TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

August 26, 1985

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the Application of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-391

Enclosed are changes to the Watts Bar Nuclear Plant (WBN), units 1 and 2 Final Safety Analysis Report (FSAR) which are necessary as a result of TVA's verification that the as-built plant is in conformance with the description in the FSAR as amended. These changes will be included in the next amendment (56) to the WBN FSAR.

If there any questions, please get in touch with K. P. Parr at FTS 858-2682.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. A. Domer

J. A. Domer, Chief
Nuclear Licensing Branch

Sworn to and subscribed before me
this 26th day of Aug, 1985

Bryant M. Lowery
Notary Public
My Commission Expires 4/8/86

Enclosure
cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attention: Dr. J. Nelson Grace, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

B001
1/1

2.4.14.4 Preparation for Flood Mode

Detailed emergency operating procedures will be available prior to operation of Unit 1.

At the time the initial flood warning is issued, the plant may be operating in any normal mode. This means that either or both units may be at power or either unit may be in any stage of refueling.

2.4.14.4.1 Reactor Initially Operating at Power

If both reactors are operating at power, Stage I and then, if necessary, Stage II procedures will be initiated. Stage I procedures will consist of a controlled reactor shutdown and other easily revokable steps, such as moving flood supplies above the maximum possible flood elevation and making temporary connections and load adjustments on the onsite power supply. After scram, the reactor coolant system will be cooled by the auxiliary feedwater (Section 10.4.9) and the pressure will be 50
reduced to less than 500 psig. Stage II procedures will be the less easily revokable and more damaging steps necessary to have the plant in the flood mode when the flood exceeds plant grade. Fire protection system water (Section 9.5.1) will replace auxiliary feedwater for reactor cooling. Other essentail plant cooling loads will be transferred from the Component Cooling Water System to the Essential Raw Cooling Water (ERCW) System; the ERCWS will also replace Raw Cooling Water to the ice condensers (Section 9.2.1). 28
The radioactive waste (Chapter 11) system will be secured by filling tanks below DBF level with enough water to prevent flotation; one exception is the waste gas decay tanks, which are sealed and anchored against flotation. Power and communication lines running beneath the DBF that are not required for submerged operation will be disconnected, and batteries beneath the DBF will be disconnected.

2.4.14.4.2 Reactor Initially Refueling

If time permits, fuel will be removed from the unit(s) undergoing refueling and placed in the spent fuel pool otherwise fuel cooling will be accomplished as described in Section 2.4.14.2.2. If the refueling canal is not already flooded, the mode of cooling described in Section 2.4.14.2.2 required that the canal be flooded with borated water from the refueling water storage tank. If the flood warning occurs after the reactor vessel head has been removed or at a time when it could be removed before the flood exceeds plant grade, the flood mode reactor cooling water will flow directly from the vessel into the refueling cavity. If the warning time available does not permit this, then the Upper Head Injection piping will be disconnected

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3.9.4.2 Applicable CRDS Design Specifications

Refer to Sections 4.2.3.1.4 and 4.2.3.2.2.

3.9.4.3 Design Loadings, Stress Limits, and Allowable Deformations

Refer to Section 4.2.3.3.1.

3.9.4.4 CRDS Performance Assurance Program

Refer to Section 4.2.3.4.2.

3.9.5 Reactor Pressure Vessel Internals

3.9.5.1 Design Arrangements

For verification that changes in design from those in previously licensed plants of similar design do not affect the flow-induced vibration behavior, refer to Section 3.9.2.3.

3.9.5.2 Design Loading Conditions

Refer to Section 4.2.2.3.

3.9.5.3 Design Loading Categories

Refer to Section 4.2.2.4.

3.9.5.4 Design Basis

Refer to Section 4.2.2.5.

applicable edition and addenda of Subsections IWV and IWP of the ASME Boiler and Pressure Vessel Code as required by 10CFR 50.55a(g).

3.9.6 Inservice Testing of Pumps and Valves

ASME Code Class 1, 2, and 3

Inservice testing of ~~quality Groups A, B, and C~~ pumps and valves will be conducted to the extent practical in accordance with the ~~guidelines of Subsections IWP and IWV, Section XI, ASME Boiler and Pressure Vessel Code, 1974 Edition, Winter 1974 Addenda~~. Since the Watts Bar piping systems were designed before the Code was issued, some valves and pump parameters cannot be tested in accordance with Subsections IWP and IWV. These exceptions will be noted in ~~the plant instructions as they are written. Quality Group D valves do not require the same periodic testing as Quality Groups A, B, and C valves and will not be tested in accordance with this section. Any malfunctioning of Group D valves will be discovered during normal plant operation and can be repaired without compromising plant safety.~~ 45

the program submittal made to NRC.

The following safety-related pumps will be tested: 45

1. Charging Pumps

1. Safety Injection Pumps
2. Residual Heat Removal Pumps
4. Containment Spray Pumps
5. Component Cooling Water Pumps
6. Auxiliary Feedwater Pumps
7. Essential Raw Cooling Water Pumps
8. Boric Acid Transfer Pumps
~~9. Spent Fuel Pit Cooling Pumps~~
~~10. High Pressure Fire Protection Pumps~~
9. Diesel Generator Fuel Oil Transfer Pumps | 45

Table 3.9-26 is a tabulation of the various category valves in each of the systems.

REFERENCES

1. Documentation of Selected Westinghouse Structural Analysis Computer Codes', WCAP-8252, April 1977. | 33

2. WCAP-8317-A, 'Prediction of the Flow-Induced Vibration of Reactor Internals by Scale Model Tests,' March 1974.

3. WCAP-8517, 'UHI Plant Internals Vibration Measurement Program and Pre and Post Hot Functional Examinations,' March 1975.

4. WCAP-7879, 'Four Loop PWR Internals Assurance and Test Program,' July 1972.

5. Trojan Final Safety Analysis Report, Appendix A-12.

6. Fabic, S., 'Description of the BLODWN-2 Computer Code,' WCAP-7918, Revision 1, October 1970.

7. Fabic, S., 'Computer Program WHAM for Calculation of Pressure Velocity, and Force Transients in Liquid Filled Piping Networks,' Kaiser Engineers Report No. 67-49-R, November 1967. | 45

8. Bohm, G. J., 'Indian Point Unit No. 2 Internals Mechanical Analysis for Blowdown Excitation,' WCAP-7332-AR-P, November, 1973 (Proprietary) and WCAP-7822-AR, November, 1973 (Non-Proprietary).

2. IEEE No. 323-1976, IEEE Train-Use Standard: General Guide for Qualifying Class I Electric Equipment for Nuclear Power Generating Stations.

3. IEEE 450-~~1975~~ 1980, IEEE Recommended Practice for Maintenance, Testing, and Replacement - Large Stationary Type Power Plant and Substation Lead Storage Batteries. 52

4. IPCEA P-46-426, Power Cable Ampacities, Vol 1 - Copper Conductors.

5. ANSI C37.1, Relays Associated with Power Switchgear.

6. ANSI C37.3-37.12, Alternating-Current Power Circuit breakers

7. ANSI C37.19, Low-Voltage a.c. Power Circuit Breakers and Switchgear Assemblies.

8. ANSI C37.20, Switchgear Assemblies and Metal-Enclosed Bus. 52

9. ANSI C57, Transformers, Regulators, and Reactors.

10. NEMA AB-1, Molded-Case Circuit Breakers

11. NEMA EI-2, Instrument Transformers

12. NEMA SG3, Low-Voltage Power Circuit Breakers

13. NEMA SG4, High-Voltage Power Circuit Breakers

14. NEMA SG5, Power Switchgear Assemblies

15. NEMA SG6, Power Switching Equipment

16. NEMA TR1, Transformers, Regulators, and Reactors

17. NEMA MG1, Motors and Generators

18. NEMA WC5, Thermoplastic-Insulated Wire and Cable

19. IPCEA S-61-402, Thermoplastic-Insulated Thermoplastic-Jacketed Cables

20. IPCEA S-56-434, Polethylene-Insulated Thermoplastic-Jacketed Cables

21. IPCEA S-66-524, Interim Standard No. 2, XLPE Insulation

22. NFPA No. 78-1971, Lightning Protection Code

23. IPCEA S-19-81, NEMA WC3-1969 IPCEA-NEMA Standards Publication, Rubber-Insulated Wire and Cable. Specific

boards, 6.9-kV RCP boards, and the associated 6.9-kV buses were procured in accordance with certain TVA standards and industry standards. TVA specifications require conformance of this equipment to such standards as the following. The overall construction, ratings, tests, service conditions, etc., are required to be in conformance to ANSI C37.20 and NEMA SD-5; the power circuit breakers are referenced to ANSI C37.4 through C37.9 and NEMA SG-4; associated relays are specified to conform to ANSI C37.1, instrument transformers to ANSI C57.13 and NEMA EI-2 and wiring to IPCEA S-61-402 and NEMA WC5.

The design of the equipment arrangement was also implemented to comply with GDC 3 for fire protection and with GDC 18 and Regulatory Guide 1.22 for each of periodic tests and inspections.

Criterion 18

General Design Criterion 18 requires that the offsite power circuits be designed to permit periodic inspection and testing to show:

a. 'The operability and functional performance of the components of the circuits, 48

b. The operability of the circuits as whole systems, and

c. Under conditions as close to design as practical, the full operation sequence that brings the system into operation.'

The offsite power system has been designed to permit appropriate periodic inspection and testing. Transfers from the normal supply to preferred (offsite) supply or between the preferred circuits may be manual or automatic. Testing of these transfers while the nuclear unit is at power could result in transients that could cause tripping of the reactor or turbine. For this reason, testing of the manual and automatic sequence will be performed ~~at intervals defined in the technical specifications~~ by causing a transfer from the normal supply to the first alternate (preferred) supply, from the normal supply to the second alternate (preferred) supply, and from the first alternate (preferred) supply to the second alternate (preferred) supply ~~will~~ may be performed by TVA for economic reasons at intervals specified by TVA.

Transfers from the normal to the first alternate supply is required to satisfy GDC 17 and will be tested at intervals specified in the technical specifications. Testing of the transfers

8.2.2 Analysis

Each 161-kV circuit and its two associated transformers has sufficient capacity and adequate voltage to supply the essential 52 kV shutdown board starts the diesel generator and initiates (after an additional 3.5 seconds) logic that trips the normal or alternate feeder breakers; all 6900V loads (except the 480V shutdown board transformers), and the major 480V loads. Table 8.3-2 shows the loads that are automatically stripped. Figures 8.3-6 thru 8.3-13 show the load stripping schematically. When the diesel generator has reached rated speed and voltage, the generator will be automatically connected to the 6.9-kV shutdown board bus. (Refer to Figure 8.3-14.) This return of voltage to the 6.9-kV shutdown bus initiates logic which connects the required loads in sequence. Table 8.3-3 shows the order of applied loads. The standby (onsite) power system's automatic sequencing logic is designed to automatically connect the required loads in proper sequence should the logic receive an accident signal prior to, concurrent with, or following a loss of all nuclear unit and preferred (offsite) power.

There are no automatic transfers of board supplies between redundant power sources. All 480V shutdown boards and all motor control centers have alternate feeders to their respective board buses. Transfers between the normal and alternate feeders are manual. Some manual transfers of loads between power trains are used. These transfers are ~~at the 480V level and involve 10 loads which are~~ tabulated in Table 8.3-10.

All circuit breakers supplying the alternate feeders for the manual transfers in Table 8.3-10 [with the exception of the spent fuel pit pump C-S, the 125V auxiliary feedwater turbine (AFWT) DC manual transfer switch (units 1 and 2), and the 120V AFWT AC manual transfer switch (units 1 and 2)] are normally opened. ~~Closure of the alternate feeder supply circuit breaker and/or transfer of the manual transfer switch to the alternate position is alarmed in the main control room. For the manual transfer switch on the spent fuel pit pump C-S, the 125V auxiliary feedwater turbine (AFWT), DC manual transfer switch (units 1 and 2), and the 120V AFWT AC manual transfer switch (units 1 and 2), the circuit breaker supplying the alternate supply will be maintained in the normally open position.~~ 48

Delete

The transfer switches are mechanically interlocked to prevent closing a switch in a manner to parallel both feeds. For the components where power supply alignment is critical (battery chargers, inverters, and component cooling water pump C-S) the alternate feeder breakers are verified open in accordance with the technical specifications. For the other components (spent fuel pit pump C-S and turbine driven auxiliary feedwater pump control power) where power supply alignment is not important; [illegible] supply.

A manual means of supplying power to the 480V Auxiliary Building common board (which is not normally supplied power from the diesel generators during a condition where offsite power is lost) is provided. Provisions have been made to manually connect this board to the 480V shutdown boards 1B2-B and 2B2-B. This is shown in Figure 8.3-15. The purpose of these feeders is to provide power to operate the ice condenser refrigeration units, located on the 480V Auxiliary Building common board and glycol pumps, located on the 480V Auxiliary Building MCC B and C, during the unlikely condition of a loss of offsite power that exceeds 2 to 3 days. The two normal bus feeder breakers must be moved from their normal compartments to the compartments which are connected to the 480V shutdown boards 1B2-B and 2B2-B. 48 52

System Instrumentation

Remote instrumentation of the 6.9-kV shutdown boards consist of

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Diesel Generator Lubrication System

A complete description of the Diesel Generator Lubrication System is given in Section 9.5.7.

Each diesel engine has an oil circulating pump and heater for use while the engine is not running. The oil is continuously circulated and held at a relatively constant temperature while 48 the engine is stopped in anticipation of a required fast start (see Figure 8.3-33 and 8.3-34).

Diesel Generator Instrumentation

Instrumentation consists of voltmeters, wattmeters, varmeters, ammeters, and annunciation display panels located in the Main Control Room, Auxiliary Control Room, and locally in the diesel building. The instrumentation is not essential for automatic operation of the diesel.

Diesel Generator Control Power

The 125-volt dc diesel-generator battery system is a Class IE system whose function is to provide control power for control and field flashing of the diesel-generator sets.

There are four diesel-generator battery systems (one per diesel-generator set). Each system consists of a battery charger (which supplies the normal steady-state dc loads and maintains the battery in a fully charged state and is capable of recharging the battery from the design minimum discharge of 105 volts dc while supplying the normal steady-state dc loads), a battery (for control and field flashing of the diesel-generator set), and a distribution board (which facilitates the dc loads and provides circuit protection). Each battery system is ungrounded and 48 incorporates ground detection devices. Each battery system is physically and electrically independent (see Section 8.3.2.1.1 and Figure 8.3-46 for physical separation).

~~Each battery is of the lead-acid type and has 57 cells connected in series and divided into 19 units, every unit having three cells. The battery is a type 3DCU-9, furnished by the C&D Batteries Division of Eltra Corporation, rated~~ The battery is rated by the manufacturer at 26 ampere-hours at 60°F for a 30-minute discharge rate. With the battery in the fully charged condition, the battery has the capacity to supply 65 amperes (A) for one minute and 41 amperes for 30 minutes at 60°F when discharged to a minimum terminal voltage of 105 volts. 5 The estimated design loads on the battery, during a loss of ac power, is 48 amperes for two seconds and 12 amperes for 30 52 minutes. Each battery is normally required to supply loads only during the time interval between loss of normal feed to its charger and the receipt of emergency power to the charger from its respective diesel-generator.

missile and fire barrier-type walls. Also, as stated above, the four battery systems are electrically independent (one per diesel-generator set). Therefore, the structures, systems, and components important for safe operation of this system are not shared.

General Design Criteria 17

The diesel generator 125-volt dc battery system's design, equipment location, separation, redundancy, and testability enables the system to perform its intended safety function assuming a single failure.

General Design Criteria 18

The diesel generator 125-volt dc battery system is designed to permit appropriate periodic inspection and testing of important areas and features, in order to assess the continuity of the system and the condition of its components. In addition, prior to placing the system into service, it will be preoperationally tested and thereafter periodically tested to ensure the proper operation of all components.

Also, under conditions as close to design as practical, the full operational sequence that requires the battery system's operation 48
will be tested periodically as a part of the diesel generator periodic system test.

Regulatory Guide 1.32

The diesel generator 125-volt dc battery system's chargers have the capacity to continuously supply all steady-state loads and maintain the batteries in the design maximum charged state or to fully recharge the batteries from the design minimum discharge state within an acceptable time interval, irrespective of the status of the plant during which these demands occur. In addition, a capacity test will be performed periodically on each diesel generator battery system, as recommended by IEEE 450-~~1975~~. 1980

Regulatory Guide 1.6

Each of the four diesel generator battery systems supply power only to the loads of the diesel generator in which it is associated with. Therefore, the battery systems' safety loads are separated into redundant load groups such that loss of any one group will not prevent the minimum safety functions from being performed. Also, there are no provisions for manually or automatically interconnecting the redundant load groups of this system.

all others. The heating and ventilating systems are designed to provide an ambient room temperature between 60°F and 104°F and a maximum relative humidity of 98 percent.

Normal D.C. Supply

Reference: Figure 8.1-3

The normal supply of d.c. current to the battery boards is from the battery charger in each channel. Each charger maintains a floating voltage of approximately 135 volts on the associated battery board bus (the battery is continuously connected to this bus also) and is capable of maintaining 140 volts during an equalizing charge period (all loads can tolerate the 140 volt equalizing voltage). The charger supplies normal steady state dc load demand on the battery board and maintains the battery in a charged state. 48 Normal recharging of the battery from the design discharged condition can be accomplished in 12 hours (with accident loads being supplied) following a 30-minute a.c. power outage and in approximately 36 hours (with normal loads being supplied) following a 2-hour a.c. power outage. Two spare chargers are available for the four channels (one each for two channels). Each spare charger can be connected to either of its two assigned channels. It can substitute for or operate in parallel with the normal charger in that channel.

A.c. power for each charger is derived from the station auxiliary power system via two 480-volt a.c., 3-phase circuits which are physically and electrically independent. Each circuit has access to a preferred (offsite) and a standby (onsite) source. If the normal circuit supplying a charger is unavailable, the alternate circuit is selected by a manual transfer. ~~Placement of the transfer switch in the alternate position and/or the closure of the 480-volt a.c. breaker supplying the alternate circuit (normally in open position) will alarm in the main control room.~~ 48 Each charger is equipped with a d.c. voltmeter, d.c. ammeter, and charger failure alarm. Malfunction of a charger is annunciated in the Main Control Room. Upon loss of normal power to a charger, each may be energized from the standby power system.

The charger is a solid-state type which converts a 3-phase 480-volt a.c. input to a nominal 125-volt d.c. output having a rated capacity of 200 amperes. Over this output current range the d.c. output voltage will vary no more than ± 1.0 percent for a supply voltage amplitude variation of ± 7.5 percent and frequency variation of ± 2.0 percent.

Some operational features of the chargers are: (1) an output voltage adjustable over the range of 125 to 140 volts, (2) equalize and float modes of operation (the charger normally

The transfer switches are mechanically interlocked to prevent closing switches in a manner to parallel both feeds. The alternate 480V feeder breakers are verified open in accordance with the technical specifications.

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All of the subdistribution circuit breakers are 150-ampere frame molded-case types with the exception of the charger input, emergency lighting, and inverter breakers, which are 400-ampere frame molded-case types. The load groups are connected to the main distribution bus with fuses sized from 60 to 400 amperes. The variation in fuses is based on the individual circuit breaker trip settings, or ratings for all devices, which are listed in Figures 8.3-47 through 8.3-50.

All circuit breakers have trip alarm contacts to alert the control room operator of a tripped breaker. The ground indicator has an alarm contact to warn the operator of a distribution system ground. Metering on the distribution board includes battery current, bus voltage, main and spare charger voltage, board charging current, and ground current. Metering for battery current and bus voltage are also located on the main control board.

<u>Tests and Inspections</u>

Prior to placing the vital d.c. system in operation, the system components will be tested to ensure their proper operation.

The batteries are tested during preoperational testing by discharging them with a load which simulates their loading during an a.c. power outage. The test is performed in accordance with IEEE-450-~~1975~~ 1980, 'Recommended Practice for Maintenance, Testing and Replacement of Large Stationary Type Power Plant and Substation Lead Storage Batteries,' Sections 4.1 and 4.2. A variable load is connected to the batteries, and a constant current drain is maintained until conclusion of the tests. The battery capacity is then determined using the procedure outlined in IEEE-450-~~1975~~ 1980, Section 5.5. 26

A battery service test, conducted in accordance with the procedures of section 5.6 of IEEE-450-~~1975~~ 1980, is also used to test the batteries under conditions as close to design as practical. After the loads have been confirmed by field measurement, performed as a part of the preoperation tests, the batteries are 52
then discharged through simulated loads for a two-hour period. The batteries are then discharged to the design minimum terminal voltage of 105 so that the battery capacity margin can be calculated. The time required to return to normal conditions is 24
established by recharging the batteries from the two-hour discharged condition to a nominally fully charged state.

Table 8.3-10

LOADS HAVING MANUAL TRANSFER BETWEEN POWER DIVISIONS

Load	Normal Supply	Alternate Supply
125V Bat Chgr I & Inverters	480V Shutdown Bd 1A1-A	480V Shutdown Bd 1B1-B
125V Bat Chgr II & Inverters	480V Shutdown Bd 1B2-B	480V Shutdown Bd 1A2-A
125V Bat Chgr III & Inverters	480V Shutdown Bd 2A1-A	480V Shutdown Bd 2B1-B
125V Bat Chgr IV & Intervers	480V Shutdown Bd 2B2-B	480V Shutdown Bd 2A2-A
125V Spare Bat Chgr 1	Con & Aux Bldg Vent Bd 1A1-A*	Con & Aux Bldg Vent Bd 1B1-B*
125V Spare Bat Chgr 2	Con & Aux Bldg Vent Bd 2A1-A*	Con & Aux Bldg Vent Bd 2B1-B*
Component Cooling System Pump C-S	480V Shutdown Bd 2B2-B	480V Shutdown Bd 1A2-A
Spent Fuel Pit Pump C-S	480V Shutdown Bd 1A1-A*	480V Shutdown Bd 2B1-B*
125V Aux Feedwater Turbine (AFWT), DC Manual Transfer Switch (Unit 1)	125V DC Vital Battery Board III* **	125V DC Vital Battery Board IV* **
120V AFWT, AC Manual Transfer Switch (Unit 1)	120V AC Vital Instrument Power Board 1-III*	120V AC Vital Instrument Power Board 1-IV*
125V AFWT, DC Manual Transfer Switch (Unit 2)	125V DC Vital Battery Board I*	125V DC Vital Battery Board II*
120V AFWT, AC Manual Transfer Switch (Unit 2)	120V AC Vital Instrument Power Board 2-I*	120V AC Vital Instrument Power Board 2-II*

*These boards are neither the normal nor alternate supply but are the available boards from which the loads can be supplied.

**During station blackout the 125V AFWT, DC manual transfer switch (Unit 1) must be placed and maintained in the normal position.

to ensure safe handling of fuel assemblies:

1. Electrical Interlocks

   a. Bridge, Trolley and Hoist Drive Mutual Interlocks

   Bridge, trolley and winch drives are mutually interlocked, using redundant interlocks to prevent simultaneous operation of any two drives and therefore can withstand a single failure.

   b. Bridge Trolley Drive - Gripper Tube Up

   Bridge and trolley drive operation is prevented except when the gripper tube up position switches are actuated. The interlock is redundant and can withstand a single failure.

   c. Gripper Interlock

   An interlock is supplied which prevents the opening of a solenoid valve in the air line to the gripper except when zero suspended weight is indicated by a force gage. As back-up protection for this interlock, the mechanical weight actuated lock in the gripper, prevents operation of the gripper under load even if air pressure is applied to the operating cylinder. This interlock is redundant and can withstand a single failure.

   d. Excessive Suspended Weight

   Two redundant excessive suspended weight switches open the hoist drive circuit in the up direction when the loading is in excess of 110 percent of a fuel assembly weight. The interlock is redundant and can withstand a single failure.

   e. Hoist-Gripper Position Interlock

   An interlock in the hoist drive circuit in the up direction permits the hoist to be operated only when either the open or closed indicating switch on the gripper is actuated. The hoist-gripper position interlock consists of two separate circuits that work parallel such that one circuit must be closed for the hoist to operate. If one or both interlocking circuits fail in the closed position, an audible and visual alarm on the console is actuated. The interlock, therefore, is not redundant but can withstand a single failure since both an interlocking circuit and the mointoring circuit must fail to cause a hazardous condition.

   ¶ The hoist is also provided with a low-load safety circuit, which 9.1-20 will prevent down-travel of the hoist if the load cell weight is suddenly reduced ~~to~~ to 2100 lbs wet (2200 lbs dry) ~~300 pounds~~. This minimizes the possibility of fuel assembly damage if one fuel assembly were to be lowered on top of another fuel assembly.

normally closed during purge system shutdown. See Section 6.2.4. Since the annulus is maintained at a 5-inch water gauge negative pressure by the annulus vacuum control system, the annulus portion of the purge system ducts is maintained at the negative pressure by four 1/2-inch leakoffs. This arrangement is designed to prevent containment contamination leakage from escaping through the purge system ducts into the Auxiliary Building.

The Reactor Building Purge Ventilation System is an engineered safety feature. Its primary containment isolation valves and intermediate piping are designed in accordance with ANS Safety Class 2A; other portions are designated ANS Safety Class 2B. The instrument room purge subsystem is not an engineered safety feature and credit for LOCA or fuel handling accident mitigation is not claimed. 55

Containment ventilation isolation signals automatically shut down the fan systems and isolate the purge systems by closing their respective dampers and butterfly valves. Each Primary Containment purge system isolation butterfly valve ~~including those provided for containment penetration isolation,~~ is designed for failsafe closing within 4 seconds. The purge containment isolation valve locations and descriptions are given in Table 9.4-1. Each valve is provided with an air cylinder valve operator, control air solenoid valve, and valve position indicating limit switches.

9.4.6.3 Safety Evaluation

Functional analyses and failure modes and effects analysis have shown that the Reactor Building Purge Ventilating System has the capabilities for normal operations and for accident mitigation. These results are described below.

A functional analysis of the system shows that:

1. During normal operation, adequate fresh air will be provided for breathing and for contamination control when the primary or secondary containment is occupied.

2. Primary and secondary containment exhaust air will be cleaned up during normal operations and following a fuel handling accident. 52 53

3. Thyroid doses (inhalation pathway)

4. Thyroid doses (pasture/cow/milk pathway)

The basic assumptions and calculational methods used in computing these doses are described in Subsection ~~11.3.8.~~ 11.3.10.

Continual review of the data resulting from the offsite monitoring program and reevaluations of the adequacy of the dose models will ensure that the actual doses received by individuals and the population as a whole remain as low as practicable and within the applicable Federal Regulations.

11.6.2.2 <u>Internal Doses from Liquid Effluents</u>

The following doses will be calculated for exposures to radionuclides routinely released in liquid effluents:

1. Internal doses from the ingestion of water

2. Internal doses from the consumption of fish

3. External doses from water sports

A detailed description of the basic assumptions and calculational methods used in calculating the doses is given in Subsection ~~11.2.8.~~ 11.2.9. 42

The dose models employed will be continually reevaluated in light of the data resulting from the offsite monitoring program to ensure that all significant pathways are included in the calculations and to ensure that the actual doses received by individuals and the population as a whole remain as low as reasonably achievable and within the applicable Federal Regulations.

11.6.3 SAMPLING MEDIA, LOCATIONS, AND FREQUENCY

The ~~proposed~~ operational environmental radiological monitoring program is ~~presented in Table 16A.3.2-1. The final program will be~~ outlined in section 3.12 of the technical specifications~~, issued with the operating license.~~ The media selected were chosen on two bases: First, those vectors which would readily indicate releases from the plant, and secondly, those vectors which would indicate long-term buildup of radioactivity. Consideration was also given to the pathways which would result in exposure to man, such as milk and food crops. Locations for sampling stations were chosen after considering meteorological factors and population density around the site. Frequencies for sampling the various vectors

TABLE 14.2-1

LIST OF PREOPERATIONAL TESTS
(Sheet 212)

Title of Test No. TVA-68	Test Prerequisites	Test Objectives Summary of Testing and Acceptance Criteria
		obtained when tested with DOP in accordance with Section 10 of ANSI N510-1980. 5. Leak tightness efficiency of at least 99.95% for each charcoal adsorber section of the PASF ACU when tested with Freon in accordance with Section 12 of ANSI N510-1980. 6. The relative humidity heater of the PASF ACU shall be at least 5kW continuous operation and shall shut off on low airflow signal. 7. The supply and exhaust fans of the PASF sampling and associated work areas shall maintain a positive pressure [greater than or equal to 0.12] ~~of 0.125 ± 0.05~~ inch of water with respect to atmospheric pressure for at least 30 minutes. A dirty filter condition (approximately 6-inch of water) shall be simulated to verify that ΔP requirements can be met under the worst conditions. 48 8. The supply and exhaust fans of the PASF Sentry sampling cabinets and the valve gallery shall maintain a negative pressure [less than or equal to 0.25] ~~between 0.20 to 0.30~~ inch of water with respect to sampling area pressure for at least 30 minutes. A dirty filter condition

022.26 Question:

Identify all secondary containment openings such as personnel access doors and equipment hatches. Discuss the administrative control to be exercised over these openings.

Response:

There are two personnel locks and one equipment hatch in each shield building. One personnel lock and the equipment hatch are between the Auxiliary Building and the Reactor Building at Elevation 757.0. The other personnel lock is between the Auxiliary Building and the Reactor Building at Elevation 713.0. The location of the equipment hatch and personnel locks is shown on Figures 3.8.1-4 through 3.8.1-6. 28

~~In modes 1, 2, 3, or 4, entry through the personnel air lock on elevation 713.0 will be controlled by the operator. In modes 5 and 6, entries will be logged on an entry log posted with a special work permit.~~

Insert Attached → ~~In modes 1, 2, 3, or 4, entry through the personnel air lock on elevation 757.0 will be controlled by the operator. In mode 5, entries will be logged on an entry log posted with a special work permit. In mode 6, entry will be controlled by a public safety officer who will have a list of authorized personnel.~~ 36

~~All movement through the equipment hatch on elevation 757.0 will be on an "as authorized" basis.~~

~~Special work permit requirements will be checked before each entry.~~

Insert for Q 022.26

In mode 1, 2, 3 or 4, entry through the personnel air locks on elevations 713 or 757 will be controlled by Public Safety Service (PSS) who will log personnel on an entry log. PSS will continue to control access during modes 5 and 6, but will not log entries at the air locks.

In mode 6 on elevation 757, PSS will log personnel who enter the control zones.

A Radiation Work Permit will be required for all entries after criticality.

All movement through the equipment hatch on elevation 757 will be on an "as authorized basis."