Project Numbers 23, 24, 29, 37, 38, 41, and 50 in the Fire Protection Upgrade Report.
8. Special Protection Guidelines	8. Special Protection Guidelines
a. Storage of Acetylene-Oxygen Fuel Gases	a. Storage of Acetylene - Oxygen Fuel Gases
Gas cylinder storage locations should not be in areas that contain or expose safety-related equipment or the fire protection systems that serve those safety-related areas. A permit system should be required to use this equipment in safety-related areas of the plant (also see Position C.2).	The gas cylinder manifolds of acetylene and oxygen for the shops in the Service Building are located outside the north wall of the building. These manifolds are protected by water spray systems actuated by thermal detectors. These areas do not expose any safety-related equipment. The bulk storage of acetylene and oxygen cylinders are located outside the north wall of the Power Stores Building and do not expose any safety-related equipment. A permit in accordance with a procedural attachment to the FPP entitled "Storage and Labelling of Hazardous Chemicals Flammable or Combustible Liquids, and Compressed Gas Cylinders" is required to use gas cylinder in areas that contain safety-related equipment.
b. Storage Areas for Ion Exchange Resins	b. Storage Areas for Ion Exchange Resins
Unused ion exchange resins should not be stored in areas that contain or expose safety-related equipment.	Unused ion exchange resins in safety-related areas are controlled to the extent that only 20 bags are permitted within a three sided metal enclosure located on elevation 621 of the Reactor Building.

NRC GUIDELINES	TVA RESPONSE
	A fire on elevation 621 in the Reactor Building may expose safety-related equipment; however, both trains of redundant safe shutdown systems will not be damaged due to the effects of a fire.
c. Hazardous Chemicals Hazardous chemicals should not be stored in areas that contain or expose safety-related equipment.	c. Hazardous Chemicals Hazardous chemicals (reactive, combustible, or flammable) are not stored in areas that contain safety-related equipment. Transient fire loads are controlled by a procedural attachment to the FPP entitled "Control of Transient Combustibles."
d. Materials Containing Radioactivity Materials that collect and contain radioactivity such as spent ion exchange resins, charcoal filters, and HEPA filters should be stored in closed metal tanks or containers that are located in areas free from ignition sources or combustibles. These materials should be protected from exposure to fires in adjacent areas as well. Consideration should be given to requirements for removal of decay heat from entrained radioactive materials.	d. Materials Containing Radioactivity Materials that collect and contain radioactivity are stored in closed metal tanks in areas free from ignition sources and combustibles. Decay heat from entrained materials was considered in the design of the equipment used to process radioactive wastes.

BRANCH TECHNICAL POSITION CMEB 9.5-1 COMPARISON

ATTACHMENT A

REFERENCES

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2. "Fire Protection Manual," Division of Nuclear Power, 01/05/87.

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   Volume II. (Compartmentation and Cable Separation Drawings)
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10. Browns Ferry Nuclear Plant - "Emergency Plans Manual," Volumes 1 and 2.

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12. "Supplement No. 8 to the Safety Evaluation Report by the Division of Project Management Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission. In the matter of Tennessee Valley Authority Browns Ferry Nuclear Plant Units 1, 2, and 3. Docket Nos. 50-259, 50-260, and 50-296," U.S. Nuclear Regulatory Commission of Nuclear Reactor Regulation, July 1976.

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17. NFPA 13, "Standard for the Installation of Sprinkler Systems," 1985 Edition.

18. NFPA 15, "Standard for Waterspray Fixed Systems for Fire Protection," 1985 Edition.

19. "An Evaluation of Water Based Fire Suppression Systems Installed In Nuclear Safety Related Areas At Browns Ferry Nuclear Plant," Revision 0, Professional Loss Control.

20. "Fire Hazard Evaluation Report for Browns Ferry Nuclear Plant, Units 1, 2, and 3," Tennessee Valley Authority, February 28, 1986.

21. NFPA 803, "Standard for Fire Protection for Light Water Nuclear Power Plants," 1983 Edition.

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23. BFNP - MPI-0-026-INS005, Annual Hydrostatic Test Outside Fire Hoses, Revision 0001.

24. BFNP - MPI-0-026-INS016, Triennial Hydrostatic Test Inside Fire Hoses, Rev. 0000.

25. NFPA 10, "Standard for Portable Fire Extinguishers," 1984 Edition.

26. T. C. Temple, "Appendix R - Compilation of Required Equipment," Tennessee Valley Authority, OE Calculation, BFN-BFS6-013, RIMS B45 870806 426.

27. BFNP - High Pressure Fire Protection System, "Office of Engineering, Final Report, Design Study Request (DSR) - S050," C. R. Hack, August 1985.

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28. "An Analysis of Fire Suppression and Detection in Areas Not Required for Safe Plant Shutdown at Browns Ferry Nuclear Plant Units 1, 2, and 3," Professional Loss Control, August 28, 1986, Revision 0.

29. NFPA 16A, "Recommended Practice for the Installation of Closed-Head Foam-Water Sprinkler Systems," 1983 Edition.

30. NFPA 12, "Standard on Carbon Dioxide Extinguishing Systems," 1966 Edition.

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35. NFPA-49, "Hazardous Chemicals Data," 1975 Edition.

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37. NFPA-30, "Flammable and Combustible Liquids Code," 1984 Edition.

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39. TVA Fire Recovery Plan, R6 April 9, 1976, Part X-Section A

40. NFPA 70, "National Electrical Code," 1984 Edition.

41. NFPA 20A, "Guide for Smoke and Heat Venting," 1986 Edition.

42. R. Abbas, "Appendix R Fire Pump Availability Study", Tennessee Valley Authority, DNE Calculation - B22 851227 101.

43. Browns Ferry Nuclear Plant Final Safety Analysis Report.

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45. Nuclear Quality Assurance Manual.

46. Radiological Emergency Plans.

ATTACHMENT B

ABBREVIATIONS

AFFF-	Aqueous Film Forming Foam.
BF EMSIL -	Browns Ferry Electrical Maintenance Instruction Letter.
BFNP -	Browns Ferry Nuclear Plant.
FHA -	Fire Hazards Analysis.
FM -	Factory Mutual
FP SIL -	Fire Protection Section Instruction Letter.
FPP -	Fire Protection Plan.
FPU -	Fire Protection Upgrade
GET-	General Employee Training
gpm -	gallons per minute.
HPCI -	High Pressure Coolant Injection.
IEEE -	Institute of Electrical and Electronics Engineers.
MG-	Motor Generator
MMI -	Mechanical Maintenance Instruction.
MSA -	Mine Safety Appliances.
NFPA -	National Fire Protection Association.
NRC -	Nuclear Regulatory Commission.
OSHA -	Occupational Safety and Health Act.
SCBA -	Self Contained Breathing Apparatus.
UL -	Underwriters Laboratories.

ATTACHMENT C

NFPA Code Deviation Summary

The following is a summary of the deviations from NFPA Codes identified during the review of the BFN fire protection systems. Proposed corrective actions are presented in the Fire Protection Upgrade Program.

1.0 Fire Detection and Alarm

Code deviations from NFPA 72D and 72E present in existing fire detection and alarm systems include the following:

- There is no central supervising station with an approved annunciator panel and "hard copy" printer.
- Alarm circuits that transmit signals to the control room, actuate preaction and CO_2 valves, and start fire pumps are not electrically supervised.
- Detectors installed prior to 1975 were installed on unsupervised circuits.
- Control room fire alarms are not distinctive from other alarm signals.
- Some local alarm panels are not UL listed, or have been modified or installed in a way to void the UL listing.
- Some detectors need to be relocated slightly to improve spacing.
- Duct mounted detectors are not properly installed.
- High air velocity under certain conditions in the cable tunnel leading to the Intake Pump Station could affect detector response.

The most significant of these deviations is the lack of electrical supervision of detection and alarm circuits. This deviation has been acknowledged by TVA for some time, with compensation provided in the form of increased technical specification surveillance frequencies. The adequacy of this measure is justified in the technical specification bases. Upgrades are planned to correct these deviations, but the systems as installed are fully operational, and are consistent with current licensing commitments.

2.0 Manual and Automatic Sprinkler Systems

Code deviations from NFPA 13 present in the existing sprinkler systems include the following:

- Small orifice sprinkler heads are used throughout.
- Some pendant sprinkler heads are installed in the upright position.

- Sprinkler heads are located an excessive distance from the ceiling.

- Pipe bushings are used instead of reducing fittings.

- Air vents are installed at the ends of the cross mains.

- Some small diameter piping needs additional bracing.

- Cable trays, ducts, and other equipment below the sprinkler system obstruct the spray pattern at several locations.

- There are some areas where sprinkler head spacing slightly exceeds code requirements.

- Open hatches and stairways are not protected by water curtains.

- Air pressure supervision is not provided to assure piping integrity.

- Not all low points are provided with auxiliary drains.

- Inspector's test connections are 1-inch, rather than the specified 1/2-inch.

- Shutoff valves are provided on the system side of the preaction valves.

- Some sprinkler heads are unlisted.

Several of these deviations have already been corrected for the Unit 2 Reactor Building sprinkler system. Specifically, the air vents have been removed, additional sprinklers have been installed beneath obstructions, and water curtains have been provided around vertical openings constituting fire zone boundaries. In addition, the sprinkler heads which were furthest below the ceiling (approximately 9 feet) have been relocated to within 12 inches of the ceiling. The most significant of the remaining deviations are those related to selection and positioning of the sprinkler heads.

Small orifice heads are normally restricted to wet-pipe systems protecting light hazard areas. At BFN, the small orifice heads are used for preaction systems in ordinary hazard areas. The use of small orifice heads is justified in that hydraulic calculations have shown that adequate water delivery can be achieved. The small orifices increased the probability of a sprinkler head being plugged, but this is not a major concern since strainers have been provided upstream of each preaction value. The use of pendant heads in the upright position was based on the design philosophy at the time of installation, which was to place the sprinkler heads below cable tray obstructions. By using pendant heads in the upright position, the water discharge is directed upwards to enhance protection of the cables. This approach was allowed by other NFPA standards at the time.

In many cases, the sprinkler heads are two to four feet below the ceiling, rather than the 12 inches specified by NFPA 13. As a result, the sprinkler systems are expected to be slower to respond to a fire than if the heads were correctly located. However, the sprinkler heads are expected to respond rapidly enough to control the potential spread of fire beyond the area of origin.

TVA has already committed to upgrade the Reactor Building sprinkler systems before restart of Units 1 and 3, and to complete the upgrade of the unit 2 Reactor Building system during the next cycle outage of Unit 2. The fire detection systems provided throughout the sprinklered areas, coupled with the manual fire fighting capability available, provides an adequate level of fire protection until the sprinkler system upgrades can be completed.

3.0 Carbon Dioxide Systems

Code deviations from NFPA 12 present in existing carbon dioxide (CO_2) fire suppression systems include the following:

- The CO_2 systems do not meet the soak time requirements specified in the current edition of NFPA 12. The requirements were added to the code after the systems were installed.

- Fuel oil transfer pumps should be interlocked to stop upon detection of a fire.

- Additional manual release stations should be provided at the routine access points to electrical equipment rooms in the Diesel Generator Buildings (manual releases are provided along the fire brigade's access route from the outside).

The only significant deviations are those related to soak time. Since the CO_2 systems have a considerable excess of installed agent capacity for any one hazard, the fire brigade can actuate the systems repeatedly, if required, to make up for any loss of CO_2 through leakage from the protected rooms. From a fire fighting standpoint, the automatic shutoff of the fuel transfer pumps would be desirable. However, the nuclear safety function of the diesel generators indicates that any decision to shutoff any portion of the system should be made by qualified operations personnel. Upgrades are planned to replace the CO_2 systems with other forms of automatic fire suppression, or as an alternative to reverify the design and upgrade the CO_2 systems to current code requirements. The systems as installed are operational, and are consistent with current licensing commitments.

Adequate fire protection is provided by the current CO_2 installation until the proposed upgrades can be completed.

4.0 Fire Pumps

Code deviations from NFPA 20 present in existing fire pumps include the following:

- Fire pumps start from a signal from fire alarm panels throughout the plant, but do not start on pressure loss in the fire main.
- Power supply for the three electric fire pumps is routed through a common tray in the cable tunnel.
- Discharge from the three electric fire pumps is routed through a common main to the plant yard loop.
- To minimize start-up current loads, the automatic start functions of the electric fire pumps are locked out upon accident signals such as high drywell pressure, low-low reactor water level, or when the diesel generators are supplying power to the 4160v shutdown boards. The fire pumps can be manually started as soon as diesel loads stabilize, but this does not conform to code requirements.
- Electric fire pumps and their controllers are not UL listed or FM approved.

The diesel raw water fire pump is basically in conformance with NFPA 20, but minor deviations were noted, as follows:

- Start logic for the diesel fire pump is the same as the electric pumps.
- There is no bypass line around the discharge strainer.
- The fuel tank is slightly undersized, and the tank and fuel line need to be revised to minimize fire exposure to the diesel pump.

The diesel fire pump supplying ancillary facilities, including the Low Level Radioactive Waste (LLRW) storage area, is basically in conformance with NFPA 20. The only significant concern is that the redundant water supply is of very limited flow and pressure capability. Otherwise, only minor deviations were noted.

The most significant deviations noted related to the lack of independence between the three electric fire pumps. In essence, the three pumps are considered as a single pump installation.

Since system design loads in all safety related areas can be met with only one pump, the diesel pump provides adequate redundant capacity for meeting regulatory requirements. Since the LLRW has never been activated, the limited flow and pressure of the secondary supply is of only economic concern. The fire pumps, as currently installed, are consistent with current licensing commitments, and provide adequate fire protection until proposed upgrades can be completed.

FIRE PROTECTION UPGRADE PROGRAM

BROWNS FERRY NUCLEAR PLANT

3360D

FIRE PROTECTION UPGRADE PROGRAM

BROWNS FERRY NUCLEAR PLANT

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LARRY RETZER
FIRE PROTECTION MANAGER

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FIRE PROTECTION UPGRADE PROGRAM

I. INTRODUCTION

This report outlines the Fire Protection Upgrade Program (FPUP) for the Browns Ferry Nuclear Plant (BFN) which establishes the plans and schedules for the modifications required to bring BFN into compliance with NRC Branch Technical Position CMEB 9.5-1 guidelines. The report also provides the plans and schedules for correcting fire protection system deviations to applicable National Fire Protection Association (NFPA) standards. In addition to the NRC and NFPA guidelines, insurance company and utility industry standard practices were also used for program development.

II. BACKGROUND

After the March 22, 1975, fire at Browns Ferry Nuclear Plant, TVA made extensive modifications to enhance the plant's fire protection features. These enhancements had a significant impact on subsequent fire protection guidelines in the NRC's Branch Technical Position APCSB 9.5-1 that was issued in May, 1976, and Appendix A to the Branch Technical Position that was issued in August 1976. At the time these guidelines were issued, TVA and the NRC staff considered the BFN fire protection features to meet the intent of the Appendix A guidelines.

BFN is currently undergoing fire protection modifications to bring the plant into compliance with the applicable sections of 10CFR50 Appendix R as required in 10CFR50.48. These modifications will be completed before restart from the current outage on each of the plant's units.

TVA intends to further enhance the BFN fire protection features as discussed the commitments made in Volume III, Section 5.2.3 of the Nuclear Performance Plan (NPP). In the NPP, TVA committed to performing a comparison review of the BFN fire protection programs and systems against the guidelines in NRC Branch Technical Position CMEB 9.5-1, which was issued in July, 1981. The guidelines are more stringent than the Appendix A guidelines and apply to nuclear plants licensed after the documents issue date.

III. SCOPE

The scope of the FPUP includes the entire BFN facility. The purpose of the program is to provide a complete and integrated a fire protection system for the plant considering NRC and NFPA guidelines and insurance company and utility industry standard practices.

IV. CRITERIA

In order to develop a comprehensive program, a systematic review methodology was established to evaluate the results of the Branch Technical Position CMEB 9.5-1 Comparison. This involved screening all identified deficiencies to the NRC guidelines, NFPA standard practices, insurance company guidelines, and utility industry standard practices. During the screening process, the proposed upgrade actions were determined or a justification for continued use was developed. The justifications were documented as part of the Comparison report and the proposed upgrade actions were then evaluated as projects under the FPUP. First priority was given to projects in safety related areas and other areas directly related to NRC requirements. Next, each project was assigned an implementation level rating. Then within each level, a weighted project evaluation was prepared for prioritizing the projects. From these basic evaluations, the preliminary project matrix list was developed.

V. FIRE PROTECTION UPGRADE PROGRAM MATRIX

To better illustrate the FPUP results, a matrix was developed to summarize the project evaluation. This matrix prioritizes the projects, documents the basic evaluation basis, and provides project schedule information. Each project was also assigned a number for tracking and identification purposes. The FPUP matrix has two major project groupings in addition to the information columns.

A. Project Group Level

The first major project grouping is the assigned project level. This level assignment groups the projects in a preliminary priority basis. The project levels used in the matrix are:

Level 1

Projects to upgrade the automatic sprinkler systems for the Reactor Buildings to meet specific commitments to the NRC. These projects will enhance the fire protection features for areas containing spatially spearated redundant safe shutdown components.

Level 2

Projects to replace the fire detection and alarm systems to eliminate NFPA code deviations such as the lack of electrical supervision of extensive portions of the system circuitry. These projects will enhance the fire protection features for areas that include those containing spatially separated redundant safe shutdown components.

Level 3

Projects to upgrade the fire protection features which would enhance protection for areas containing safety related equipment, and to provide a treated water supply to support subsequent wet-pipe sprinkler system installation in other areas of the facility.

Level 4

Projects to add fire suppression in areas of the plant which contain significant fire hazards or to complete the upgrade of fire protection features to address NFPA code deviations in areas containing safety related equipment. The upgrades to features in areas containing safety related equipment would provide only minor enhancement to the overall level of fire protection.

Level 5

Projects which would provide a desirable improvement in the overall level of fire protection, but which could be deferred without impact on the fire protection for areas containing safety related equipment.

B. Project Evaluation Process

Within each Level grouping, the projects were then reviewed using a "weighted value evaluation process" to determine the relative project ranking within its assigned Level. Four evaluation categories were developed by which this priority was developed. These categories are:

Regulatory Rating (REG) - Weighting Factor 3

The regulatory rating establishes the relative importance of the project in satisfying NRC guidelines. The higher the number, the greater the importance of the project.

Loss Rating (LOSS) - Weighting Factor 2

A relative rating of potential significant equipment damage, or loss of power generation capacity. A higher number indicates a greater loss potential.

Importance Rating (IMP) - Weighting Factor 1

A measure of the overall impact on the effectiveness of plant fire protection. The higher the number, the greater the impact.

Cost/Benefit Ratio (COST BENEFIT) - Weighting Factor 2

The relative potential for return for the money expended. The higher the number, the greater protection provided per dollar spent.

For each rating area, the importance of that evaluation category was assigned a numerical value of from 1 (low importance) to 10 (high importance). These ratings are then multiplied by the weighting factor, and added together in the sum column. This weighted numerical value is used for a ranking within each level, the higher the weighted sum, the more important the project is in relation to the others in the level. This weighted sum would form one of the evaluation criteria for project prioritization in the FPUP.

C. Project Scheduling

To develop a project implementation schedule a series of constraints on the individual projects was considered. These constraints consider a wide range of areas and have been summarized into the following categories:

1. NRC Commitments

TVA has committed to the NRC to complete the unit 2 Reactor Building sprinkler system upgrade prior to unit 2 cycle 6 restart. Additionally, the upgrade of the units 1 and 3 Reactor Building sprinkler systems are committed to be completed prior to restart of the affected unit.

2. TVA Fire Protection Policies

TVA has committed to insure the health and safety of the public and agency employees and to insure that TVA facilities are properly protected against loss and damage.

3. Refueling Outages

The integration of the FPUP required that some projects be scheduled during refueling outages due to construction activities interfering with plant operation, access requirements, etc.

4. Budget Allocation Constraints

Recognizing the budget allocation constraints, the program will extend over a several year period.

5. Design Resource and Implementation Limitations

Significant design resources are being applied to the BFN restart program. The scope of the early upgrade efforts are restricted to high priority projects.

6. Construction Program Resource Limitations

As part of the scheduling of projects, the availability of construction resources must be considered.

7. Project Interdependence

Several of the projects are interdependent, requiring a coordinated project implementation schedule. The major example of this was the scheduling of the fire protection water system upgrade projects prior to the installation of any wet pipe sprinkler systems to minimize corrosion and Asiatic clam problems in new piping systems.

Using the project scheduling constraints, the Level 1 and Level 2 projects have been assigned implementation dates and are being committed to by BFN. The Level 3, 4, and 5 projects have not been assigned implementation dates at this time. These projects will be evaluated for inclusion in the BFN integrated schedule using the Integrated Safety Assessment Program (ISAP) methodology described in Generic Letter 88-02. The integrated schedule and ISAP methodology will provide BFN with a standardized comparison and project determination process with which to discuss future projects with the NRC.

It should be recognized that with any long range plan, project priorities and assignments may change, as a result of regulatory changes, budgetary constraints or releases, etc. And as such, the project assignments as presented should be considered subject to change. Changes to the planning schedule will be properly documented and submitted for review.

VI. PROJECT DESCRIPTION SHEETS

As part of the FPUP, a preliminary project description sheet was developed for each of the 52 projects. Each sheet provides basic project information, including project number, project name, proposed start and completion dates, a description of the project, a summary of identified problem areas, and justifications for continued operation until the proposed projects can be implemented.

VII. SUMMARY

The implementation of the FPUP will give BFN a long range program that will result in achieving an appropriate level of compliance with the guidelines of Branch Technical Position CMEB 9.5-1 and correcting deviations to NFPA standards.

Existing fire protection features are adequate to support continued plant operation until the upgrade program is completed. For areas containing safety-related equipment, the detection and suppression systems are functional and capable of meeting their design intent. These systems satisfy BFN licensing commitments. They will either limit fire damage so that safe shutdown capability is maintained or their operability is not critical. The operability of systems in other areas of the plant is also not critical to shutdown.

FIRE PROTECTION UPGRADE PROJECT LIST REVIEW MATRIX

MARCH 23,1988

NOTE: TBD - TO BE DETERMINED

PROJECT NUMBER	PROJECT DESCRIPTION/LOCATION	WEIGHTED EVALUATIONS REG	LOSS	IMP	COST INFL	SUM	UNIT 2 RESTART REQ'D CYCLE 6	UNIT 3 RESTART REQ'D CYCLE	UNIT 1 RESTART REQ'D CYCLE	OUTAGE REQUIRED FOR CONSTRUCTION	PROJECT DESIGN START	START CONSTRUCTION	COMPLETE CONSTRUCTION
	LEVEL 1												
1	UNIT 3 REACTOR BLDG.-AUTOMATIC SPRINKLER UPGRADE	10	8	8	5	44	NO	YES	NO	YES	Oct-88	Feb-89	Nov-89
2	UNIT 2 REACTOR BLDG.-AUTOMATIC SPRINKLER UPGRADE COMPLETION	10	8	8	5	44	YES	NO	NO	YES	Apr-90	Aug-90	Feb-91
3	UNIT 1 REACTOR BLDG.-AUTOMATIC SPRINKLER UPGRADE	10	8	8	5	44	NO	NO	YES	YES	Oct-90	Dec-90	Aug-91
	LEVEL 2												
4	INSTALL CENTRAL FIRE ALARM PANEL IN UNITS 1 & 2 CONTROL ROOM	9	8	8	5	61	YES	NO	NO	NO	Oct-89	Jan-90	Jul-90
5	UNIT 3 REACTOR BLDG.-UPGRADE FIRE DETECTION/ALARM	9	8	8	5	61	NO	YES	NO	YES	Oct-88	Dec-88	Jun-89
6	UNIT 1 REACTOR BLDG.-UPGRADE FIRE DETECTION/ALARM	9	8	8	5	61	NO	NO	YES	YES	Oct-90	Dec-90	Aug-91
7	UNIT 2 REACTOR BLDG.-UPGRADE FIRE DETECTION/ALARM	9	8	8	5	61	YES	NO	NO	YES	Oct-89	Jan-90	Jul-90
8	INSTALL CENTRAL FIRE ALARM PANEL IN UNIT 3 CONTROL ROOM	9	8	8	5	61	NO	YES	NO	YES	Oct-88	Jan-89	Aug-89
9	UPGRADE UNIT 3 CONTROL ROOM FIRE DETECTION	8	6	4	4	48	NO	YES	NO	NO	Oct-88	Jan-89	Aug-89
10	UNIT 3 DIESEL GENERATOR BLDG.-FIRE DETECTION/ALARM UPGRADE	8	5	4	5	48	NO	YES	NO	YES	Oct-88	Jan-89	Aug-89
11	UNITS 1 & 2 DIESEL GENERATOR BLDG.-FIRE DETECTION/ALARM UPGRADE	8	5	4	5	48	YES	NO	NO	NO	Jan-92	Mar-92	Sep-92
12	CONTROL BLDG.-UPGRADE FIRE DETECTION/ALARM AND SUPPRESSION	8	5	4	5	48	NO	NO	NO	YES	Oct-89	Jan-91	Aug-91
13	UPGRADE UNITS 1 & 2 CONTROL ROOM FIRE DETECTION	8	6	4	4	48	NO	NO	NO	NO	Jan-90	May-90	Jul-90
14	CABLE SPREADING ROOM A-FIRE DETECTION/ALARM UPGRADE	8	2	2	4	38	NO	NO	NO	NO	Oct-90	Nov-90	May-91
15	CABLE SPREADING ROOM B-FIRE DETECTION/ALARM UPGRADE	8	2	2	4	38	NO	YES	NO	NO	Oct-90	Jan-91	Apr-91
16	INTAKE PUMP STATION-UPGRADE FIRE DETECTION/ALARM SYSTEM	8	2	1	3	35	NO	NO	NO	NO	Dec-91	Mar-92	Aug-92
	LEVEL 3												
17	FIRE PROTECTION WATER SUPPLY - INSTALL NEW TANK AND PUMPS	5	6	7	7	48	NO	NO	NO	NO	TBD	TBD	TBD
18	FIRE PROTECTION WATER SUPPLY - SEPARATE RAW AND PPFP SYSTEMS	5	6	7	7	48	NO	NO	NO	NO	TBD	TBD	TBD
19	STANDBY GAS TREATMENT BLDG. - INSTALL AUTOMATIC SPRINKLERS	5	6	5	6	44	NO	NO	NO	NO	TBD	TBD	TBD
20	CABLE SPREADING ROOM A-SUPPRESSION SYSTEM UPGRADE	6	5	5	5	43	NO	NO	NO	NO	TBD	TBD	TBD
21 A	CONTROL BLDG. - ELEVATION 593-UPGRADE FIRE DETECTION/ALARM	5	5	5	4	38	YES	NO	NO	NO	TBD	TBD	TBD
21 B	CONTROL BLDG. - UPGRADE COMPARTMENTATION	5	5	5	4	38	NO	NO	NO	NO	TBD	TBD	TBD
21 C	CONTROL BLDG. - UPGRADE INTERIOR FINISHES	5	5	5	3	36	NO	NO	NO	NO	TBD	TBD	TBD
22	CABLE SPREADING ROOM B-SUPPRESSION SYSTEM UPGRADE	6	5	5	5	43	NO	NO	NO	NO	TBD	TBD	TBD
	LEVEL 4												
23	UNIT 2 TURBINE BLDG-INSTALL AUTOMATIC SPRINKLER SYSTEMS	4	10	8	10	60	NO	NO	NO	YES	TBD	TBD	TBD
24	UNIT 3 TURBINE BLDG-INSTALL AUTOMATIC SPRINKLER SYSTEM	4	10	8	10	60	NO	NO	NO	YES	TBD	TBD	TBD
25	HVAC-SMOKE/HEAT CONTROL UPGRADE-SAFETY RELATED BLDGS.	5	5	5	4	38	NO	NO	NO	YES	TBD	TBD	TBD
26	STANDBY GAS TREATMENT BLDG. - INSTALL FIRE DETECTION	5	5	5	5	40.5	NO	NO	NO	NO	TBD	TBD	TBD
27 A	UNITS 1 & 2 DIESEL GENERATOR BLDG-SUPPRESSION SYSTEM UPGRADE	5	5	8	4	41	NO	NO	NO	NO	TBD	TBD	TBD
27 B	UNITS 1 & 2 DIESEL GENERATOR BLDG-UPGRADE COMPARTMENTATION	5	5	8	4	41	NO	NO	NO	NO	TBD	TBD	TBD
28	CONTROL BLDG. ELEVATION 593' - SUPPRESSION SYSTEM UPGRADE	5	6	8	4	43	NO	NO	NO	NO	TBD	TBD	TBD
29	UNIT 1 TURBINE BLDG.-INSTALL AUTOMATIC SPRINKLER SYSTEM	4	10	8	10	60	NO	NO	NO	YES	TBD	TBD	TBD
30	ANCILLARY FACILITIES FIRE PROTECTION PUMP UPGRADE	4	6	4	4	36	NO	NO	NO	NO	TBD	TBD	TBD
31	RAD WASTE BLDG.-INSTALL AUTOMATIC SPRINKLER SYSTEMS	5	6	2	3	35	NO	NO	NO	NO	TBD	TBD	TBD
32	RECORD STORAGE ROOM-SUPPRESSION SYSTEM UPGRADE	5	4	3	3	32	NO	NO	NO	NO	TBD	TBD	TBD
33	SERVICE BUILDING-INSTALL AUTOMATIC SPRINKLERS	3	5	5	2	28	NO	NO	NO	NO	TBD	TBD	TBD
34	GENERAL SITE COMPLETION-FIRE DETECTION/ALARM SYSTEMS	4	3	6	1	26	NO	NO	NO	NO	TBD	TBD	TBD
35 A	UNIT 3 DIESEL GENERATOR BLDG-SUPPRESSION SYSTEM UPGRADE	5	5	8	4	41	NO	NO	NO	NO	TBD	TBD	TBD
35 B	UNIT 3 DIESEL GENERATOR BLDG-UPGRADE COMPARTMENTATION	5	5	8	4	41	NO	NO	NO	NO	TBD	TBD	TBD
36	TURBINE BLDG/SWITCH YD. CABLE TUNNEL-INSTALL AUTOMATIC SPRINKLERS	5	2	1	1	22	NO	NO	NO	NO	TBD	TBD	TBD
37	UPGRADE OUTSIDE OIL STORAGE TANK PROTECTION	2	3	2	3	20	NO	NO	NO	NO	TBD	TBD	TBD
	LEVEL 5												
38	UNIT 3 TURBINE BLDG-INSTALL FIRE DETECTION/ALARM SYSTEM	4	10	8	10	60	NO	NO	NO	YES	TBD	TBD	TBD
39	EAST PORTAL BLDG.-INSTALL SUPPRESSION AND FIRE DETECTION	2	6	6	10	44	NO	NO	NO	NO	TBD	TBD	TBD
40	SITE CENTRAL ALARM PANELS-FIRE HOUSE AND PUBLIC SAFETY	1	6	8	7	37	NO	NO	NO	NO	TBD	TBD	TBD
41	UNIT 2 TURBINE BLDG.-INSTALL FIRE DETECTION/ALARM SYSTEM	4	10	8	10	60	NO	NO	NO	YES	TBD	TBD	TBD
42	TRANSFORMER/SWITCH YARD -UPGRADE SUPPRESSION SYSTEMS	4	6	6	6	42	NO	NO	NO	YES	TBD	TBD	TBD
43	FIRE HOUSE/FIRE PROTECTION BLDG.	2	3	6	5	28	NO	NO	NO	NO	TBD	TBD	TBD
44	POWER STORES WAREHOUSE-INSTALL AUTOMATIC SPRINKLER SYSTEMS	2	6	6	5	34	NO	NO	NO	NO	TBD	TBD	TBD
45	PARK FIRE EXITS/ROUTES	5	2	1	7	34	N/A	N/A	NO	NO	TBD	TBD	TBD
46	HYDROGEN TRAILER PORT UPGRADE SUPPRESSION/DETECTION SYSTEMS	4	4	6	4	34	NO	NO	NO	NO	TBD	TBD	TBD
47	TRANSFORMER/SWITCH YARD -UPGRADE FIRE DETECTION/ALARMS	4	4	6	2	30	NO	NO	NO	YES	TBD	TBD	TBD
48	HVAC-SMOKE/HEAT CONTROL UPGRADE-NON-SAFETY RELATED BLDGS	4	4	3	3	29	NO	NO	NO	NO	TBD	TBD	TBD
49	RAD WASTE BLDG.-INSTALL FIRE DETECTION/ALARM SYSTEM	4	4	2	3	28	NO	NO	NO	NO	TBD	TBD	TBD
50	UNIT 1 TURBINE BLDG.-INSTALL FIRE DETECTION/ALARM SYSTEM	4	10	8	10	60	NO	NO	NO	YES	TBD	TBD	TBD
51	FIRE PROTECTION WATER SYSTEM UPGRADES	2	2	2	2	16	NO	NO	NO	NO	TBD	TBD	TBD
52	INSTALL OFFICE BUILDING AUTO SPRINKLER SYSTEM	1	1	1	1	8	NO	NO	NO	NO	TBD	TBD	TBD

PROJECT NUMBER : 1

NAME : UNIT 3 REACTOR BUILDING - AUTOMATIC SPRINKLER UPGRADE

PROJECT START DATE : September, 1988

PROJECT COMPLETION : November, 1989

PROJECT DESCRIPTION: The purpose of the project is to upgrade the existing automatic sprinkler systems in the unit 3 reactor building (all levels as required) to meet TVA commitments to the NRC. NFPA Codes will be used to upgrade the existing system by; installing new pipings, sprinkler heads and valves, installing piping supervision, upgrading the Motor Generator. Set AFFF System, and extending coverage as required. The upgrade will bring the system up to NFPA Standards 13, 16 and 16A.

The following problems have been identified:

1. Improper sprinkler head location
2. Non-listed equipment/components
3. Poor sprinkler head coverage
4. Non-conformance to NFPA codes - missing air supervision, small orifice heads, etc.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The areas are generally equipped with fire detection which would provide warning in the event of a fire.
2. Manual fire fighting capability is available.
3. The installed systems are functional.
4. The unit is not in operation and the new systems will be installed prior to restart of unit 3.
5. Existing systems are fully consistent with BFN licensing commitments.
6. The existing fire protection systems and upgraded separation features that will be provided prior to unit 2 restart will be adequate to limit fire damage to one train of unit 2 redundant safe shutdown equipment.

TVA has commited to implement this project prior to Unit restart.

PROJECT NUMBER : 2

NAME : UNIT 2 REACTOR BUILDING - AUTOMATIC SPRINKLER UPGRADE

PROJECT START DATE : April, 1990

PROJECT COMPLETION : February, 1991

PROJECT DESCRIPTOIN: The purpose of the project is to complete the upgrade of the existing automatic sprinkler systems in the unit 2 reactor building (all levels as required) to meet TVA commitments to the NRC. NFPA Codes will be used to upgrade the existing system by; installing new piping, sprinkler heads and valves, installing piping supervision, and extending coverage as required. The upgrade will bring the system up to NFPA Standard 13.

The following problems have been identified:

1. Improper sprinkler head location
2. Non-listed equipment/components
3. Poor sprinkler head coverage
4. Non-conformance to NFPA Codes - missing air supervision, small orifice heads, etc.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The areas are generally equipped with fire detection which would provide warning in the event of a fire.
2. Manual fire fighting capability is available.
3. The installed systems are functional.
4. The new systems will be installed prior to Cycle 6.
5. Existing systems are fully consistent with BFN licensing commitments.
6. The existing fire protection systems and upgraded separation features that will be provided prior to unit 2 restart will be adequate to limit fire damage to one train of redundant safe shutdown equipment.

TVA has commited to implement this project prior to unit cycle 6 restart.

PROJECT NUMBER : 3

NAME : UNIT 1 REACTOR BUILDING - AUTOMATIC SPRINKLER UPGRADE

PROJECT START DATE : October, 1990

PROJECT COMPLETION : August, 1991

PROJECT DESCRIPTION: The purpose of the project is to upgrade the existing automatic sprinkler systems in the Unit 1 reactor building (all levels as required) to meet TVA Commitments to the NRC. NFPA codes will be used to upgrade the existing system by; installing new pipings, sprinkler heads and valves, installing piping supervision, upgrading the Motor Generator Set AFFF System, and extending coverage as required. The upgrade will bring the system up to NFPA standards 13, 16 and 16A.

The following problems have been identified:

1. Improper sprinkler head location
2. Non-listed equipment/components
3. Poor sprinkler head coverage
4. Non-conformance to NFPA Codes - missing air supervision, small orifice heads, etc.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The areas are generally equipped with fire detection which would provide warning in the event of a fire.
2. Manual fire fighting capability is available.
3. The installed systems are functional.
4. The unit is not in operation and the new systems will be installed prior to restart of unit 1.
5. Existing systems are fully consistent with BFN licensing commitments.
6. The existing fire protection systems and upgraded separation features that will be provided prior to unit 2 restart will be adequate to limit fire damage to one train of unit 2 redundant safe shutdown equipment.

TVA has commited to implement this project prior to Unit restart.

PROJECT NUMBER : 4

NAME : INSTALL CENTRAL FIRE ALARM PANEL IN UNITS 1 & 2 CONTROL ROOM

PROJECT START DATE : October, 1989

PROJECT COMPLETION : July, 1990

PROJECT DESCRIPTION: The purpose of the project is to install a central alarm panel in the units 1 & 2 control room to provide a central alarm monitoring point. The system will utilize multiplexing and microprocessor based systems to meet the requirement. Included will be distinctive alarm output, monitoring and storage capability. The system will be designed to meet the new site fire alarm design requirements and NFPA 72 D guidelines.

The following problems have been identified:

1. The present system does not meet NFPA 72 D guidelines, and does not provide annunciation, supervision, alarm printout, etc.
2. The present system will not meet the needs of the new local fire alarm panels installed as part of the upgrade

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present system meets BFN licensing commitments.
2. The present system does provide adequate alarm capability.
3. Until the existing local fire alarm panels are upgraded, the new central panel will not be required.
4. Increased surveillance procedures have been provided for the system.
5. The fire detection capability that will be provided prior to restart of each unit will be adequate to support safe shutdown during a fire and to limit damage to one train of redundant safe shutdown equipment.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER : 5

NAME : UNIT 3 REACTOR BUILDING - UPGRADE FIRE DETECTION/ALARM SYSTEMS

PROJECT START DATE : October, 1988

PROJECT COMPLETION : June, 1989

PROJECT DESCRIPTION: The purpose of the project is to replace the existing fire detection/alarm systems which do not meet NFPA 72D and 72E series codes. The new systems will be compatible with the planned site central alarm system. Included as put of the project will be new detectors, wiring and local fire panels, to NFPA 72D and 72E.

The following problems have been identified:

1. The systems do not meet the NFPA 72D and 72E codes for detector installation, supervision, etc.
2. Replacement parts are difficult to obtain due to the age of the systems
3. The present system is not compatible with the planned central alarm system

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Increased surveillance frequencies have been implemented to insure operability of the present system.
2. The existing configuration meets BFN licensing commitments.
3. The installed systems are functional and provide control room annunciation and suppression system actuation.
4. The fire detection capability that will be provided prior to unit 3 restart will be adequate to support safe shutdown during a fire and to limit damage to one train of redundant safe shutdown equipment.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 6

NAME: UNIT 1 REACTOR BUILDING - UPGRADE FIRE DETECTION/ALARM SYSTEMS

PROJECT START DATE: October 90

PROJECT COMPLETION: August 91

PROJECT DESCRIPTION: The purpose of this project is to replace the existing fire detection/alarm systems which do not meet NFPA 72D and 72E codes. The new systems will be compatible with the planned site central alarm system. Included as part of the project will be new detectors, wiring, and local fire panels.

The following problems have been identified:

1. The systems do not meet NFPA 72D and 72E for detector installation, supervision, etc.

2. Replacement parts are difficult to obtain due to the age of the system.

3. The present system is not compatible with the planned central alarm system.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Increased surveillance frequencies have been implemented to insure operability of the present system.

2. The existing configuration meets BFN licensing commitments.

3. The installed systems are functional and provide control room annunciation and suppression system actuation.

4. The fire detection capability that will be provided prior to unit 1 restart will be adequate to support safe shutdown during a fire and to limit damage to one train of redundant safe shutdown equipment.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 7

NAME: UNIT 2 REACTOR BUILDING - UPGRADE FIRE DETECTION/ALARM SYSTEMS

PROJECT START DATE: October 89

PROJECT COMPLETION: July 90

PROJECT DESCRIPTION: The purpose of this project is to replace the existing fire detection/alarm systems which do not meet NFPA 72D and 72E codes. The new systems will be compatible with the planned site central alarm system. Included as part of the project will be new detectors, wiring, and local fire panels.

The following problems have been identified:

1. The systems do not meet NFPA 72D and 72E for detector installation, supervision, etc.

2. Replacement parts are difficult to obtain due to the age of the systems.

3. The present system is not compatible with the planned central alarm system.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Increased surveillance frequencies have been implemented to insure operability of the present system.

2. The existing configuration meets BFN licensing commitments.

3. The installed systems are functional and provide control room annunciation and suppression system actuation.

4. The fire detection capability that will be provided prior to unit 2 restart will be adequate to support safe shutdown during a fire and to limit damage to one train of redundant safe shutdown equipment.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 8

NAME: INSTALL CENTRAL FIRE ALARM PANEL IN UNIT 3 CONTROL ROOM

PROJECT START DATE: October 88

PROJECT COMPLETION: August 89

PROJECT DESCRIPTION: The purpose of this project is to install a central alarm panel in the unit 3 control room to provide a central alarm monitoring point for that unit. The system will utilize multiplexing and microprocessor based systems to meet the requirements. Included will be distinctive alarm output, monitoring and storage capabilities. The system will be designed to meet the new site fire alarm design requirements and NFPA 72D guidelines.

The following problems have been identified:

1. The systems do not meet NFPA 72D guidelines, and do not provide distintive annunciation, supervision, etc.

2. The present system will not meet the needs of the new local fire alarm panels installed as part of the upgrade.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present system meets BFN licensing commitments.

2. The present system provides adequate alarm capability.

3. Until the existing local fire alarm panels are upgraded, the new central panel will not be required.

4. Increased surveillance procedures have been provided for the system.

5. The fire detection capability that will be provided prior to restart of unit 3 will be adequate to support safe shutdown during a fire and to limit damage to one train of redundant safe shutdown equipment.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 9

NAME: UPGRADE UNIT 3 CONTROL ROOM FIRE DETECTION

PROJECT START DATE: October 88

PROJECT COMPLETION: August 89

PROJECT DESCRIPTION: The purpose of this project is to install new fire detectors, wiring, and a local fire panel meeting the NFPA 72D and 72E guidelines in the control room.

The following problems have been identified:

1. The present system does not meet NFPA 72D and 72E guidelines.

2. There is no local alarm panel for annunciation and control of the detectors.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present configuration meets the BFN licensing commitments.

2. The control room is manned 24 hours a day. This provides adequate capability to detect a fire so that the plant can be safely shutdown using alternative shutdown features that will be provided outside the control building prior to unit 3 restart.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 10

NAME: UNIT 3 DIESEL GENERATOR BUILDING - FIRE DETECTION/ALARM SYSTEM UPGRADE

PROJECT START DATE: October 88

PROJECT COMPLETION: August 89

PROJECT DESCRIPTION: The purpose of this project is to install new fire detection systems in the Unit 3 Diesel Generator rooms, replacing the existing systems. Included in addition to the detectors will be new wiring, local fire panel, and new controls for the fixed suppression systems. The new alarm panel will provide alarm capabilities not now available, including supervised alarm circuits, audible annunciation and central reporting. This panel will be part of the site wide fire detection/alarm system upgrade program. The new systems will meet NFPA 72D and 72E codes.

The following problems have been identified:

1. The circuits from the systems to the control room are unsupervised, and the systems do not meet NFPA guidelines.

2. The present systems provide only limited information to the control room.

3. The present system will not be adequate to properly handle the new alarm capabilities.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The existing systems are functional and provide local annunciation and suppression system activation.

2. The existing systems meet BFN licensing commitments.

3. Increased inspection and maintenance has been instituted for the system.

4. A fire in one or more of the unit 3 diesel generator rooms will not affect the ability to safely shutdown the plant using equipment located in the unit 1 and 2 diesel generator building.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 11

NAME: UNITS 1 AND 2 DIESEL GENERATOR BUILDING - FIRE DETECTION/ALARM SYSTEM UPGRADE

PROJECT START DATE: January 92

PROJECT COMPLETION: September 92

PROJECT DESCRIPTION: The purpose of the project is to install a new fire detection systems in the unit 1 and 2 Diesel Generator rooms, replacing the existing systems. Included in addition to the detectors will be new wiring, local fire panels, and new controls for the fixed suppression systems. The new alarm panel will provide alarm capabilities not now available, including supervised alarm circuits, audible annunciation, and central reporting. This project will be part of the site wide fire detection/alarm system upgrade program. The new system will meet NFPA 72D and 72E codes.

The following problems have been identified:

1. The circuits from the systems to the control room are unsupervised and the systems do not meet NFPA guidelines.

2. The present systems provide only limited information to the control room.

3. The present system will not be adequate to properly handle the new alarm capabilities.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The existing systems are functional and provide local annunciation and suppression system actuation.

2. The existing systems meet BFN licensing Commitments.

3. Increased inspection and maintenance has been instituted for the systems.

4. A fire in one or more of the Unit 1 and 2 diesel generator rooms will not affect the ability to safely shutdown the plant using equipment located in the Unit 3 diesel generator building.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 12

NAME: CONTROL BUILDING - UPGRADE FIRE DETECTION/ALARM AND SUPPRESSION SYSTEM

PROJECT START DATE: October 89

PROJECT COMPLETION: August 91

PROJECT DESCRIPTION: The purpose of the project is to complete the upgrade of the control building fire detection/alarm systems by providing new local alarm panels, automatic sprinkler flow switches, and new fire detection systems in areas not covered under other major programs. The project will install equipment to the guidelines of the NFPA 72D and 72E and which is compatible with the planned central alarm system. The sprinkler systems on elevation 606 will be upgraded to NFPA 13. Stand pipes will be upgraded/relocated to NFPA 14.

The following problems have been identified:

1. The present configuration will not be compatible with the new alarm system.

2. The present systems provide only limited information to the control room.

3. The sprinkler systems do not meet NFPA 13 guidelines.

4. The stand pipes will be relocated and the supply pipe configured to NFPA 14.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present configuration meets BFN licensing commitments.

2. There are personnel in the area 24 hours a day.

3. Limited areas are protected with automatic sprinklers.

4. Alternative shutdown capability will be provided prior to restart of each unitoutside the control building so that a fire in the building will not prevent safe shutdown.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 13

NAME: UPGRADE UNITS 1 AND 2 CONTROL ROOM FIRE DETECTION

PROJECT START DATE: January 1990

PROJECT COMPLETION: July 1990

PROJECT DESCRIPTION: The purpose of the project is to install new fire detectors, wiring, and a local fire panel meeting the NFPA 72D and 72E guidelines in the control room.

The following problems have been identified:

1. The present system does not meet the guidelines of NFPA 72D and 72E.

2. There is no local alarm panel for annunciation and control of the detectors.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present configuration meets the BFN licensing commitments.

2. The control room is manned 24 hours a day. This provides adequate capability to detect a fire so that the plant can be safely shutdown using alternative shutdown features that will be provided outside the control building prior to restart of each unit.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 14

NAME: CABLE SPREADING ROOM A - FIRE DETECTION/ALARM UPGRADE

PROJECT START DATE: October 1990

PROJECT COMPLETION: May 1991

PROJECT DESCRIPTION: The purpose of the project is to install a new fire detection system in Cable spreading room A replacing the existing system. Included in addition to the detectors will be new wiring, and a local fire panel. The new alarm panel will provide new alarm capabilities not now available, including supervised alarm circuits, distinctive audible annunciation, and central reporting. This panel will be part of the site wide fire detection/alarm system upgrade program and will meet the NFPA 72D and 72E code guidelines.

The following problems have been identified:

1. The present system provides only limited information to the control room, and does not meet NFPA guidelines.

2. The present system will not be compatible with the new alarm capabilities.

3. Detector relocation/addition is required and detectors are becoming difficult to replace and maintain.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The installed systems are functional.

2. The systems meet BFN Licensing commitments.

3. The room is provided with automatic sprinklers and a manual CO_2 system.

4. Alternative shutdown capability will be provided prior to restart of each unit outside the control building so that a fire in the cable spreading room will not prevent safe shutdown.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 15

NAME: CABLE SPREADING ROOM B - FIRE DETECTION/ALARM UPGRADE

PROJECT START DATE: October 1990

PROJECT COMPLETION: April 1991

PROJECT DESCRIPTION: The purpose of the project is to install a new fire detection system in Cable spreading room B replacing the existing system. Included in addition to the detectors will be new wiring, and a local fire panel. The new alarm panel will provide new alarm capabilities not now available, including supervised alarm circuits, distinctive audible annunciation, and central reporting. This panel will be part of the site wide fire detection/alarm system upgrade program and will meet the NFPA 72D and 72E code guidelines.

The following problems have been identified:

1. The present system provides only limited information to the control room, and does not meet NFPA guidelines.

2. With the existing local fire panel, the present system will not be compatible with the new alarm capabilities.

3. Detector relocation/addition is required and detectors are becoming difficult to replace and maintain.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The installed systems are functional.

2. The existing system meets BFN licensing commitments.

3. The room is provided with automatic sprinklers and a manual CO_2 system.

4. Alternative shutdown capability will be provided prior to restart of each unit outside the control building so that a fire in the cable spreading room will not prevent safe shutdown.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 16

NAME: INTAKE PUMP STATION FIRE DETECTION/ALARM SYSTEM

PROJECT START DATE: December 91

PROJECT COMPLETION: August 92

PROJECT DESCRIPTION: The purpose of the projects is to install a new fire detection system in the Intake pump station, replacing the existing system. Included in addition to the detectors will be new wiring, local fire panel, and new controls for the pre-action sprinkler system. The new alarm panel will provide alarm capabilities not now available, including supervised alarm circuits, distinctive audible annunciation, and central reporting. This panel will be part of the site-wide fire detection system upgrade program.

The following problems have been identified:

1. The present system does not meet NFPA 72D and 72E guidelines for supervision, alarms, and functions.

2. The present system does not provide protection for the entire area.

3. The present system will not be compatible with the new central alarm system.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present fire alarm/detection system will function as required to protect the area.

2. The existing configuration meets BFN licensing commitments.

3. Increased surveillance frequencies have been implemented to ensure operability of the present system.

4. An automatic sprinkler system is installed in the valve gallery on elevation 550 of the Intake Pumping Station.

5. The existing fire protection systems and upgraded separation features that will be provided prior to unit 2 restart will be adequate to limit fire damage to one train of redundant safe shutdown equipment.

Budgetary approval of this project is required prior to implementation.

PROJECT NUMBER: 17

NAME: FIRE PROTECTION WATER SUPPLY - INSTALL NEW TANKS AND PUMPS

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install a new water storage tank(s), two diesel fire pumps, and two jockey pumps to provide a separate/treated water supply for the fire protection systems. This project is associated with project number 18 and will provide an enhanced fire protection water supply. The new systems will conform to the guidelines of NFPA 20, 22, and 24.

The following problems have been identified:

1. The existing electric fire pumps do not meet NFPA guidelines for controls and installation.

2. The existing system is not configured for jockey pump/pressure drop operation.

3. The present system uses river water, which requires special treatment for clams and corrosion protection.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Installation of the project is planned prior to the installation of any wet pipe sprinkler system or this system.

2. The present configuration meets BFN licensing commitments.

3. The system provides adequate fire protection water supplies.

4. The existing water supply is adequate to support safe shutdown of the plant during a fire and to limit damage to one train of redundant safe shutdown equipment.

PROJECT NUMBER: 18

NAME: FIRE PROTECTION WATER SUPPLY SYSTEM - SEPARATE RAW SERVICE WATER AND HPFP SYSTEMS

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to separate and upgrade the fire protection water supply system in the plant. The project will provide additional piping as required to separate the systems such that the raw service water and fire protection water systems will be completely separated and supplied by independent sources. The project is associated with project 17. Any new underground piping will be installed to NFPA 24 guidelines. Piping installed inside buildings will be designed in accordance with ANSI B31.1.

The following problems have been identified:

1. The present configuration does not meet NFPA guidelines. Fire pump start is not automatic on pressure drop.

2. The present system uses river water, which requires special treatment for clams and corrosion protection.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present system is consistent with BFN licensing commitments.

2. Shared fire protection and raw water service systems is not prohibited by NFPA 24.

3. The existing water supply is adequate to support safe shutdown of the plant during a fire and to limit damage to one train of redundant safe shutdown equipment.

Implementation of the proposed project will be evaluated under I.S.A.P.

0615g3

PROJECT NUMBER: 19

NAME: STANDBY GAS TREATMENT BUILDING - INSTALL AUTOMATIC SUPPRESSION SYSTEMS

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install an automatic wet pipe sprinkler system for area coverage, and a fixed water spray system on the charcoal filter sets. NFPA codes 13, 14,and 15 guidance will be used to upgrade existing yard supply piping, and install piping, heads, and valves.

The following problems have been identified:

1. Loss of the building could affect continued operation of the plant.

2. Fires in the charcoal filters can be difficult to manually suppress, with additional damage beyond the loss of the charcoal possible.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Manual fire fighting capability is available.

2. The present configuration meets NRC licensing commitments.

3. A fire in the Standby Gas Treatment Building would have no impact on safe shutdown capabilities for the plant.

0615g4

PROJECT NUMBER: 20

NAME: CABLE SPREADING ROOM A - SUPPRESSION SYSTEM UPGRADE

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to upgrade the automatic sprinkler system in cable spreading room A. Present plans are to remove the CO_2 system when the automatic sprinkler system is upgraded. The new system will meet NFPA 13 guidelines.

The following problems have been identified:

1. The sprinkler system does not meet NFPA guidelines for sprinkler head location, air supervision, and coverage.

2. The CO_2 system presents life safety hazard for personnel working in the area.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The area is equipped with fire detection which would provide warning in the event of a fire.

2. Manual fire fighting capability is available.

3. The installed systems will function and provide protection.

4. The present systems meet licensing commitments.

5. Alternative shutdown capability will be provided prior to restart of each unit outside the control building so that a fire in the cable spreading room will not prevent safe shutdown.

PROJECT NUMBER: 21A

NAME: CONTROL BUILDING ELEVATION 593 - UPGRADE FIRE DETECTION/ALARM SYSTEM

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The project is intended to install new fire detection systems in the Elevation 593 rooms replacing the existing systems. Included in addition to the detectors will be new wiring, local fire panel, and new controls for the CO_2 or other suppression system. The new alarm panel will provide new alarm capabilities not now available, including supervised alarm circuits, distinctive audible annunciation, and central reporting. This panel will be part of the site-wide fire detection/alarm system upgrade program. The new systems will meet NFPA 72D and 72E codes.

The following problems have been identified:

1. The detection circuits are unsupervised and do not meet the NFPA 72D and 72E.

2. The present system provides limited information to the Control Room and at the local panel.

3. The present control panels are not compatible with the planned new central fire detection/alarm system.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The installed systems are functional.

2. The present systems meet NRC Licensing commitments.

3. Increased surveillance frequencies have been implemented to ensure operability of the present system.

4. Alternative shutdown capability will be provided prior to restart of each unit outside the control building so that a fire in the building will not prevent safe shutdown.

PROJECT NUMBER: 21B

NAME: Control Building - Upgrade Compartmentation

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to upgrade the compartmentation in the Control Building. The existing walls and floors will be evaluated along with their penetrations (including piping, conduits, ductwork, and doors). Where deficiencies exist, the compartmentation will be upgraded to meet NRC guidelines.

The following problems have been identified:

1. The control room complex is not separated from other areas of the Control Building by 3 hour fire-rated barriers.

2. The main control room is not separated from peripheral rooms in the control room complex by 1 hour fire-rated barriers.

3. The cable spreading room is not separated from other areas of the Control Building by 3 hour fire-rated barriers.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Fire detection is provided throughout the Control Building with the exception of corridors, stairs, lunch room, and computer services room.

2. Fixed fire suppression is provided in all rooms in the control room complex with the exception of corridor, relay room, control room, and lunch room.

3. The spreading rooms on the floor below the control room complex are provided with an automatic fire sprinkler system and a backup fixed CO_2 fire suppression system.

4. Prior to Unit 2 startup, the Control Building will be separated from the Reactor Building and Turbine Building by 3 hour fire-rated barriers.

5. Manual fire fighting capability is provided throughout the Control Building.

6. Alternative shutdown capability will be provided prior to restart of each unit outside the control building so that a fire in the building will not prevent safe shutdown of the plant.

PROJECT NUMBER: 21C

NAME: Control Building -- Upgrade Interior Finishes

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of this project is to minimize the amount of combustibles in the Control Building. Existing interior finishes including light fixtures, floor coverings, wall coverings and ceiling components will be evaluated and replaced with noncombustible materials as required.

The following problems have been identified:

1. Plastic light covers are installed in the Control Building.

2. Combustible carpeting has been installed in the shift engineer's office.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Fire detection has been installed throughout the Control Building with the exception of corridors, stairs, lunch room and computer services room.

2. Fixed fire suppression is provided in all areas of the Control Building containing major amounts of combustibles.

3. Hose stations and extinguishers are provided throughout the Control Building.

4. Alternative shutdown capability will be provided prior to restart of each unit outside the control building so that a fire in the building will not prevent safe shutdown of the plant.

0623g2

PROJECT NUMBER: 22

NAME: CABLE SPREADING ROOM B - SUPPRESSION SYSTEM UPGRADE

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to upgrade the automatic sprinkler system in cable spreading room B. The new systems will meet NFPA 13 guidelines. Present plans are to remove the CO_2 system.

The following problems have been identified:

1. The sprinkler system does not meet NFPA guidelines for sprinkler head location, air supervision, and coverage.

2. The CO_2 system presents life safety hazard for personnel working in the area.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The area is equipped with fire detection which would provide warning in the event of a fire.

2. Manual fire fighting capability is available.

3. The installed systems will function and provide protection.

4. The present systems meet licensing commitments.

5. Alternative shutdown capability will be provided prior to restart of each unit outside the control building so that a fire in the cable spreading room will not prevent safe shutdown.

PROJECT NUMBER: 23

NAME: UNIT 2 TURBINE BUILDING - INSTALL AUTOMATIC SPRINKLER SYSTEMS

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install/modify automatic sprinkler/water spray systems in the unit 2 Turbine Building. Included in this project are wet pipe sprinkler systems under the turbine deck, upgrade of the standpipe system and water supply headers, upgrade/replacement of the turbine head end, lube oil tank, H_2 Seal Oil and RFP Turbine suppression systems; and upgrading/installation of safety related area sprinkler systems. The system will meet NFPA 13, 14, 15, 16 and 16A.

The following problems have been identified:

1. The existing systems (standpipe and water spray) do not meet NFPA guidelines.
2. There is no general area coverage of the Turbine Building.
3. Insurance companies (ANI/NML) are showing increased interest in this protection with the installation of the Sequoyah Nuclear Plant systems.
4. The Turbine Building is a high value area shared by all three units.
5. Safety related cabling on elevation 586 is exposed to a potential fire in the turbine lubricating oil system.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The suppression systems presently installed meet licensing commitments and are in service.
2. Manual fire fighting capability is available.
3. A fire in the turbine building would affect only one train of redundant safe shutdown cables and would not prevent the plant from being safely shutdown.

PROJECT NUMBER: 24

NAME: UNIT 3 TURBINE BUILDING - INSTALL AUTOMATIC SPRINKLER SYSTEMS

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install/modify automatic sprinkler/water spray systems in the unit 3 Turbine Building. Included in this project are wet pipe sprinkler systems under the turbine deck, upgrade of the standpipe system and water supply headers, upgrade/replacement of the turbine head end, lube oil tank, H_2 Seal Oil and RFP Turbine suppression systems; and upgrading/installation of safety related area sprinkler systems. The systems will meet NFPA 13, 14, 15, 16 and 16A.

The following problems have been identified:

1. The existing systems (standpipe and water spray) do not meet NFPA guidelines.

2. There is no general area coverage of the Turbine Building.

3. Insurance companies (ANI/NML) are showing increased interest in this protection with the installation of the Sequoyah Nuclear Plant systems.

4. The Turbine Building is a high value area shared by all three units.

5. Safety related cabling on elevation 586 is exposed to a potential fire in the turbine lubricating oil system.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The suppression systems presently installed meet licensing commitments and are in service.

2. Manual fire fighting capability is available.

3. A fire in the turbine building would affect only one train of redundant safe shutdown cables and would not prevent the plant from being safely shutdown.

PROJECT NUMBER: 25

NAME: HVAC - SMOKE/HEAT CONTROL UPGRADE - SAFETY RELATED BUILDINGS

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The project will evaluate and where needed install or modify smoke control/HVAC systems for the protection of the safety related areas.

The following problems have been identified:

1. The Reactor Building, Control Building, and Diesel Generator Building HVAC were not designed for smoke and heat removal.

2. Systems have not been installed for smoke/heat removal that meet NFPA guidelines.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Under the original design criteria, there were no requirements for smoke/heat removal.

2. Manual smoke/heat removal capability is available using portable fans, generators, and ducts.

3. The existing HVAC systems will be used for smoke/heat removal when available.

PROJECT NUMBER: 26

NAME: STANDBY GAS TREATMENT SYSTEM - INSTALL FIRE DETECTION

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install a fire detection/alarm system in the building, and provide additional detection capability on the charcoal filters. NFPA code 72D and 72E guidelines will be used to: Install new detectors, wiring, and local control panels.

The following problems have been identified:

1. The building is remote and not continually manned.

2. Loss of the building would affect operations.

3. A fire in the charcoal filters is difficult to detect and to suppress unless early notification is received.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present configuration meets BFN Licensing commitments.

2. Manual fire fighting cability is available.

3. A fire in the Standby Gas Treatment Building would have no impact on safe shutdown capability for the plant.

PROJECT NUMBER: 27A

NAME: UNITS 1 & 2 DIESEL GENERATOR BUILDING - SUPPRESSION SYSTEM UPGRADE

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to replace the Unit 1 and 2 Diesel Generator Building CO_2 fire suppression system with a AFFF Preaction sprinkler system. The replacement is to be reviewed prior to project installation, since with minor modifications, the CO_2 system could remain. New systems, if installed, will meet NFPA 13, 16, and 16A guidelines.

The following problems have been identified:

1. The CO_2 systems present life safety hazard for personnel working in the area.
2. The control system does not meet present NFPA guidelines for detection systems.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present suppression system meets Licensing commitments.
2. The present system will function properly in the event of a fire.
3. Manual fire fighting capability is available.
4. A fire in the Unit 1 and 2 diesel generator building will not affect the ability to safely shutdown the plant using equipment located in the Unit 3 diesel generator building.

PROJECT NUMBER: 27B

NAME: Units 1 and 2 Diesel Generator Building - Upgrade Compartmentation

PROJECT START DATE: Implementation and scheduling of this project will b evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to upgrade the compartmentation in the Units 1 and 2 Diesel Generator Building. The existing walls and floors will be evaluated along with their penetrations (including pipes, conduits, cable tray, ductwork and doors). Where required, the compartmentation will be upgraded to meet NRC guidelines.

The following problems have been identified:

1. The individual diesel generator rooms (including associated auxiliary board rooms and air intake and exhaust plenums) are not separated from each other by 3 hour rated walls.

2. All rooms within a single Diesel Generator Building are part of the same fire area.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Automatic fire detection and suppression is provided in the diesel generator rooms, diesel auxiliary board rooms, and tunnels.

2. Prior to Unit 2 restart the Diesel Generator Building will be separated from the Reactor Building by 3 hour fire-rated barriers.

3. Manual fire fighting capability is provided throughout the diesel generator building.

4. A fire in the Units 1 and 2 Diesel Generator Building will not affect the ability to safely shutdown the plant using equipment located in the Unit 3 Diesel Generator Building.

0623g4

PROJECT NUMBER: 28

NAME: CONTROL BUILDING ELEVATION 593' - SUPPRESSION SYSTEM UPGRADE

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to review the fire suppression systems on the 1C level of the control building. The areas presently protected by CO_2 protection will be reviewed and under present policies replaced with Halon 1301 gaseous suppression systems.

The following problems have been identified:

1. The present CO_2 control system does not meet present NFPA guidelines for detection systems.

2. The CO_2 systems present an unnecessary life safety hazard for personnel working in the area.

The existing situation will be adequate for continued operation unit the upgrade program is completed due to the following:

1. The CO_2 systems are operational and provide protection.

2. The present configuration meets NRC licensing commitments.

3. Manual fire fighting capability is available

4. Alternative shutdown capability will be provided prior to restart of each unit outside the control building so that a fire in the building will not prevent safe shutdown.

PROJECT NUMBER: 29

NAME : UNIT 1 TURBINE BUILDING - INSTALL AUTOMATIC SPRINKLER SYSTEMS

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install/modify automatic sprinkler/water spray systems in the Unit 1 Turbine Building. Included in this project are; wet pipe sprinkler systems under the turbine deck; upgrade of the stand pipe system and water supply headers; upgrade/replacement of the turbine head end, lube oil tank, H_2 Seal oil and RFP turbine suppression systems; and upgrading/installation of safety related area sprinkler systems. The systems will meet to NFPA 13, 14, 15, 16, and 16A.

The following problems have been identified:

1. The existing systems (standpipe and water spray) do not meet NFPA guidelines.

2. There is no general area coverage of the Turbine Building.

3. Insurance companies (ANI/NML) are showing increased interest in this protection with the installation of the Sequoyah Nuclear Plant systems.

4. The Turbine Building is a high value area shared by all three units.

5. Safety-related cabling on elevation 586 is exposed to a potential fire in the turbine lubricating oil system.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The suppression systems presently installed meet licensing commitments and are in service.

2. Manual fire fighting capability is available.

3. A fire in the Turbine Building would affect only one train of redundant safe shutdown cables and would not prevent the plant from being safely shutdown.

PROJECT NUMBER: 30

NAME: ANCILLARY FACILITIES-FIRE PROTECTION PUMP UPGRADE

PROJECT START DATE: IMPLEMENTATING AND SCHEDULING OF THIS PROJECT WILL BE EVALUATED UNDER I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to replace the existing diesel fire pump for the ancillary facility fire protection system with a larger capacity pump. The installation will be in accordance with NFPA 20.

The following problems have been identified:

1. The present fire pump has not met original procurement specification flow requirements.

2. The present design flow capacity (1500 gpm) may be inadequate to meet flow requirements for future/planned facility additions.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The installed systems will meet current flow demand requirements.

2. The fire pump does not supply safety-related areas, and does not supply the main fire protection water loop.

3. The second fire pump should be in operation by mid-1988 providing an adequate main flow capability.

4. This project has no impact on safe operation or shutdown of the plant.

1375d-5

PROJECT NUMBER: 31

NAME: RADWASTE BUILDING - INSTALL AUTOMATIC SPRINKLER SYSTEM

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install an automatic sprinkler system in the Radwaste Building to NFPA 13 guidelines. There is presently no automatic suppression system located in this building.

The following problems have been identified:

1. The area handles a large quantity of combustible materials.

2. A major fire in the area could create a limited radiation contamination problem.

3. The building does not meet industry fire protection guidelines for loss control.

The existing situation will be adequate for continual operation until the upgrade program is completed due to the following:

1. Manual fire fighting capability is available.

2. A fire in the Radwaste Building would have no impact on safety-related equipment or on safe shutdown capability for the plant.

PROJECT NUMBER: 32

NAME: RECORD STORAGE ROOM - SUPPRESSION SYSTEM UPGRADE

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The project will install fire detection and suppression systems in the Turbine Building Record Storage Room. The room is presently protected with a CO_2 system. As part of the engineering analysis and a review of the status of the CO_2 systems, the decision will be finalized as to the possible replacement of the present system. The work will include, installation of a new fire detection/alarm system including detectors, wiring, and a local fire panel which will be compatible with the new site-wide fire detection/alarm system. The new alarm panel will provide alarm capabilities not now available, including supervised alarm circuits, distinctive audible annunciation, and central reporting.

The following problems have been identified:

1. The present system provides limited information to the control room, and at the local panel.

2. With the existing local fire panel, the present system will not be compatible with the new alarm capabilities.

3. The CO_2 system presents an unnecessary life safety hazard to TVA personnel working in the area.

The existing situation will be adequate for continual operation until the upgrade program is completed due to the following:

1. The installed CO_2 system provides adequate fire protection for the room.

2. The present fire alarm/detection system are functional.

3. A fire in the record storage room would have no impact on safety-related equipment or on safe shutdown capabilities.

PROJECT NUMBER: 33

NAME: SERVICE BUILDING-INSTALL AUTOMATIC SPRINKLER

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The project is for new fire detection/alarm and automatic sprinkler systems in the Service Building. Presently, only the high hazard areas of the building are provided with suppression and detection systems. Included as part of the new systems, in addition to the detectors will be new wiring, and a local fire panel. The new panel will provide alarm capabilities not now available, including supervised alarm circuits, distinctive audible annunciation, and central reporting. This panel will be part of the site-wide fire detection/alarm system upgrade program. A wet pipe sprinkler system will be installed throughout the building.

The following problems have been identified:

1. The present system provides limited information to the control room, and at the local panel.

2. The existing local fire panel will not be compatible with the new site-wide alarm.

3. The building without sprinkler protection provides a serious exposure to important drawings and documents.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The installed systems are functional.

2. A fire in the Service Building would have no impact on safety-related equipment or on safe shutdown capabilities for the plant.

PROJECT NUMBER: 34

NAME: GENERAL SITE COMPLETION - FIRE DETECTION/ALARM SYSTEMS

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to complete the general plant-wide fire detection/alarm system upgrade by installing new local fire panels, detectors and wiring in buildings not covered as part of other major projects. These buildings would include the Temporary Design Services Buildings, and Contractor Trailers. The new equipment will meet NFPA 72 Series guidelines.

The following problems have been identified:

1. The present systems are not compatible with the new site-wide alarm system.

2. The temporary facilities house documents that are important to BFN restart and continued operation.

3. Systems do not meet the guidelines of the NFPA 72 Series.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Most areas are protected by either fire detection or sprinkler systems.

2. Public Safety provides a roving patrol.

3. The facilities are temporary and may be replaced prior to project implementation.

4. A fire in these areas would have no impact on safety-related equipment or on safe shutdown capability.

PROJECT NUMBER: 35A

NAME: UNIT 3 DIESEL GENERATOR BUILDING - SUPPRESSION SYSTEM UPGRADE

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to replace the Unit 3 Diesel Generator Building CO_2 fire suppression system with a AFFF Pre-Action sprinkler system. The replacement is to be reviewed prior to project installation, since with minor modifications, the CO_2 system could remain. New systems will meet NFPA 13, 16, and 16A guidelines.

The following problems have been identified:

1. The CO_2 systems present a life safety hazard for personnel working in the area.

2. The control system does not meet present NFPA guidelines for fire detection systems.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present system meets NRC Licensing commitments.

2. The present system will function properly in the event of a fire.

3. Manual fire fighting capability is available.

4. A fire in the Unit 3 diesel generator building will not affect the ability to safely shutdown the plant using equipment located in the Unit 1 and 3 diesel generator building.

PROJECT NUMBER: 35B

NAME: Unit 3 Diesel Generator Building - Upgrade Compartmentation

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to upgrade the compartmentation in the Unit 3 Diesel Generator Building. The existing walls and floors will be evaluated along with their penetrations (including pipes, conduits, ductwork and doors). Where required, the compartmentation will be upgraded to meet NRC guidelines.

The following problems have been identified:

1. The individual diesel generator rooms (including associated auxiliary board rooms and air intake and exhaust plenums) are not separated from each other by 3 hour rated walls.

2. All rooms within a single Diesel Generator Building except the shutdown board rooms are part of the same fire area.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Automatic fire detection and suppression is provided in the diesel generator rooms, diesel auxiliary board rooms, and tunnels.

2. Prior to Unit 2 restart the Diesel Generator Building will be separated from the Reactor Building by 3 hour fire-rated barriers.

3. Manual fire fighting capability is provided throughout the diesel generator building.

4. A fire in the Unit 3 Diesel Generator Building will not affect the ability to safely shutdown the plant using equipment located in the Units 1 and 2 Diesel Generator Building.

0623g3

PROJECT NUMBER: 36

NAME: TURBINE BUILDING/SWITCH YARD CABLE TUNNEL - INSTALL FIRE DETECTION/ALARM AND SUPPRESSION SYSTEMS

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install a preaction sprinkler system and fire detection system in the Turbine Building/Switch yard cable tunnel to protect the main feeder cables. The new systems will meet NFPA 13, 72D and 72E.

The following problems have been identified:

1. Fire suppression and detection systems have not been provided in the cable tunnel.

2. The problem has been identified as a generic issue and is an Employee Concern from Bellefonte.

3. A fire in the cable tunnel could result in a significant economic loss and would be difficult to manually fight.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Manual fire fighting capability is available.

2. A fire in the cable tunnel would have no impact on safety-related equipment or no safe shutdown capabilities for the plant.

PROJECT NUMBER: 37

NAME: UPGRADE OUTSIDE OIL STORAGE TANK PROTECTION

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The project will install as part of the diesel fuel oil and lubricating oil storage tank installation; a subsurface tank fire suppression system, regrade the truck unloading area, install protective drains/pumps by the truck unloading area, upgrade and replace as required the storage tank relief venting, lightning protection, and pumps/piping. The subsurface tank fire suppression system will meet NFPA 11.

The following problems have been identified:

1. Spills from a tank truck could flow toward the Intake Pump Station.

2. There is no fixed fire protection for the tanks.

3. Tank piping, venting and lightning protection is in need of a detailed review.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. A dike is provided around the fuel oil and lubricating oil storage tanks.

2. Manual fire fighting capability is available.

3. A fire in this area would not affect safe shutdown capability.

PROJECT NUMBER: 38

NAME: UNIT 3 TURBINE BUILDING - INSTALL FIRE DETECTION/ALARM SYSTEM

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install new fire detection alarm systems throughout the Turbine Building area. This system will supplement the automatic sprinkler systems planned under project 24. The detection/alarm system is planned to include turbine deck protection in addition to the other elevations. The fire panels and equipment, will be compatible with the new site fire alarm system.

The following problems have been identified:

1. The area is a high value area with significant fire hazards associated with the turbine lubrication systems.

2. Fire detection general area coverage has not been provided.

3. All areas of the turbine building cannot be protected by automatic sprinkler systems.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The existing fire protection features meet licensing commitments and are in service.

2. Manual fire fighting capability is available.

3. A fire in the turbine building would affect only one train of redundant safe shutdown cables would not prevent the plant from being safely shutdown.

PROJECT NUMBER: 39

NAME: EAST PORTAL BUILDING - INSTALL SUPPRESSION AND FIRE DETECTION

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install automatic sprinklers/halon 1301 systems and a fire alarm/detection systems in the East Portal Building. The systems are planned in order to protect the Health Physics areas which contain radiation monitoring equipment and records. The systems will be designed to meet the guidelines of NFPA 13, 12A, and the 72 series.

The following problems have been identified:

1. There is no fire detection/alarm or automatic sprinkler systems in the building.

2. The building is of temporary construction providing limited fire resistance.

3. Loss of the Health Physics area could detrimentally affect plant operation.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The building is manned 24 hours a day.

2. Manual fire fighting capability is available.

3. A fire in the building would have no affect on safety-related equipment or on safe shutdown capability.

PROJECT NUMBER: 40

NAME: SITE CENTRAL ALARM PANEL - FIRE HOUSE AND PUBLIC SAFETY

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.To be determined

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to complete the site wide fire alarm system. The project will install the remaining required signal lines from the outlying buildings to the power house area and provide the site-wide central monitoring panels in the Fire House. The system will be installed in accordance with the NFPA 72 series. All fire alarm/detection systems on the site will be monitored from these locations with maintenance, troubleshooting and alarm response.

The following problems have been identified:

1. There is no central alarm system for the entire site.

2. Outlying areas require manual alarm transmission increasing response time.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present configuration meets BFN Licensing Commitments.

2. A fire in outlying buildings would have no affect on safety-related equipment or on safe shutdown capabilities for the plant.

PROJECT NUMBER: 41

NAME: UNIT 2 TURBINE BUILDING - INSTALL FIRE DETECTION/ALARM SYSTEM

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to install new fire detection/alarm systems throughout the Turbine Building area. This system will supplement the automatic sprinkler systems planned under project 23. The detection/alarm system is planned to include turbine deck protection in addition to the other elevations. The fire panels and equipment, will be compatible with the new site fire alarm system.

The following problems have been identified:

1. The area is a high value area with significant fire hazards associated with the turbine lubrication systems.

2. Fire detection general area coverage has not been provided.

3. All areas of the turbine building cannot be protected by automatic sprinkler systems.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The existing fire protection features meet licensing commitments and are in service.

2. Manual fire fighting capability is available.

3. A fire in the turbine building would affect only one train of redundant safe shutdown cables and would not prevent the plant from being safely shutdown.

PROJECT NUMBER: 42

NAME: TRANSFORMER/SWITCH YARD - UPGRADE SUPPRESSION SYSTEM

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The project intends to upgrade the existing water fire suppression systems in the switch yard and the transformer yard. NFPA 15 and 16 guidance will be used to: Correct improper water spray head location; Upgrade existing water supply piping; Install new piping, heads, valves and risers as required, and relocate the risers to safer operating areas; and upgrade the systems as required with an AFFF foam system.

The following problems have been identified:

1. The control valves are located in unsafe and potentially inaccessible areas during an emergency.

2. The system contains unlisted equipment.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The existing suppression equipment is operable.

2. Manual fire fighting capability is available.

3. A fire in the transformer/switch yard would have no affect on safety related equipment or on safe shutdown capability.

PROJECT NUMBER: 43

NAME: FIRE HOUSE/FIRE PROTECTION BUILDING

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The purpose of the project is to provide a new building for the fire apparatus, ambulance, and fire protection group. The building will also be used as the central dispatch, fire protection equipment maintenance shop and storage, special training facility, and administrative facility.

The following problems have been identified:

1. There is no central for the fire protection group facility.

2. The fire apparatus is not centrally located.

3. The present storage and maintenance areas are inadequate for the intended purpose.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Temporary facilities are being provided for the fire protection group.

2. The present operation meets BFN licensing commitments.

3. This project does not affect safe operation or shutdown of the plant.

PROJECT NUMBER: 44

NAME: POWER STORES WAREHOUSE - AUTOMATIC SPRINKLER SYSTEM

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The project will install automatic wet pipe sprinkler systems in the areas of the Power Stores Warehouse that do not have sprinkler systems. The systems will be installed to NFPA 13 guidelines.

The following problems have been identified:

1. Critical parts, stores, materials are exposed to a potential fire hazard.

2. TVA policy is to protect high value facilities.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Fire detection is installed in some areas, providing early warning capability.

2. Manual fire fighting capability is available.

3. A fire in the Power Stores Warehouse would have no impact on safety related equipment or on safe shutdown capability of the plant.

PROJECT NUMBER: 45

NAME: MARK FIRE EXITS/ROUTES

PROJECT START DATE: Implementation and scheduling of this project will be evaluated under I.S.A.P.

PROJECT COMPLETION:

PROJECT DESCRIPTION: The project will provide the required markings, signs, and lights to guide plant personnel to the nearest fire exist in the event of an emergency.

The following problems have been identified:

1. The plant does not have properly marked fire exit/route throughout the plant.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The plant has restricted access.

2. Existing "To Assembly Area" markings provide limited exit marking.

3. This project has no affect on safe operation or shutdown of the plant.

Project Number: 46

Name: HYDROGEN TRAILER PORT-SUPPRESSION/DETECTION UPGRADE

Project Start Date: Implementation and scheduling of this project will be evaluated under I.S.A.P.

Project Completion:

PROJECT DESCRIPTION: The project proposes to upgrade/replace the existing fire detection and fire suppression systems. NFPA codes 13 and 15 will be used to install new water spray heads and piping as required. A new fire detection/alarm system will be installed using the NFPA 72D and 72E as guidelines of the NFPA 72 series.

The following problems have been identified

1. The existing fire detection/alarm and suppression systems do not meet NFPA code guidelines.

2. The water spray system has unlisted components installed.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present system will function in the event of a fire.

2. Manual fire fighting capability is available.

3. The Hydrogen Trailer Port is well separated from structures containing safety-related equipment.

4. The Hydrogen Trailer Port is aligned and barriers provided to minimize the possibility of missiles from a trailer failure from damaging structures containing safety-related equipment.

5. A fire in the Hydrogen Trailer Port would have no impact on safe shutdown capabilities for the plant.

Project Number: 47

Name: TRANSFORMER/SWITCH YARD-UPGRADE FIRE DETECTION/ALARM SYSTEM

Project Start Date: Implementation and scheduling of this project will be evaluated under I.S.A.P.

Project Completion:

Project Description: The project is intended to upgrade/replace the existing fire detection/alarm system now installed. NFPA 72D and 72E codes and guidance will be used to; Correct improper detector head location; install new detector heads, wiring, and local control panels to correct any supervision, listing, and operation problems; and extend the fire detection system into areas as required.

The following problems have been identified

1. The present system provides minimal information to the control room, and does not meet NFPA 72D and E guidelines.

2. The present system will not be compatible with the new alarm capabilities.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present fire detection system is operable and provides suppression system actuation capability.

2. Manual fire fighting capability is available.

3. A fire in the transformer/switch yard would have no affect on safety-related equipment or on safe shutdown capability.

Project Number: 48

Name: HVAC-SMOKE/HEAT CONTROL UPGRADE - NON-SAFETY RELATED BUILDINGS

Project Start Date: Implementation and scheduling of this project will be evaluated under I.S.A.P.

Project Completion:

Project Description: The project will evaluate and where necessary install or modify smoke control/HVAC systems for the protection of non-safety-related buildings.

The following problems have been identified

1. HVAC systems for non-safety-related buildings were not designed for smoke and heat removal.

2. Systems have not been installed for smoke/heat removal that meet NFPA guidelines.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. Under the original design criteria, there were no requirements for smoke/heat removal.

2. Manaual smoke/heat removal capability is available using portable fans, generators, and ducts.

3. The existing HVAC systems will be used for smoke/heat removal when available.

4. Smoke/heat removal capability for non-safety-related building has no impact on safe operation or shutdown of the plant.

Project Number: 49

Name: RADWASTE BUILDING-INSTALL FIRE DETECTION/ALARM SYSTEM

Project Start Date: Implementation and scheduling of this project will be evaluated under I.S.A.P.

Project Completion:

Project Description: The purpose of the project is to install a fire detection system in the Radwaste Building. Included in addition to the detectors will be new wiring, and a local fire panel. The alarm panel will provide alarm capabilities including supervised alarm circuits, distinctive audible annunciation, and central reporting. This panel will be part of the site wide fire detection/alarm system upgrade program.

The following problems have been identified

1. The building is not equipped with fire alarm/detection capability.
2. The area stores/handles large quantities of combustible materials.
3. A fire could create a radiation contanination problem in the area.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. A fire in the Radwaste Building would have no impact on safety-related equipment or on safe shutdown capability for the plant.

Project Number: 50

Name: UNIT 1 TURBINE BUILDING - INSTALL FIRE DETECTION/ALARM SYSTEMS

Project Start Date: Implementation and scheduling of this project will be evaluated under I.S.A.P.

Project Completion:

Project Description: The purpose of the project is to install new fire detection/alarm systems throughout the turbine building area. This system will supplement the automatic sprinkler systems planned under project 30. The detection/alarm system is planned to include turbine deck protection in addition to the other elevations. The fire panels, etc. will be compatible with the new site fire alarm system.

The following problems have been identified:

1. The area is a high value area with significant fire hazards associated with the turbine lubrication systems

2. Fire detection general area coverage has not been provided.

3. All areas of the turbine building can not be protected by automatic sprinkler systems

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The existing fire protection features meet licensing commitments and are in service.

2. Manual fire fighting capability is available.

3. A fire in the turbine building would affect only one train of redundant safe shutdown cables and would not prevent the plant from being safely shutdown.

Project Number : 51

Name : FIRE PROTECTION WATER SYSTEM UPGRADES

Project Start Date : Implementation and scheduling of this project will be evaluated under I.S.A.P.

Project Completion :

Project Description: The project will upgrade/replace the fire protection water supply control valves to meet the requirements of BTP CMEB 9.5-1, section C.6.b and c. NFPA 24 guidance will be used to upgrade the system.

The following problems have been identified:

1. The system has non-indicating valves.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The present non-indicating valves do not interfere with proper operation of the fire protection system.

2. The use of non-indicating valves in the fire protection water system would have no affect on safe operation and shutdown of the plant.

Project Number : 52

Name : OFFICE BUILDING - INSTALL AUTOMATIC SPRINKLER SYSTEMS

Project Start Date : Implementation and scheduling of this project will be evaluated under I.S.A.P.

Project Completion :

Project Description: The project will install automatic sprinkler systems in the Temporary Administration and Modifications Buildings. The systems will be installed as part of the BFN fire protection upgrade, and protection of buildings and will meet NFPA 13 guidelines.

The following problems have been identified:

1. A fire in the buildings could cause the loss of critical documents that could affect BFN restart and future operations.

2. The present fire detection systems will not be compatible with the new site-wide alarm/detection system.

The existing situation will be adequate for continued operation until the upgrade program is completed due to the following:

1. The existing detection systems are functional.

2. Manual fire fighting capability is available.

3. A fire in either of the office buildings would have no affect on safety-related equipment or on safe shutdown capability for the plant.

PRIOR COMMITMENT EVALUATION

BROWNS FERRY NUCLEAR PLANT

PRIOR COMMITMENT EVALUATION

BROWNS FERRY NUCLEAR PLANT

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CONTENTS

I. INTRODUCTION

A. PURPOSE

The purpose of this report is to identify previous commitments related to the fire protection program and to correlate those commitments to current fire protection submittals. A primary objective of the correlation is to support the Fire Protection Report as a new basis for meeting the fire protection requirements of the Nuclear Regulatory Commission (NRC). All current commitments are contained in the Fire Protection Report and all prior commitments are either incorporated into the report or they are to be superseded. Since the Fire Protection Report is to provide a new baseline, the discussion of prior commitments is general rather than detailed. A separate license revision will also be submitted to specifically modify or update those commitments which are included in the license.

B. SCOPE

This report identifies the current status of all fire protection commitments. Section II of the evaluation report addresses the "Plan for Evaluation, Repair, and Return to Service of Browns Ferry Units 1 and 2 as a result of the March 22, 1975, Fire" (Fire Recovery Plan, Reference 1). Section III addresses additional commitments made outside of the Fire Recovery Plan.

II. SUMMARY OF FIRE RECOVERY PLAN COMMITMENTS

A. COMPARTMENTATION

A number of commitments were made to provide fire barrier separations in areas of the plant containing safety-related equipment. These commitments have been documented in the Fire Recovery Plan and in subsequent letter submittals. As part of the 10CFR50 Appendix R review, TVA has thoroughly reviewed the fire areas and fire zones needed to support the safe shutdown of the BFN units. The results of this review were presented to the NRC in the 10CFR50 Appendix R submittal titled "Fire Protection and Safe Shutdown Systems Analyses Report for Browns Ferry Nuclear Plant - TVA" (NEDC-31119) Section 7.2 (Reference 4).

The BFN Fire Hazards Analysis, contained in Section IV of the Fire Protection Report further supports the compartmentation plan by describing the overall combustible loading for each fire area and fire zone, the barriers which separate the area or fire zone from its adjacent fire area or fire zone, and the safe shutdown systems which could be affected by a fire in the fire area or zone.

Results of the Fire Hazards Analysis are presented in a standard format, with combustible loading in paragraph 4.1 of each fire area or fire zone evaluation, fire area boundaries in paragraph 4.4 of each fire area evaluation, fire zone boundaries in paragraph 3 of each fire zone evaluation, and safe shutdown system analyses in Section 5 of each fire area or fire zone evaluation.

The objectives of the 1986 compartmentation plan are the same as those of the 1975 and subsequent commitments, i.e., the prevention of fire spread so as to assure the ability to achieve and maintain safe shutdown. Based on this, TVA considers NEDC-31119 to fully supersede prior fire barrier commitments. This includes the commitments for fire-rated protective devices for doorways, ventilation openings, electrical and mechanical penetrations, or any other openings through previously identified fire barriers that are no longer required by NEDC-31119.

Superseding fire rating requirements for a specific sealing device does not alter other requirements for the device, since it may serve other purposes that are still required, such as pressure or flood barriers.

B. FIRE PROTECTION SYSTEMS

1. Sprinkler System Design Criteria

The Fire Recovery Plan, Part X, Section 5.2.2, established a design basis for the pre-action automatic sprinkler systems which required a minimum discharge density of 0.30 gallons per minute per square foot (gpm/sq ft) with all sprinklers in a 5,000 square foot area operating. NEDC-31119, Section 8.1.2, established an alternate design basis for general area sprinkler protection of 0.16 gpm/sq ft with an operating area of 1500 square feet. According to the same reference, water curtains are to be designed to provide 3 gpm per linear foot of opening, with a minimum of 15 gpm from any individual sprinkler. The revised sprinkler design density is fully consistent with National Fire Protection Association (NFPA) requirements for ordinary hazard group 1 occupancies, and provides adequate suppression capability for the fire hazards in the areas protected by the sprinklers. TVA considers that NEDC-31119 superseded prior commitments regarding sprinkler system design basis.

2. Open-Head Fixed Water Spray Systems

The Fire Recovery Plan, Part X, Section 5.2:1, committed to the installation of open-head fixed water spray systems protecting cable tray installations in a number of specified locations throughout the facility. NEDC-31119 provided a safe shutdown method that did not rely on the cable tray water spray systems to achieve separation between redundant equipment. Accordingly, TVA considers that NEDC-31119 establishes the basis to supersede prior commitments regarding cable tray water spray systems. However, since the cable tray systems are specifically required by BFN technical specifications, the commitments remain effective until a technical specification change is submitted and approved by the NRC.

3. Carbon Dioxide Suppression Systems

The carbon dioxide systems installed in the plant predate the Fire Recovery Plan, but numerous commitments were made in the Fire Recovery Plan and subsequent letter submittals in regard to revising control logic for automatic versus manual operation, provision of odorizers, floor drain seals, etc. These commitments are fully incorporated in the Fire Protection Plan, Section 4.9. Thus, TVA considers the Fire Protection Report to supersede the prior commitment documents by restating the commitments.

4. Fire Detection, Annunciation, and Initiation Systems

The Fire Recovery Plan, Part X, Section 5.3, committed to the installation of fire detectors in various areas of the plant. The fire detection system described in Section 4.4 of the Fire Protection Plan incorporates these commitments, and provides additional detection in excess of the prior commitments. TVA considers the Fire Protection Report to supersede the prior fire detection commitment documents by restating or expanding the commitments. The upgrade plans contained in the Fire Protection Report Supplement commit to the replacement of the existing fire alarm system with a new system which meets the criteria established in NFPA standards. Implementation of the upgrade commitments will fully supersede the fire detection, annunciation, and initiation system commitments.

C. ELECTRICAL DESIGN CHANGES

The Fire Recovery Plan, Part X, Section 3, identified a number of electrical design changes to prevent spurious operation of safety-related equipment. These changes have been implemented and were taken into consideration by the rigorous safe shutdown analysis described in NEDC-31119. NEDC-31119 establishes current safe shutdown system requirements, minimum safe shutdown equipment, and associated electrical circuitry. Since the objectives of the current submittal are the same as those of the Fire Recovery Plan, TVA considers NEDC-31119 to fully supersede prior electrical design change commitments.

Prior commitments for separation between Main Steam Relief Valve (MSRV) cabling warrant specific mention. The analysis presented in NEDC-31119 is based on the availability of any three MSRVs. Modifications have been identified to ensure the availability of three MSRVs for any postulated fire. These modifications are included in the commitment to complete all Appendix R modifications prior to restart of the affected unit.

D. DRYWELL CONTROL AIR SYSTEM

The Fire Recovery Plan, Part X, Section 6.0, made commitments to modify the drywell control air system to assure an uninterrupted air supply to the MSRVs. Modifications made to implement this commitment are incorporated in Section 10.14 of the Final Safety Analysis Report (FSAR). NEDC-31119 established an additional commitment to use Containment Atmosphere Dilution (CAD) nitrogen supply as a backup source of pressure for the drywell control air system. TVA considers the FSAR and NEDC-31119 to fully incorporate the prior drywell control air commitments.

E. PORTABLE BREATHING APPARATUS

The Fire Recovery Plan, Part X, Section 7.0, commited to providing recharge capability for self contained breathing apparatus. Paragraph 4.14 of the Fire Protection Plan provides alternate commitments which are fully consistent with the guidelines of the NRC Branch Technical Position CMEB 9.5-1 "Fire Protection for Nuclear Power Plants" (BTP CMEB 9.5-1). TVA considers the current submittal to fully supersede the prior breathing apparatus commitments.

F. LIGHTING SYSTEMS

The Fire Recovery Plan, Part X, Section 8.3, established commitments for the plant emergency lighting system, using the 250 volt direct current station batteries. These lights remain in service but TVA no longer takes credit for them as providing emergency lighting under fire conditions. In order to meet the requirements of Appendix R, TVA chose to provide 8-hour battery pack emergency lights. These lights facilitate manual actions for safe shutdown, and illuminate access and egress routes to fire areas containing safe shutdown equipment. This approach is consistent with BTP CMEB 9.5-1. Accordingly, TVA considers NEDC-31119 to fully supersede the prior commitment regarding emergency lighting under fire conditions. Commitments in Section 8.4 to provide hand held lighting for fire brigade use are incorporated in Section 4.11 of the Fire Protection Plan.

G. VENTILATION

The Fire Recovery Plan, Part X, Section 9.0, establishes commitments for ventilation of the Reactor Buildings, Cable Spreading Rooms, Main Control Rooms, Shutdown Board Rooms, and backup control systems. Ventilation for purposes of smoke control and ventilation functions related to contamination control and secondary containment under fire conditions are discussed in Section 4.12 of the Fire Protection Plan. Other ventilation requirements are discussed in Sections 5.3 (for the reactor building) and 10.12 (for other buildings) of the FSAR. TVA considers the contents of the Fire Protection Report and the FSAR to fully incorporate the prior ventilation commitments.

H. FIRE PROTECTION ADMINISTRATIVE CONTROLS

The Fire Recovery Plan, Part X, Section 1.2, and Part XII, establish various commitments for fire protection administrative controls. As administrative programs have been refined and improved, and additional or revised regulatory guidelines and requirements have been promulgated, TVA has modified its administrative control system. The current administrative activities are discussed in the Fire Protection Plan, Sections 3.0 and 7.0. These activities are consistent with both current regulatory requirements and with the objectives of the previous commitments. TVA considers the current plan to fully supersede all prior administrative commitments.

I. FIRE HAZARD AND IMPAIRMENT ANALYSES

The Fire Recovery Plan, Part X, also contained the Fire Hazard Analysis and an analysis of potential impairments to the High Pressure Fire Protection System (HPFP) and the Carbon Dioxide system. As previously stated, the current Fire Hazard Analysis is presented in Section IV of the Fire Protection Report. One item discussed in the prior analysis (the possible accumulation of hydrogen in the Battery Rooms) was determined to be inappropriate for inclusion in the current Fire Hazard Analysis, since the current analysis dealt with probable fire severity and potential impact on safe shutdown capability, not on potential fire causes. This issue is discussed in Section 4.12 of the Fire Protection Plan. The impairment analysis identified several modifications to assure that no single impairment could unacceptably degrade or disable fire protection for the plant. The identified modifications were made, and remain a part of the plant design basis. There are no outstanding commitments in this section of the Fire Recovery Plan.

J. MISCELLANEOUS

Other information addressed in the Fire Recovery Plan included:

1. Fire investigation reports and descriptions of the events that occurred prior to, during, and after the fire.

2. Program to identify the post-fire condition of the plant and actions taken to obtain and maintain a safe shutdown status.

3. Program for sampling, analysis, and cleanup of residue from the fire.

4. Programs for identifying and repairing fire damaged electrical equipment and cables, structures, and mechanical equipment.

5. Program for evaluating and repairing damage to the primary containment structure.

6. Program for component and system retests.

7. Description of the quality assurance plan for the fire restoration efforts.

8. Schedule for accomplishing the Fire Recovery Plan activities.

This information described one-time activities that TVA committed to perform to support the restart of the fire affected units. The activities have no ongoing applicability and are of historical interest only.

III. INDIVIDUAL COMMITMENT DOCUMENTS

A. MAJOR DOCUMENTS

This section of the evaluation of prior commitments discusses the major commitment documents since the Fire Recovery Plan, provides a general description of the documents and the commitments made therein, and states the current document which incorporates or supersedes the commitments.

1. "Safety Evaluation by the Division of Operating Reactors Supporting the Operation after the Restoration and Modification of Browns Ferry Nuclear Plant, Units 1 and 2 Following the March 22, 1975, Fire" dated February 23, 1976.

   GENERAL DESCRIPTION:

   This Safety Evalution Report (SER) describes the fire investigation process followed by TVA and the NRC following the 1975 fire at Browns Ferry, and the overall fire protection re-analysis that was performed. Specific commitments are recorded in the areas of administrative changes, design changes, and component and system retesting, as described in Parts X, XI, and XTT of the Fire Recovery Plan.

   CURRENT STATUS:

   The retest program was a one-time activity to support the restart of the effected units. It has no ongoing applicability. Design changes made at the time have been incorporated or superseded by the current submitals, principally NEDC-31119 and the Fire Protection Plan (see section II above). Current administrative and procedural controls are contained in the Fire Protection Plan, Section 3.0 and 7.0, which supersedes the programs discussed in this SER.

2. "Supplement No. 1 to the Safety Evaluation by the Division of Operating Reactors Supporting the Operation after the Restoration and Modification of the Browns Ferry Nuclear Plant, Units 1 and 2 Following the March 22, 1975, Fire," dated June 18, 1976.

   GENERAL DESCRIPTION:

   Supplement 1 to the SER discussed TVA's approach to quality assurance, technical requirements for water suppression systems, the use of non-supervised detection circuits, and the retest program for fire protection systems and for plant systems that may have been damaged during the 1975 fire. Approval was granted to the Technical Specification for fire protection that TVA had submitted.

This SER also discussed ACRS concerns that had been raised regarding the effect of fire retardant coatings on the cable insulation, the chemical releases from the coating under fire conditions, and the periodic use of an outside auditor to provide an independent overview of TVA's fire protection program.

CURRENT STATUS:

The Quality Assurance program for fire protection is discussed in Section 3.8 of the Fire Protection Plan. This program is consistent with the requirements of BTP CMEB 9.5-1, and supersedes the prior Quality Assurance commitments. The current status of TVA's fire detection and water suppression systems is presented in Section 4.4 and 4.6 of the Fire Protection Plan. TVA considers these current commitments to fully supersede the prior fire detection and water suppression commitments. Section 3.8 of the Fire Protection Plan commits to an audit program in conformance to the requirements of Generic Letter 82-21. This supersedes prior commitments regarding external audits of TVA's fire protection program.

Other commitments reflected in this document were applicable to the restart effort, and to a five year monitoring program for accelerated cable aging. As such, the commitments are no longer applicable.

3. "Supplement No. 2 to the Safety Evaluation by the Division of Operating Reactors Supporting the Operation after the Restoration and Modification of the Browns Ferry Nuclear Plant Units 1 and 2 Following the March 22, 1975, Fire," dated July 3, 1976.

GENERAL DESCRIPTION:

Supplement 2 to the SER described TVA commitments to maintenance of plant procedures for pre-fire plans, housekeeping, and control of cutting and welding activities. The supplement also reviewed training and equipment for the plant fire brigade, and design criteria for manual and automatic sprinkler systems.

CURRENT STATUS:

The current commitments for fire loss prevention and pre-fire planning are presented in Sections 7.0 and 8.0 of the Fire Protection Plan, and fire brigade equipment and training requirements are in Section 8.0 of the plan. Sprinkler system criteria are located in Section 4.6 of the plan. TVA considers these commitments to fully supersede the prior commitments.

4. Safety Evaluation Report related to operation of Browns Ferry Nuclear Plant, Units 1, 2, and 3, supplement 8 dated July 1976, and Supplement 9 dated August 1976.

GENERAL DESCRIPTION:

The post-fire SER (see item 1 above) addressed only units 1 and 2, since unit 3 was not yet in service at the time of the 1975 fire. Supplement 8 of the overall SER incorporated the contents of the post-fire SER and its Supplement 1 into the licensing basis for unit 3, and Supplement 9 incorporated Supplement 2 of the post-fire SER. These two revisions established no new criteria or commitments, but served only to extend the fire recovery requirements equally to unit 3.

CURRENT STATUS:

All requirements of the Fire Protection Report are equally applicable to unit 3.

5. TVA letter from J. E. Gilleland to Benard C. Rushche of the NRC dated December 8, 1975.

GENERAL DESCRIPTION:

This letter discussed TVA's commitment, made in a letter from J. E. Gilleland to Benard C. Rushche dated August 29, 1975, to review the use of fire barriers to separate divisional cables. The conclusion was that such barriers could result in unacceptable cable heating during operation, and/or could reduce the effectiveness of the proposed fixed water spray systems and automatic sprinklers. The letter committed to the use of Flamemastic coating, fixed water spray systems, and pre-action sprinkler systems in specified locations.

CURRENT STATUS:

The commitments regarding the use of "Flamemastic" were revised in a TVA letter from L. M. Mills to H. R. Denton dated October 18, 1984. The revised commitments are reflected in Section 4.16 of the Fire Protection Plan. Current commitments regarding fixed water suppression systems are discussed in Sections II.B.1 and II.B.2 of this evaluation.

6. TVA letter from J. E. Gilleland to Benard C. Rushche of the NRC dated January 21, 1976.

GENERAL DESCRIPTION:

This letter transmitted the recommendations of TVA's fire protection consultant following the 1975 fire and TVA's responses thereto, a review by the consultant of portions of the Fire Recovery Plan, and TVA studies of self-contained breathing apparatus, fire emergency communications, and fire prevention procedures. Specific commitments which extend beyond the reconstruction phase were made in the following areas:

- Control of combustible materials
- Control of ignition sources
- Provision of exit signs
- Installation of Diesel fire pump
- Design and testing of water fire suppression systems
- Design and testing of fire detection and alarm systems
- Installation and maintenance of fire barriers
- Fire brigade organization, training, and equipment
- Replacement of the combustible main control room ceiling
- Periodic audits of the BFN fire protection program

CURRENT STATUS:

Control of combustible materials and ignition sources is incorporated into Section 7.0 of the Fire Protection Plan. The diesel fire pump is discussed in Section 4.5 of the Fire Protection Plan. Current fire barrier compartmentation plans are discussed in Section 4.3 of the Fire Protection Plan, and in Section 7.2 of NEDC-31119. The fire brigade organization, training, and equipment is presented in Sections 3.6 and 8.0 of the Fire Protection Plan. Periodic audit commitments are contained in Section 3.8 of the Fire Protection Plan. TVA considers the current commitments in each of these areas to fully supersede prior commitments.

Current design bases for fire detection systems and water fire suppression systems are discussed in Sections 4.4 and 4.6 of the Fire Protection Plan, respectively. Periodic inspection and surveillance requirements are contained in Section 9.0 of the Fire Protection Plan. TVA considers these current commitments to fully supersede prior commitments in regard to fire detection and water fire suppression. Subsequent commitments contained in TVA's letter from L. M. Mills to R. L. Tedesco (see item 23) revised this letter's commitment regarding the main control room ceiling.

7. TVA letter from J. E. Gilleland to Benard C. Rushche of the NRC dated June 20, 1976.

GENERAL DESCRIPTION:

This letter transmitted the final report of TVA's fire protection consultants and TVA's responses thereto. Specific commitments were made in the following areas:

- fire protection water supply
- fire barriers and compartmentation
- manual fire suppression (portable fire extinguishers and fire hose stations)
- fire alarm and detection systems
- carbon dioxide systems.

CURRENT STATUS:

The fire protection water supply is described in detail in Section 4.5 of the Fire Protection Plan. Current compartmentation plans are discussed in Section II.A of this evaluation. Portable fire extinguishers are provided throughout the plant, as described in Section 4.8 of the Fire Protection Plan. Fire hose stations are discussed in Section 4.7 of the Fire Protection Plan. The current status of carbon dioxide system commitments and fire detection, annunciation, and initiation system commitments are discussed in Sections II.B.3 and II.B.4 of this evaluation, respectively.

TVA considers these current commitments to fully supersede the prior commitments.

8. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated April 21, 1977

GENERAL DESCRIPTION:

This letter submitted a number of specific details justifying the use of non-listed fire doors and frames. It also identified modifications that were needed to upgrade fire doors and frames that could not be justified

CURRENT STATUS:

Current overall compartmentation plans are presented in Section 7.2 of NEDC-31119. Detailed analysis of specific fire doors and fire door frames are included in an evaluation package prepared in accordance with the guidance of Generic Letter 86-10 and maintained on site for review. TVA considers these commitments to be incorporated in the current documentation and the prior commitment document to be superseded.

B. OTHER COMMITMENT DOCUMENTS

This section of the commitment evaluation presents, in date order, the letters from TVA to NRC in which fire protection commitments have been made, and discusses, in the same format as Section III.A, the general description of the correspondence and the current status of the commitments.

1. TVA letter from J. E. Gilleland to N. C. Moseley of the AEC dated August 5, 1974.

   GENERAL DESCRIPTION:

   This letter was related to the design of QA record storage facilities, and listed exceptions to ANSI draft standard 45.2.9. Two exceptions were listed, as follows:

   - The concrete floor is not sloped for drainage,
   - Floor drain pipes for the floor above are routed through the facility.

   CURRENT STATUS:

   The QA record storage facility is described in Section 4.15 of the Fire Protection Plan. This description incorporates the prior commitment, and supersedes the previous document.

2. TVA letter from J. E. Gilleland to Benard C. Rushche of the NRC dated August 29, 1975.

   GENERAL DESCRIPTION:

   This letter issued 10 specific commitments related to the fire recovery activity, covering subjects such as fixed water fire suppression systems, carbon dioxide systems, Flamemastic coating on exposed cables, and fire walls and fire barrier penetration seals.

   CURRENT STATUS:

   Each of the ten commitments was subsequently incorporated into the Fire Recovery Plan. All Fire Recovery Plan commitments have been addressed, as discussed in Section II of this evaluation.

3. TVA letter from J. E. Gilleland to Benard C. Rushe of the NRC dated November 17, 1975.

GENERAL DESCRIPTION:

This letter made only one specific commitment, related to cable tray penetration fire stops.

CURRENT STATUS:

All fire stops at penetrations through fire barriers are discussed in Section II.A of this evaluation. As stated there, NEDC-31119 superseded prior commitments regarding fire barriers.

4. TVA letter from J. E. Gilleland to N. C. Moseley of the NRC dated December 9, 1975.

GENERAL DESCRIPTION:

This letter provided the NRC with recommendations made by the Nuclear Energy Liability and Property Insurance Association (NELPIA) and TVA's responses and commitments based on the recommendations. Commitments were made in such areas as administrative controls governing fire protection program activities, fire zone and fire area boundaries, separation of redundant safe shutdown circuits, safe shutdown procedures, modification to the carbon dioxide fire suppression system in the cable spreading rooms, and the use of electrically safe nozzles on plant fire hoses.

CURRENT STATUS:

Current criteria for manual and fixed fire suppression equipment and administrative control of the fire protection activities are presented in the Fire Protection Plan. Compartmentation requirements, separation of redundant safe shutdown capability, and safe shutdown procedures are described in detail in NEDC-31119. These commitments fully supersede prior commitments.

5. TVA letter from H. G. Parris to Benard C. Rushche of the NRC dated April 23, 1976.

GENERAL DESCRIPTION:

This letter discussed overall corporate management responsibilities and the role of the fire protection engineering staff, preparation of pre-fire plans, and specific details on the use of ladders for fire fighting.

CURRENT STATUS:

Specific commitments regarding ladders were withdrawn in a letter from J. E. Gilleland to E. G. Case dated May 5, 1978 (see item 18 below). The remainder of these commitments are superseded by current commitments in Sections 3, 4, and 8 of the Fire Protection Plan.

6. TVA letter from J. E. Gilleland to Benard C. Rushche of the NRC dated June 10, 1976.

GENERAL DESCRIPTION:

This letter made specific commitments regarding the qualifications of the on-site fire protection technician, and committed to maintaining an informal agreement with the Decatur, Alabama, fire department to provide technical guidance in the absence of that person.

CURRENT STATUS:

Section 3.4 of the Fire Protection Plan establishes a minimum requirement for at least one individual available to the fire protection staff to meet eligibility requirements of member grade in the Society of Fire Protection Engineers, which is in excess of the prior commitment. With considerable increase in staff size, along with support available from TVA's Division of Nuclear Services and Division of Nuclear Engineering, the informal agreement with the Decatur fire department is no longer needed. The current plan fully supersedes prior commitments.

7. TVA letter from Godwin Williams, Jr., to Benard C. Rushche of the NRC dated June 17, 1976.

GENERAL DESCRIPTION:

This letter discussed cable derating issues related to the effect of Flamastic on power, control, and signal cable ampacity.

CURRENT STATUS:

Cable ampacity issues are addressed in TVA's Nuclear Performance Plan, Volume III, Section 3, Subsection 13, Paragraph 13.2. Commitments made in that document supersede the prior commitments.

8. TVA letter from J. E. Gilleland to Benard C. Rushche of the NRC dated July 16, 1976.

GENERAL DESCRIPTION:

This letter continued the discussion of cable derating issues related to the effect of Flamastic on power, control, and signal cable ampacity.

CURRENT STATUS:

Cable ampacity issues are addressed in TVA's Nuclear Performance Plan, Volume III, Section 3, Subsection 13, Paragraph 13.2. Commitments made in that document supersede the prior commitments.

9. TVA letter from J. E. Gilleland to A. Schwencer of the NRC dated November 2, 1976.

GENERAL DESCRIPTION:

This letter made specific commitments regarding the interim use of fire department pumper trucks until the diesel fire pump could be installed, including training of personnel to operate the pumper trucks.

CURRENT STATUS:

No longer applicable, since the diesel fire pump has been installed.

10. TVA letter from J. E. Gilleland to A. Schwencer of the NRC dated February 3, 1977.

GENERAL DESCRIPTION:

This letter provided a more detailed description of the interim measures taken to assure water supply availability until the diesel fire pump could be installed, including a tabulation of the raw service water design loads.

CURRENT STATUS:

The raw service water design loads are currently reflected in the BFN Technical Specifications. Other commitments in this letter are no longer applicable, since the diesel fire pump installation is complete.

11. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated June 1, 1977.

GENERAL DESCRIPTION:

This letter provided a schedule for completion of the Fire Recovery Plan commitments.

CURRENT STATUS:

No longer applicable.

12. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated June 19, 1977.

GENERAL DESCRIPTION:

This letter provided additional schedular information for the completion of Fire Recovery Plan commitments.

CURRENT STATUS:

No longer applicable.

13. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated August 5, 1977.

GENERAL DESCRIPTION:

This letter, written in response to open items in the Fire Recovery SER, provided the design bases and detailed design information for the following fire protection systems:

- Manual sprinklers in the Cable Spreading Rooms
- Water spray systems in the Reactor Buildings
- Automatic sprinkler systems in the Reactor Buildings and Diesel Generator Buildings
- Cable Spreading Room floor drains
- Cable Spreading Room heat detectors

CURRENT STATUS:

The design basis for existing systems installed in accordance with this letter is discussed in general in sections 4.4, 4.5, 4.6, and 4.9 of the Fire Protection Plan. Specific details of the designs are available on site for review. TVA considers the current Fire Protection Plan to incorporate the commitments, and supersede the prior design basis commitment document.

14. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated October 5, 1977.

GENERAL DESCRIPTION:

This letter provides additional information and revisions to the design criteria stated in TVA's letter of August 5, 1977 (see item 13 above).

CURRENT STATUS:

As stated in item 13, commitments in these letters have been incorporated in the Fire Protection Plan, and the prior commitment documents are superseded.

15. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated October 31, 1977.

GENERAL DESCRIPTION:

This letter requested NRC staff approval to defer completion of the following fire protection commitments:

- Modify cable spreading room drains and replace glycerin - filled traps with ethylene glycol-filled traps.
- Install fire doors on electrical board rooms and spreading rooms.
- Provide fire dampers in ventilation ducts where they cross fire zone boundaries.

TVA proposed a completion date of February 1978 for all three items.

CURRENT STATUS:

All three commitments have been completed. Therefore, this letter contains no outstanding commitments.

16. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated March 6, 1978

GENERAL DESCRIPTION:

This letter provided schedular information regarding the installation of the diesel fire pump.

CURRENT STATUS:

No longer applicable since the diesel fire pump has been installed.

17. TVA letter from J. E. Gilleland to George Lear of the NRC dated April 20, 1978.

GENERAL DESCRIPTION:

This letter revised a Fire Recovery Plan commitment to have automatic carbon dioxide fire suppression systems in the Cable Spreading Rooms, with manual water sprinklers as a backup. The revised commitment is to have the sprinkler systems converted to an automatic pre-action system, with the carbon dioxide systems made manual.

CURRENT STATUS:

The modifications were made as committed. Section 4.6.2 of the Fire Protection Plan specifies an automatic pre-action sprinkler system for the Cable Spreading Rooms and Section 4.9 specifies the manual carbon dioxide systems. These current commitments fully supersede the prior commitment document.

18. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated May 5, 1978.

GENERAL DESCRIPTION:

This letter presented justification for rescinding commitments related to provision of ladders for fire fighting purposes. The original commitments had been made in a TVA letter from H. G. Parris to Benard C. Rushche dated April 23, 1976 (see item 5 above). These commitments were withdrawn, based upon completion of fixed fire protection systems in the areas where overhead congestion prevented effective manual fire fighting from the floor level.

CURRENT STATUS:

This letter contains no outstanding commitments.

19. TVA letter from J. E. Gilleland to J. P. O'Reilly of the NRC dated May 24, 1978

GENERAL DESCRIPTION:

This letter stated TVA's position related to fire rating of Quality Assurance (QA) document storage areas.

CURRENT STATUS:

Section 4.15 of the Fire Protection Plan contains current commitments regarding QA record storage. These commitments are consistent with and fully supersede prior commitments.

20. TVA letter from J. E. Gilleland to George Lear of the NRC dated June 14, 1978

GENERAL DESCRIPTION:

This letter provided additional information related to fire rating of QA document storage areas.

CURRENT STATUS:

As stated in item 19 above, Section 4.15 of the Fire Protection Plan contains current commitments regarding QA record storage. These commitments are consistent with and fully supersede prior commitments.

21. TVA letter from L. M. Mills to R. L Tedesco of the NRC dated January 14, 1981.

GENERAL DESCRIPTION:

This letter commited to provide the NRC with detailed information about the fire hazard characteristics of the control room ceiling.

CURRENT STATUS:

The information requested was provided in a TVA letter from L. M. Mills to R. L. Tedesco dated February 20, 1981 (see item 22). There are no outstanding commitments in this letter.

22. TVA letter from L. M. Mills to R. L. Tedesco of the NRC dated February 20, 1981.

GENERAL DESCRIPTION:

This letter provided the additional information about the control room ceiling commited to in the January 14, 1981 letter (see item 21). The letter indicates that the ceiling panels were subjected to four separate ASTM standards for determination of self-ignition temperature, smoke density rating, deflection temperature, and flammability route. The letter also indicates that the ceiling panels were UL classified as a "slow burning: plastic material.

CURRENT STATUS:

The control room ceiling remains consistent with the information provided. Any modifications to or replacement of the ceiling materials will be consistent with the requirements of the Standard Building Code, as directed by Section 7.6 of the Fire Protection Plan. This fully supersedes any prior commitment documents regarding building interior finishes.

23. TVA letter from L. M. Mills to H. R. Denton of the NRC dated March 4, 1981.

GENERAL DESCRIPTION:

A TVA letter from J. E. Gilleland to George Lear of the NRC dated April 20, 1978, (see item 17 above) advised the NRC of TVA's plan to revise the actuation logic for the cable spreading room fire protection systems. That letter incorrectly concluded that no Technical Specification change was required to allow the planned modification. As a result of a subsequent NRC Notice of Violation, this letter was submitted to initiate the required license revision.

CURRENT STATUS:

Section 4.6.2 of the Fire Protection Plan specifies an automatic pre-action sprinkler system for the Cable Spreading Rooms and Section 4.9 specifies the manual carbon dioxide systems. Technical Specification Sections 3.11.A and 3.11.B also reflect this configuration. These current commitments fully supersede the prior commitment. (also see item 26, to follow)

24. TVA letter from L. M. Mills to J. P. O'Reilly of the to NRC dated March 4, 1981.

GENERAL DESCRIPTION:

This letter provided design calculations related to the adequacy of the vents in the outside walls of the carbon dioxide tank rooms. The letter constitutes an implied commitment to maintain adequate vent capacity.

CURRENT STATUS:

This commitment is incorporated in section 4.9 of the Fire Protection Plan. Therefore, TVA considers this commitment document to be superseded.

25. TVA letter from L. M. Mills to H. R. Denton of the NRC dated March 18, 1981.

GENERAL DESCRIPTION:

This letter provided information related to TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R.

26. TVA letter from H. G. Parris to Victor Stello of the NRC dated April 3, 1981.

GENERAL DESCRIPTION:

In response to an NRC Notice of Violation, TVA made numerous commitments for fire protection improvements. Specific commitments were made in the following areas:

- Installation of an automatic sprinkler system in the Intake Pumping Station (IPS)
- Use of listed deluge valves for the systems protecting the HPCI turbines
- Assuring fire pump operability tests were performed as required by Technical Specifications
- Improved inspection and surveillance procedures for fire doors
- Revised procedures for fire watches and fire drills
- Compliance with earlier commitments regarding Flamemastic coating on cables
- Replacement of specific fire doors and fire door hardware
- Installation of fire dampers
- Upgrading of TVA's commitment tracking procedures

The Notice of Violation also addressed the change in actuation logic for the cable spreading room fire protection systems. Commitments on this subject were addressed in items 17 and 23 above.

CURRENT STATUS:

The IPS sprinkler system is discussed in Section 4.6.2 of the Fire Protection Plan. Section 4.6.1 discusses the use of approved valves for water spray systems protecting safety related areas. Section 9 of the plan establishes the requirements for surveillance of fire protection systems. Procedures for fire watches and fire drills are referenced in Sections 7.5 and 8.0 of the plan, respectively. Exit marking is discussed in Section 4.11 of the plan. Commitments regarding Flamemastic coating were superseded in TVA's letter to the NRC dated October 18, 1984 (see item 50).

Fire door and fire damper installation commitments have been superseded by NEDC-31119, as discussed in Section II.A of this evaluation.

Fire protection commitments are included in the corporate commitment tracking system, which is beyond the scope of this evaluation.

TVA considers this commitment document to be superseded by incorporation of the requirements into current commitment documents.

27. TVA letter from L. M. Mills to J. P. O'Reilly of the NRC dated May 26, 1981.

GENERAL DESCRIPTION:

This letter provided TVA's response to NRC's IE Bulletin No. 81-03, related to possible flow blockage of safety systems (including fire protection) by marine organisms. Commitments were made in regard to clam control in a number of safety systems. The following comments and commitments are applicable to the high pressure fire protection (HPFP) system:

- scheduled inspection and flushing of the HPFP has indicated only small amounts of mud and clams, with no severe flow restriction or pluggage problems since the initial inspection.

- The HPFP system is flushed monthly and inspected quarterly by performance of a maintenance instruction with an additional flush performed quarterly in accordance with Technical Specification 4.11.A.1.f.(a).

- The HPFP system will be chlorinated twice per year in accordance with Technical Specification 4.11.A.1.f(b).

CURRENT STATUS:

Flushing and biocide addition are both to be performed in accordance with Section 9.1.3 of the Fire Protection Plan. The surveillance frequency requirement is semi-annual, which is consistent with BFN's current license conditions. This commitment supersedes the prior commitment regarding control of marine organisms.

28. TVA letter from L. M. Mills to H. R. Denton of the NRC dated May 11, 1981.

GENERAL DESCRIPTION:

This letter provided information related to emergency lighting, as a portion of TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R.

29. TVA letter from L. M. Mills to J. P. O'Reilly of the NRC dated June 19, 1981.

GENERAL DESCRIPTION:

This letter was in response to an NRC Notice of Violation regarding the configuration of fire seals on cable tray penetrations into the cable spreading rooms. TVA had removed certain cable tray covers while adding additional cables, and had not replaced them. TVA commited to replace the covers by September 1, 1981.

CURRENT STATUS:

Since the covers were replaced, the schedular commitments are no longer applicable.

30. TVA letter from L. M. Mills to L. C. Rouse of the NRC dated October 22, 1981.

GENERAL DESCRIPTION:

This letter responded to NRC questions regarding the Low Level Radiological Waste (LLRW) facility. Among NRC questions were two related to fire protection concerning; 1. provision of automatic fire detection and fire suppression systems, and 2. verification that there were two separate and redundant water supplies for the fire hydrants in the area. TVA responded that an assessment of potential fires had indicated that the automatic systems were not necessary. To the second question, TVA responded with a discussion of the fire pump and storage tank to be installed, and indicated that the redundant supply was the potable water main supplying Browns Ferry from the local utility.

CURRENT STATUS:

Section 4.5 of the Fire Protection Plan discusses the provision of water supplies for the LLRW facility.

31. TVA letter from L. M. Mills to L. C. Rouse of the NRC dated November 3, 1981.

GENERAL DESCRIPTION:

This letter is an amended application for storage of low level radioactive waste (LLRW) at BFN. It describes the LLRW facility including the fire hazards associated with the storage facility and the fire protection features provided.

CURRENT STATUS:

Section 4.5 of the Fire Protection Plan discusses the fire protection features provided for the LLRW facility.

32. TVA letter from L. M. Mills to H. R. Denton of the NRC dated November 3, 1981.

GENERAL DESCRIPTION:

This letter provided schedular information related to installation of emergency lighting, as a portion of TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R. Previous commitments state that all Appendix R modifications will be completed prior to restart of the affected unit.

33. TVA letter from L. M. Mills to H. R. Denton of the NRC dated December 30, 1981.

GENERAL DESCRIPTION:

This letter deleted TVA's prior commitments to maintain an agreement with an offsite fire department. The deletion was justified based on the provision of a fully equipped fire department type pumper for use by the fire brigade.

CURRENT STATUS:

Section 8 of the Fire Protection Plan provides current commitments for continued availability of the fire department type pumper, and also reinstates the commitment to maintain an agreement with an offsite fire department. The new document supersedes the prior commitment document.

34. TVA letter from L. M. Mills to H. R. Denton of the NRC dated May 12, 1982.

GENERAL DESCRIPTION:

This letter revised the schedular information provided in the letter from TVA to NRC dated November 3, 1981, (see item 32 above) related to the installation of emergency lighting, as a portion of TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R. Previous commitments state that all Appendix R modifications will be completed prior to restart of the affected unit.

35. TVA letter from L. M. Mills to H. R. Denton of the NRC dated June 30, 1982.

GENERAL DESCRIPTION:

This letter provided information related to TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R.

36. TVA letter from H. J. Green to J. P. O'Reilly of the NRC dated August 27, 1982.

GENERAL DESCRIPTION:

This letter transmitted a Licensee Event Report regarding the automatic carbon dioxide fire suppression system in the units 1 and 2 Diesel Generator Building. Commitments were made to increase the level of surveillance of the power switches and provide more readily heard pre-discharge alarms for the diesel cells.

CURRENT STATUS:

The pre-discharge alarms are discussed in Section 4.9 of the Fire Protection Plan, and periodic surveillance requirements are listed in Section 9 of the plan. These current requirement documents incorporate prior commitments.

37. TVA letter from L. M. Mills to D. B. Vassallo of the NRC dated January 5, 1983.

GENERAL DESCRIPTION:

This letter provided information related to TVA's program for compliance with the applicable portions of 10CFR50 Appendix R as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R.

38. TVA letter from L. M. Mills to J. P. O'Reilly of the NRC dated February 1, 1983.

GENERAL DESCRIPTION:

This letter was a TVA proposal to reduce the frequency of fire door visual and maintenance inspections.

CURRENT STATUS:

Current requirements for a daily visual inspection and semiannual functional verification are presented in Section 9.1.1 of the Fire Protection Plan. These requirements are fully consistent with current standards and supersede prior commitments.

39. TVA letter from D. S. Kammer to J. P. O'Reilly of the NRC dated March 21, 1983.

GENERAL DESCRIPTION:

This letter provided additional information regarding the semi-annual addition of biocide to the High Pressure Fire Protection (HPFP) system.

CURRENT STATUS:

See response to item 27.

40. TVA letter from L. M. Mills to H. R. Denton of the NRC dated March 22, 1983.

GENERAL DESCRIPTION:

This letter requested confirmation of TVA's interpretation of portions of 10CFR50 Appendix R.

CURRENT STATUS:

TVA's current program for compliance with applicable portion of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R.

41. TVA letter from L. M. Mills to H. R. Denton of the NRC dated March 27, 1984.

GENERAL DESCRIPTION:

This letter provided information related to TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R.

42. TVA letter from G. T. Jones to the NRC dated June 4, 1984.

GENERAL DESCRIPTION:

This was a Licensee Event Report related to TVA's discovery that the manual and ADS MSRV cables were not separated as previously committed. Interim commitments were made to maintain fire watches and revise operating procedures until the problem could be corrected.

CURRENT STATUS:

As discussed in Section II.C of this evaluation, the safe shutdown analysis submitted as a part of NEDC-31119 provides another means of assuring MSRV capability. Therefore, the Fire Recovery Plan commitment to separate manual and ADS MSRV's is fully superseded.

43. TVA letter from L. M. Mills to H. R. Denton of the NRC dated June 5, 1984.

GENERAL DESCRIPTION:

This letter provided information related to TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R.

44. TVA letter from L. M. Mills to H. R. Denton of the NRC dated June 12, 1984.

GENERAL DESCRIPTION:

This letter provided information related to TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119 and subsequent letter submittals. These submittals expressly superseded prior commitments related to Appendix R.

45. TVA letter from L. M. Mills to J. P. O'Reilly of the NRC dated August 7, 1984.

GENERAL DESCRIPTION:

This letter provided information related to TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R.

46. TVA letter from G. T. Jones to the NRC dated August 8, 1984.

GENERAL DESCRIPTION:

This letter is a supplemental Licensee Event Report concerning the same event discussed in item 42 above. No additional commitments were made.

CURRENT STATUS:

As previously discussed, the safe shutdown analysis incorporated in NEDC 31119 assures MSRV availability. Therefore, this commitment is fully superseded.

47. TVA letter from L. M. Mills to H. R. Denton of the NRC dated August 23, 1984.

GENERAL DESCRIPTION:

This letter requested a schedular exemption related to TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R. The request for schedular exemption ws withdrawn.

48. TVA letter from G. T. Jones to the NRC dated August 31, 1984.

GENERAL DESCRIPTION:

This letter was an additional supplement to the Licensee Event Report discussed in items 42 and 46 above. This supplement provided the permanent corrective actions to be taken to assure MSRV operability.

CURRENT STATUS:

As previously discussed, the safe shutdown analysis incorporated in NEDC-31119 assures MSRV availability. Therefore, this commitment is fully superseded.

49. TVA letter from G. T. Jones to the NRC dated September 25, 1984.

GENERAL DESCRIPTION:

This letter transmitted a Licensee Event Report which documented unauthorized modifications to several fire doors. The modifications invalidated the Underwriters' Laboratories (UL) listings of the fire doors. Commitments were made to replace the modified doors, to post fire watches until such replacement could be made, and to revise maintenance practices to prevent recurrence.

CURRENT STATUS:

All fire doors in barriers required to support the BFN fire hazard and safe shutdown analyses presented in NEDC-31119 have been evaluated to assure they meet appropriate criteria. Section 4.3 of the Fire Protection Plan requires that all doors in rated fire barriers be UL listed or equivalent, or be specifically evaluated and found acceptable. These current commitments fully supersede the prior commitments.

50. TVA letter from L. M. Mills to H. R. Denton of the NRC dated October 18, 1984.

GENERAL DESCRIPTION:

This letter revised prior commitments TVA had made regarding the use of "Flamemastic" or other fire retardant coatings to reduce the flammability of non-IEEE-383 qualified cables. The initial commitment had been to coat all exposed electrical cables in the secondary containment area of the Reactor Building, and throughout the Diesel Generator Buildings, Intake Pumping Station, cable spreading rooms, and pumping station cable tunnel. The commitment did not distinguish between IEEE-383 qualified cables and non-qualified cables. This letter revised the commitment to state that IEEE-383 qualified cables would not be coated with Flamemastic. The letter further stated that cable coating would continue to be applied and maintained, in accordance with previous commitments, to all non-IEEE-383 qualified cables.

CURRENT STATUS:

This commitment is currently incorporated in section 4.16 of the Fire Protection Plan.

51. TVA letter from L. M. Mills to H. R. Denton of the NRC dated October 31, 1984.

GENERAL DESCRIPTION:

This letter provided information related to TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119 and subsequent letter submittals. These submittals expressly superseded prior commitments related to Appendix R.

52. TVA letter from J. A. Domer to H. R. Denton of the NRC dated November 15, 1984.

GENERAL DESCRIPTION;

This letter provided information related to TVA's program for compliance with the applicable portions of 10CFR50 Appendix R, as required by 10CFR50.48.

CURRENT STATUS:

TVA's current program for compliance with applicable portions of Appendix R is presented in NEDC-31119. This submittal expressly superseded prior commitments related to Appendix R.

53. TVA letter from J. W. Hufham to H. R. Denton of the NRC dated February 22, 1985.

GENERAL DESCRIPTION:

This letter presented specific criteria for repairing or modifying fire doors to maintain UL listing of the doors.

CURRENT STATUS:

The criteria is included in NEDC-31119. Therefore, the prior commitment document is fully superseded.

IV. REFERENCES

1. "Plan for Evaluation, Repair, and Return to Service of Browns Ferry Units 1 and 2 as a Result of the March 22, 1975, Fire" (Fire Recovery Plan).

2. "Safety Evaluation by the Division of Operating Reactors Supporting the Operation after the Restoration and Modification of the Browns Ferry Nuclear Plant, Units 1 and 2 Following the March 22, 1975 Fire" dated February 23, 1976.

3. "Supplement No. 1 to the Safety Evaluation by the Division of Operating Reactors Supporting the Operation after the Restoration and Modification of the Browns Ferry Nuclear Plant, Units 1 and 2 Following the March 22, 1975 Fire" dated June 18, 1976.

4. Supplement No. 2 to the Safety Evaluation by the Division of Operating Reactors Supporting the Operation after the Restoration and Modification of the Browns Ferry Nuclear Plant, Units 1 and 2 Following the March 22, 1975 Fire" dated July 3, 1976.

5. "Safety Evaluation Report Related to Operation of Browns Ferry Nuclear Plant, Unit 1, 2, and 3," Supplement 8 dated July 1976 and Supplement 9 dated August 1976.

6. "Fire Protection and Safe Shutdown Systems Analyses Report for Browns Ferry Nuclear Plant - TVA" (NEDC-31119), dated January 31, 1986.

7. TVA letter from J. E. Gilleland to N. C. Moseley of the AEC dated August 5, 1974.

8. TVA letter from J. E. Gilleland to Benard C. Rusche of the NRC dated August 29, 1975.

9. TVA letter from J. E. Gilleland to Benard C. Rusche of the NRC dated November 17, 1975.

10. TVA letter from J. E. Gilleland to Benard C. Rusche of the NRC dated December 8, 1975.

11. TVA letter from J. E. Gilleland to N. C. Moseley of the NRC dated December 9, 1975.

12. TVA letter from J. E. Gilleland to Benard C. Rusche of the NRC dated January 21, 1976.

13. TVA letter from H. G. Parris to Benard C. Rusche of the NRC dated April 23, 1976.

14. TVA letter from J. E. Gilleland to Benard C. Rusche of the NRC dated June 10, 1976.

15. TVA letter from Godwin Williams, Jr., to Benard C. Rusche of the NRC dated June 17, 1976.

16. TVA letter from J. E. Gilleland to Benard C. Rusche of the NRC dated June 20, 1976.

17. TVA letter from J. E. Gilleland to Benard C. Rusche of the NRC dated July 16, 1976.

18. TVA letter from J. E. Gilleland to A. Schwencer of the NRC dated November 2, 1976.

19. TVA letter from J. E. Gilleland to A. Schwencer of the NRC dated February 3, 1977.

20. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated April 21, 1977.

21. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated June 1, 1977.

22. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated June 19, 1977.

23. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated August 5, 1977.

24. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated October 5, 1977.

25. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated October 31, 1977.

26. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated March 6, 1978.

27. TVA letter from J. E. Gilleland to George Lear of the NRC dated April 20, 1978.

28. TVA letter from J. E. Gilleland to E. G. Case of the NRC dated May 5, 1978.

29. TVA letter from J. E. Gilleland to J. P. O'Reilly of the NRC dated May 24, 1978.

30. TVA letter from J. E. Gilleland to George Lear of the NRC dated June 14, 1978.

31. TVA letter from L. M. Mills to R. L. Tedesco of the NRC dated January 14, 1981.

32. TVA letter from L. M. Mills to R. L. Tedesco of the NRC dated February 20, 1981.

33. TVA letter from L. M. Mills to H. R. Denton of the NRC dated March 4, 1981.

34. TVA letter from L. M. Mills to J. P. O'Reilly of the NRC dated March 4, 1981.

35. TVA letter from L. M. Mills to H. R. Denton of the NRC dated March 18, 1981.

36. TVA letter from H. G. Parris to Victor Stello of the NRC dated April 3, 1981.

37. TVA letter from L. M. Mills to H. R. Denton of the NRC dated May 11, 1981.

38. TVA letter from L. M. Mills to J. P. O'Reilly of the NRC dated May 26, 1981.

39. TVA letter from L. M. Mills to J. P. O'Reilly of the NRC dated June 19, 1981.

40. TVA letter from L. M. Mills to L. C. Rouse of the NRC dated October 22, 1981.

41. TVA letter from L. M. Mills to L. C. Rouse of the NRC dated November 3, 1981.

42. TVA letter from L. M. Mills to H. R. Denton of the NRC dated November 3, 1981.

43. TVA letter from L. M. Mills to H. R. Denton of the NRC dated December 30, 1981.

44. TVA letter from L. M. Mills to H. R. Denton of the NRC dated May 12, 1982.

45. TVA letter from L. M. Mills to H. R. Denton of the NRC dated June 30, 1982.

46. TVA letter from H. J. Green to J. P. O'Reilly of the NRC dated August 27, 1982.

47. TVA letter from L. M. Mills to Dominic B. Vassallo of the NRC dated January 5, 1983.

48. TVA letter from L. M. Mills to J. P. O'Reilly of the NRC dated February 1, 1983.

49. TVA letter from D. S. Kammer to J. P. O'Reilly of the NRC dated March 21, 1983.

50. TVA letter from L. M. Mills to H. R. Denton of the NRC dated March 22, 1983.

51. TVA letter from L. M. Mills to H. R. Denton of the NRC dated March 27, 1984.

52. TVA letter from G. T. Jones to the NRC dated June 4, 1984.

53. TVA letter from L. M. Mills to H. R. Denton of the NRC dated June 5, 1984.

54. TVA letter from L. M. Mills to H. R. Denton of the NRC dated June 12, 1984.

55. TVA letter from L. M. Mills to J. P. O'Reilly of the NRC dated August 7, 1984.

56. TVA letter from G. T. Jones to the NRC dated August 8, 1984.

57. TVA letter from L. M. Mills to H. R. Denton of the NRC dated August 23, 1984.

58. TVA letter from G. T. Jones to the NRC dated August 31, 1984.

59. TVA letter from G. T. Jones to the NRC dated September 25, 1984.

60. TVA letter from L. M. Mills to H. R. Denton of the NRC dated October 18, 1984.

61. TVA letter from L. M. Mills to H. R. Denton of the NRC dated October 31, 1984.

62. TVA letter from J. A. Domer to H. R. Denton of the NRC dated November 15, 1984.

63. TVA letter from J. W. Hufham to H. R. Denton of the NRC dated February 22, 1985.