TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

July 29, 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 for TVA to verify that the as-built plant is in conformance with the description in the FSAR as amended. These changes include revisions to Chapter 3 text, revisions to table 14.2-1, and revised responses to FSAR Questions 040.25, 212.116, 371.31, and 450.1. 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 29th day of July 1985
Paulette H. White
Notary Public
My Commission Expires 8-24-88

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
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assigned to nuclear power plant equipment per the August 1970 Draft of ANSI N18.2,"Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants." The TVA piping classification system for WBNP does not conform strictly to the guidance of Regulatory Guide 1.26 (which was not in affect on the docket date for the Construction Permit). The ANS safety classification of each component has been considered in the various aspects of design, fabrication, construction, and operation. 28 5.3

3.2.2.1 Class A

Class A applies to reactor coolant pressure boundary components whose failure could cause a loss of reactor coolant which would not permit an orderly reactor shutdown and cooldown assuming that makeup is only provided by the normal makeup system. Branch piping 3/8 inch inside diameter and smaller, or protected by a 3/8 inch diameter or smaller orifice, is exempted from Class A. The branch piping for the pressurizer steam space instrumentation nozzles is also exempted from Class A.

3.2.2.2 Class B

Safety Class B applies to those components of safety systems necessary to fulfill a system safety function. The classification is specifically applicable to containment and to components of those safety systems, or portions thereof, through which reactor coolant water flows directly from the reactor coolant system or the containment sump.

3.2.2.3 Class C

Class C applies to components of those safety systems that are important to safe operation and shutdown of the reactor but that do not recirculate reactor coolant.

3.2.2.4 Class D

Class D applies to components not in TVA Class A, B, or C the failure of which would result in release to the environment of an offsite dose of 0.5 rem or greater of gaseous radioactivity normally held up for radioactive decay. 28

3.2.2.5 Relationship of Applicable Codes to Safety Classification for Mechanical Components

The applicable codes used for the design, material selection, and inspection of components for the various safety classes are shown in Table 3.2-4. The applicable TVA classification and ANS Safety Classification for each of the fluid systems are tabulated in Table 3.2-2. TVA classifications are also delineated on flow diagrams which have been included in those

TABLE 3.2-2 (Continued)
SUMMARY OF CRITERIA - MECHANICAL SYSTEM COMPONENTS

Component	Scope (1)	Safety Class (2)	Code (3)	QA Required (4)	Location (5)	Rad Source (6)	Seismic Qual. (7)
Demineralizers							
Mixed Bed	W	D	III-3	X	AB	X	I
Cation	W	D	III-3	X	AB	X	I
Filters							
Reactor Coolant	W	B	III-2	X	AB	X	I
Seal Water Return	W	B	III-2	X	AB	X	I
Seal Water Injection	W	B	III-2	X	AB	X	I
Boric Acid	W	C	III-3	X	AB	-	I
Miscellaneous							
Letdown Orifices	W	B	III-2	X	C	X	I
Boric Acid Blender	W	C	III-3	X	AB	-	I
Boron Recovery System							
Pumps							
Holdup Tank Recirc.	W	D	P&V-III	X	AB	X	I
Gas Stripper Feed	W	D	P&V-III	X	AB	X	I
Monitor Tank	W	G	~~P&V-III~~ VIII	X	AB	P	I(L)
Tanks							
Holdup	T	D	III-3	X	AB	X	I
Monitor	T	G	~~III-3~~ VIII	X	AB	P	I(L)
Demineralizers							
Evaporator Feed Ion Exch	W	~~D~~ G	~~III-3~~ VIII	X	AB	X	I (L)
Evaporator Condensate	W	~~D~~ G	~~III-3~~ VIII	X	AB	X	I (L)
Filters							
Evaporator Feed Ion Exch	W	~~D~~ G	~~III-3~~ VIII	X	AB	X	I (L)
Evaporator Condensate	W	~~D~~ G	~~III-2~~ VIII	X	AB	X	I (L)
Concentrates	W	~~D~~ G	~~III-3~~ VIII	X	AB	X	I (L)
Miscellaneous							
Gas Stripper & Boric Acid Evap. Pkg.	W	~~D~~ 16	~~III-3~~ (16)	X	AB	X	I (L)

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NOTES TO TABLE 3.2-2

SUMMARY OF CRITERIA - MECHANICAL SYSTEM COMPONENTS

Notes:

(1) T = Tennessee Valley Authority
W = Westinghouse

(2) A = TVA Safety Class A
B = TVA Safety Class B
C = TVA Safety Class C
D = TVA Safety Class D
G = TVA Safety Class G
H = TVA Safety Class H

I = Seismic Class I, part of structure

(3) The code class listed for an item is the minimum required. An item may have been obtained to a higher code level than that listed.

~~(3)~~ III = ASME Boiler and Pressure Vessel Code - Section III

III-1 = ASME Boiler and Pressure Vessel Code - Section III, Class 1

III-2 = ASME Boiler and Pressure Vessel Code - Section III, Class 2

III-3 = ASME Boiler and Pressure Vessel Code - Section III, Class 3

IIIa9 = ASME Boiler and Pressure Vessel Code - Section III, Article 9 'Protection Against Overpressure'

VIII = ASME Boiler and Pressure Vessel Code - Section VIII

P&V-I = ASME Code for Pumps and Valves for Nuclear Power, Class I

P&V-II = ASME Code for Pumps and Valves for Nuclear Power, Class II

P&V-III = ASME Code for Pumps and Valves for Nuclear Power, Class III

D100 = American Waterworks Association, Standard for Steel Tanks, Standpipes, Reservoirs, and Elevated Tanks for Water Storage, AWWA, D100

B31.1 = ANSI B31.1.0 (1967)

= Designed in accordance with

ACI = American Concrete Institute

AMCA = Air Moving and Conditioning Association

(3) (cont'd.)

ARI = Air Conditioning and Refrigeration Institute
HSI = Hydraulic Institute Standards
IEEE = Institute of Electrical and Electronics Engineers
NFPA = National Fire Protection Association

B58.1 = ANSI B58.1 Vertical Turbine Pumps

(4) Safety related quality assurance required:
X = Yes, - = No

(5) C = Containment
AB = Auxiliary Building
CB = Control Building
DB = Diesel Generator Building
SB = Service Building
CDWEB = Condensate Demineralizer Waste Evaporator Building
O = Outdoors above ground
B = Buried in ground
P = ERCW Pumping Station

(6) X = Source of radiation
- = No source of radiation
P = Possible source of radiation

(7) I = Seismically qualified
I(L) = Limited seismic qualification
- = Not seismically qualified

(8) AMCA Class III and performance tested in accordance with AMCA Standard air moving devices.

(9) Performance test required.

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NOTES TO TABLE 3.2-2 (Continued)

SUMMARY OF CRITERIA - MECHANICAL SYSTEM COMPONENTS

(10) Limited Fire Protection QA applies.

(11) Those components of the Heating, Ventilating, and Air Conditioning System (HVAC), which are not covered directly by the TVA piping classifications of Subsection 3.2.2, have been designed and constructed to standards and specifications which are equivalent to ANS Safety Class 2b.

(12) The coolers located in the Reactor Building are supported seismic category I(L) but are not qualified to maintain ERCW pressure boundary integrity.

(13) Vessel was built to the requirements of ASME code but does not have code stamp.

(14) Acceptable for use within Regulatory Guide 1.26 quality group C system (equivalent to ASME Section III, Class 3.)

(15) Although not purchased to ASME Section III requirements, these screen wash pumps are seismically qualified, have limited QA, and are the best commercially available product for the service.

(16) This component is actually a system containing many components. Those parts of the system that contain component cooling water are safety class C with design code of ASME III, class 3. The remainder of the system is safety class G with design codes as ~~specified~~ identified in Table 3.2-5.

TABLE 3.2-2a

CLASSIFICATION OF SYSTEMS HAVING MAJOR DESIGN CONCERNS RELATED TO A PRIMARY SAFETY FUNCTION

System	System Subsection	Safety Class ANS. N-18.2	TVA Class	Seismic* Category
Auxiliary Control Air	Portions of the System necessary for containment isolation.	2a	B	I
	Balance of system. (See Note 1 System boundary is considered to exist to the upstream side of the filters which tie the normal service air or nonessential control air systems to the auxiliary control air lines).	2b	C	I
Boron Recycle	Equipment used to provide a ready supply of concentrated boric acid (boric acid tanks, boric acid transfer pumps, boric acid filters, and associated pipes and valves; B.A. transfer pumps.	2b	C	I
	Processing and Waste Holdup Equipment ~~used to control~~ whose failure could result in a site boundary dose of 0.5 rem or more.	3	D	I

Revised by Amendment 55

CLASSIFICATION OF SYSTEMS HAVING MAJOR DESIGN CONCERNS
RELATED TO A PRIMARY SAFETY FUNCTION

System	System Subsection	Safety Class ANS. N-18.2	TVA Class	Seismic* Category
	~~radwaste (gas stripper and boric acid evaporator packages~~ (gas stripper feed pumps, holdup tanks and holdup tank recirculation pumps, ~~evaporator feed ion exchangers~~, and associated piping and valves).			
	Other equipment which carries minimal or no radioactive wastes and/or has no safety function to perform (monitor tank and pumps, evaporator condensate demineralizers, batching tank, gas stripper and boric acid evaporator packages, evaporator feed ion exchangers, condensate filters, concentrate filters, evaporator feed ion exchange filters, and associated pipes and valving).	-	G	I(L)
Chemical and Volume Control	Equipment that circulates reactor coolant normally or during an accident (charging, letdown, excess letdown, seal water return lines; positive displacement and centrifugal charging pumps; volume control tank; and, miscellaneous associated lines and valves).	2a	B	I
	Equipment necessary for boric acid addition	2b	C	I

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2000 psi.

175 cubic yards with specified strength of 3000 psi, or more.

For actual application, the quantities of each mix produced per shift were such that the average quantities represented by each test sample were appreciably less than that specified.

d. Aggregate. Tests are specified by N45.2.5 which appear inappropriate to certain aggregates. A carefully selected crushed limestone fine aggregate should not require testing for organic impurities. TVA required periodic reinspection of the quarry. The quarry strato and weathering effects did not change and therefore testing listed with 6-month frequency in N45.2.5 were not repeated.

e. Water and ice. See 1.b above. The chemical tests in CRD C 400 were repeated every 2 months, and any time a change in the water was suspected. The strength test was repeated only when chemical tests results changed significantly. 41

f. Fly ash was sampled every 3 truck loads and tested for fineness. Six samples were combined and tested for total requirements. See 1.a above.

g. Cement. TVA accepted manufacturers' mill tests which represented no more than 400 tons. TVA made tests at greater intervals which checked manufacturers' strength test within 600 psi or duplicate tests were required.

3. TVA's concrete acceptance does not conform to ACI 318. It does conform to ACI 214. TVA ~~required~~ requires that no more than 10 percent of the strength test results be below the specified strength for specified strengths equal to or greater than 3000 psi. For lower strength concrete, 20 percent of the strength test results may be below the specified strength. Such concrete is used where a batch of somewhat lower strength concrete is not critical and where hydration temperature limitations are critical. ACI 318 applies the criteria that the averages of all sets of three consecutive strength test results at least equals the specified strength and that not more than 1 of 100 strengths test results will be more than 500 psi below the specified strength. If the standard deviation of the strength test results is 500 psi, the required over-strengths from the three criteria range between 640 psi and 670 psi. We do not believe that the three criteria produce significantly different results. ACI 318 states that acceptability is based on no strength test result being more than 500 psi below the specified strength, 38 51

more than 500 psi below the specified.

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but its commentary and ACI 310 points out that 1 test in 100 probably will be. TVA specifications require 3-day tests and investigation if results are below a specified limit so as to prevent incorporation of very low strength concrete in a structure.

4. For exceptions to personnel qualifications see Chapter 17 of the WBNP FSAR.

TVA considers the applicability of N45.2.6 (Section 1.1 Scope) to be limited to those personnel performing inspection, examination, and test functions. Responsibility for examination and certification of these individuals has been established. These certifications do not correspond to the levels established in N45.2.6, except for NDE personnel who are certified in accordance with SNT-TC-1A. Construction site inspection, examination, and testing personnel are selected and assigned mechanical, electrical, instrumentation, civil, material, or welding classifications. Responsible supervision in the respective areas perform the functions identified in Table 1 as L-III in N45.2.6. Inspection, examination, and tesing personnel in the various classifications perform the functioning identified in Table 1 as L-I and L-II in N45.2.5. 38

TVA General Construction Specification G-32 'Bolts Anchors Set in Hardened Concrete' prescribes material and methods for setting threaded anchoring devices for equipment and fixtures into concrete which has previously hardened. The specification includes installation and testing procedures for the bolt anchors. To TVA's knowledge there is no known equivalent specification in the public domain. However, where manufactured expansion anchors are used, the specification requires them to be installed according to the manufacturer's instructions.

TVA Construction Specification G-29 'Process Specification for Welding' is a specification that has been developed for welding, nondestructive examinations, heat treatment and allied field fabrication procedures to be used during construction. G-29C conforms to the criteria in AWS D1.1-72 and G-29M conforms to the criteria in the American Society of Mechanical Engineers, Boiler and Pressure Vessel Code. TVA referenced these codes in this section of the FSAR, item 3 and 5.

Unless otherwise indicated in the FSAR, the design and construction of the interior structures are based upon the appropriate sections of the following codes, standards, and specifications. Modifications to these codes, standards and specifications are made where necessary to meet the specific requirements of the structures.

The access door and its frame are required to maintain their integrity and Category I function only when closed. When closed there is no load on the hoist unit, and it has no function to perform. Also, the hoist unit has no function to perform relative to the airtightness of the steel enclosure at elevation 757.0. Therefore, the hoist unit is not considered as Category I.

<u>Manways in RHR Sump Valve Room</u>

Two 54-inch-diameter manways, shown in Figure 3.8.4-16, and located at elevation 698'-1' in the walls of the residual heat removal (RHR) sump valve room are provided for each reactor unit. The manways provide passageways through the walls of the sump valve room for workmen, tools, and equipment. ~~When closed, the manways provide a closure so that any leakage from the valves within the sump valve room will be confined to the room, and any floodwater will be sealed from the sump valve room~~. Delete

The doors will be closed any time reactor containment is required. ~~When closed, the manways were designed to maintain their sealing and structural integrity during and after a safe shutdown earthquake (SSE).~~ Delete Although not required for containment integrity, the manways were designed to remain intact when the doors are open during an earthquake to prevent damage to other equipment in the vicinity of the manways.

Each manway consists of an embedded steel frame and a welded steel door. ~~In the closed or sealed position,~~ The door is secured in the closed position by bolts. ~~around the periphery. Sealing is by means of two elastomer seals which are attached to the periphery of the embedded frame and are compressed sufficiently when the door is closed to prevent leakage in either direction. An air connection is provided to permit leak testing by pressurizing the air space between the seals. Another air connection is provided for pressure testing individual compartments of the sump valve room.~~ Delete The door is provided with slotted hinges to facilitate opening and closing and to allow for compression of the seals when the door is closed.

<u>Pressure Confining Personnel Doors</u>

This section covers the following pressure confining personnel access control doors located in the Auxiliary-Control Building. Door numbers listed for the doors are the designations used in Figures 3.8.4-17 through 3.8.4-20. The door details are shown in Figures 3.8.4-21 through 3.8.4-23. 5

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Railway Access Hatch Covers

After the initial inspection, periodic visual inspections of the covers are to be made. Parts inspected during the visual inspection are to include all bolted connections, structural members for paint deterioration, limit switches, and rubber seals. The seals are to be carefully, inspected for cracks, blemishes, or any other indications of deterioration of the rubber and for properly seating at the sealing surfaces.

Railway Access Door

Prior to shipment of the door from the contractor's plant, the splice welds in the skin plate of the door and welds among the periphery of the skin plate and structural members were magnetic particle tested.

After completion of the initial tests and inspection, periodic visual inspections of the door and its parts are to be made. Parts inspected are to include all bolted connections, limit switches, door tracks, and rollers. Painting is to be inspected for evidence of deterioration, and the seals are to be carefully inspected for cracks, blemishes, or any other indications of deterioration of the rubber.

Manways in RHR Sump Valve Room

After completion of erection and adjustments, the manways were checked for leakage by pressurizing the space between the sealing rings on each door to 30 psig (125 percent design pressure). The test pressure was applied to the seals for 30 minutes with no detectable leakage. Individual compartments of the sump valve rooms were also pressure tested.

After start of operation, the manways are to be periodically tested by pressurizing the space between the sealing rings. Visual inspections are to be made whenever the manways are opened. Parts visually inspected are to include bolted connections, hinges, structural members for paint deterioration, and seals. The seals are to be carefully inspected for cracks, blemishes, or any other indications of deterioration.

Pressure Confining Personnel Doors

After the initial inspection, periodic visual inspections of the doors are to be made. Parts inspected during these visual inspections are to include all bolted connections, structural members for paint deterioration, latching or dogging mechanisms

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TABLE 14.2-1

LIST OF PREOPERATIONAL TESTS
(Sheet 71)

Title of Test No. *W9.6	Test Prerequisites	Test Objectives Summary of Testing and Acceptance Criteria
*Operational Alignment of Process Temperature Instrumentation	~~The test is run at hot shutdown conditions prior to initial criticality, 75 percent power, and 100 percent power.~~ The ΔT and T_{avg} process instrumentation shall have been initially aligned at the normal no load Reactor Coolant Conditions.	The objective of the test is to align the ΔT and T_{avg} process instrumentation under isothermal conditions prior to criticality, at power levels up to approximately 75 percent power and then extrapolate values to 100 percent, and finally at full power. Insert attached → ~~Adjustments are made to the ΔT and T_{avg} process instrumentation as necessary for for each channel to fall within 0.5[o]F of the average of all channels (the average ΔT of all channels falls within 60[o]F ± 2[o]F) and for the extrapolated 100 percent value of T_{avg} for each channel to fall within 1[o]F of the extrapolated average of all channels.~~

*Preoperational test to be completed during startup test program.

Revised by Amendment 55

Insert Table 14.2-1
Sheet 71

~~Test objectives....~~

COMPUTED ____ DATE ____
CHECKED ____ DATE ____

Prior to initial criticality each ΔT channel is aligned to within ±0.5% accuracy. The resistance/voltage converter (R/E) outputs are aligned to within 0.7°F of the respective equivalent spare resistance temperature detectors (RTD) resistance readings. The T_{AVG} voltage/current (E/I) amplifiers are aligned to within 0.5°F of the mathematical average of the R/E outputs.

At approximately 30% and 50% power levels, the R/E outputs are aligned to within 0.7°F of the respective equivalent spare RTD resistance readings. The T_{AVG} E/I amplifiers are aligned to within 0.5°F of the mathmatical average of the R/E outputs.

At approximately 75% power level, the 100% power T_{AVG} and ΔT values are determined by extrapolation. The extrapolated T_{AVG} values are compared to the maximum T_{AVG} as defined by Westinghouse (+1, −2°F). Corrections if necessary will be made in Preoperational Test W-9.7. The ΔT channels will be aligned to within 1% of reactor power from calorimetric analysis.

At approximately 90% power level, the R/E outputs are aligned to within 0.7°F of the respective equivalent spare RTD resistance readings. The T_{AVG} E/I amplifiers are aligned to within 0.5°F of the mathmatical average of the R/E outputs. The ΔT channels are aligned to within 1% of reactor power from calorimetric analysis.

At approximately full power level the R/E outputs are aligned to within 0.7°F of the respective equivalent spare RTD resistance readings. The T_{AVG} E/I amplifiers are aligned to within 0.5°F of the mathmatical average of the R/E outputs. The ΔT channels are realigned to within 1% of reactor power from calorimetric analysis, if necessary. New 100% power ΔT values are linearly extrapolated if the ΔT channels

SHEET ______ OF ______

Table 14.2-1

sht 71 (Cont)

COMPUTED ______ DATE ______

CHECKED ______ DATE ______

required realignment, the reference T_{AVG} values for the overpower ΔT trip channels are rescaled to the extrapolated T_{AVG} values.

TABLE 14.2-1

LIST OF PREOPERATIONAL TESTS
(Sheet 152)

Title of Test No. *TVA-22	Test Prerequisites	Test Objectives Summary of Testing and Acceptance Criteria
		pressure data point at the maximum start time point exceeds the manufacturer's curve. Acceptance criteria also verifies NPSH, water temperature, stablized bearing temperatures, and virbation. During cold functional tests, the turbine-driven pump will be tested to the highest capacity obtainable when auxiliary boiler steam in utilized.
		2. Cold functional and hot functional testing and post-critical testing will be conducted. The cold functional tests will demonstrate proper actuation of the motor-driven pumps from an accident signal, and will test both the motor- and turbine-driven pumps for simultaneous startup in the minimum recriculation mode. Hot functional tests will be conducted with the Reactor Coolant System at temperature and pressure. The hot functional testing will include pump tests conducted over a range of steam generator pressures. Post-critical tests are conducted at less than ~~10%~~ 25% power to obtain more complete testing with the steam generators and turbine at operating temperature and pressure.

*Preoperational test to be completed after fuel loading.

Revised by Amendment 55

040.25 Question

State the extent of conformance of the safety systems to Regulatory Guides 1.63 and 1.75. Also, for each case where the Watts Bar design does not conform to a particular recommendation contained in these Regulatory Guides, state the technical bases for the acceptability of the Watts Bar design.

Response

RCP motors are the only medium voltage (6,900 volt) loads inside containment. For these circuits, one circuit breaker is provided when the unit is at power (RCP's running off the unit station service transformer) and two circuit breakers are provided when supplied from offsite power (RCP's fed from common station service transformer via RCP start bus). These breakers are provided in the normal course of auxiliary power system design and are non-Class IE. Each RCP is supplied from dedicated switchgear (the 6,900 volt RCP board), which has a normal and an alternate breaker. Each of these breakers is equipped with redundant trip circuits consisting of a trip coil, a set of overcurrent relays, and current transformers which are separated to the maximum extent possible. Each of these separate and redundant trip circuits is provided control power from separate non-Class IE dc sources. Should either trip circuit fail for any reason, the remaining circuit will perform the required trip function. 46 44

Regulatory Guide 1.63 'Electric Penetration Assemblies in Containment Structures for Water-Cooled Nuclear Power Plants'

See FSAR Section 8.1.5.3 for conformance statement

Regulatory Position C(1) - The Watts Bar design conforms to the recommendations of the regulatory guide; however, GDC 2 phenomena were not a design basis for the circuit overload protection of nonsafety-related loads such as the RCP motors.

Regulatory Position C(2) - The maximum containment pressure as defined in footnote 1, Article NE 3000 of Section III of the ASME Boiler and Pressure Vessel Code is 15 psi. This is the pressure that was specified in the purchase contract for the WBNP penetrations. We are in compliance with this position.

Regulatory Position C(3) - Not applicable.

Regulatory Position C(4) - The quality assurance requirements for the design, construction, installation,

→ add INSERT Here

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and testing of electric penetration assemblies as set forth in ANSI N45.2-1971 and ANSI N45.2.4-1972 are contract requirements for the WBNP penetrations. 42

Add INSERT 040.25-2(A)

44

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448

INSE 040.25-2 (A)

[illegible]

[illegible]

Regulatory Guide 1.75 "Physical Independence of Electric Systems"

The criteria and their bases for the separation of Class 1E equipment and circuits at Watts Bar are given in sections 7.1.2.2 and 8.3.1.4. As stated in section D. "IMPLEMENTATION" of Regulatory Guide (RG) 1.75, January 1975, this guide applies to construction permit applications for which the issue date of the Safety Evaluation Report is February 1, 1974, or after. The Watts Bar Construction Permit was issued January 23, 1973. RG 1.75 was issued after the Watts Bar design was complete.

However, the Watts Bar design basically meets RG 1.75 except in the area of isolation devices and subsequent associated circuits, cable marking at intervals, and separate spreading areas.

The Watts Bar design utilizes circuit breakers and/or fuses in circuits as isolation devices. Since these devices are qualified as part of the Class 1E equipment, they are considered to provide acceptable isolation for supplying nondivisional loads. The circuits for the nondivisional loads are classified as nondivisional. ~~Thus, no circuits at Watts Bar have been designated as associated~~. The routing of nondivisional (nonsafety-related) circuits is described in Section 8.3.1.4.3. The nondivisional circuits are subject to the same requirements as Class 1E circuits such as cable derating, environmental qualification, flame retardance, splicing restrictions and raceway fill.

Conduit tags are located at conspicuous intervals (e.g., at entrance and exit points of large rooms and at terminations) showing their respective division of separation. Markers are located on exterior side surfaces of Class 1E cable trays at intervals not to exceed 15 feet. Cables routed in Class 1E (train or channel) cable trays are identified at intermediate points. These color coded identifications (by means of marking, tagging or taping) occur near tray intersections at sufficient intervals to provide visual verification that the cable installation conforms to the separation criteria. The computer cable routing program (discussed in Section 8.3.1.4.5) ensures that proper separation of circuits is maintained on its respective

[illegible]

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tray network assignment.

The separation criteria for the cable spreading room is discussed in Section 8.3.1.4.2. Redundant cable spreading areas are not feasible at Watts Bar. The cable spreading room is shown in Figures 1.2-4 and 8.3-2. Only those power circuits that serve equipment within the Control Building are allowed in the cable spreading room. These circuits are routed in enclosed raceways.

into the lower containment in the vicinity of the sump and the availability or lack of sufficient horizontal surface areas or obstructions to promote settlings or holdup of debris prior to reaching the sump.

d. Does metal mirror insulation house other materials, fibrous or otherwise, which could become debris is the insulation were blown off as a result of a LOCA?

e. If the Watts Bar containment contains loose insulation, include examples of how the insulation will be precluded from reaching the sump.

5. (~~4~~) Provide a schematic drawing of the post-LOCA water level in containment during the recirculation mode relative to the elevation of the ECCS sump floor. Include on this drawing the location of the containment water level sensor and the elevations corresponds to readings of zero and 100 percent of range on the control room indicator.

6. (~~5~~) Provide several large scale drawings of the containment structures, systems and components at elevations.

7. (~~6~~) Does the Watts Bar utilize or similar materials in the containment during power operation for purposes such as reactor cavity annulus biological shielding (e.g., sand tanks or sand bags) or reactor cavity blow out sand plugs?

Response

It is TVA's understanding that resolution of Generic Task A-43 'Containment Emergency Sump Reliability' is being evaluated by Burns and Roe as consultants.

TVA's interim position on task A-43 was submitted to NRC by letter dated September 11, 1981 from L. M. Mills to E. Adensam.

To support resolution of this issue the above requested information was provided to Mr. R. Reyer of Burns and Roe by letters dated October 20, 1980 and December 23, 1980.

SHEET ____ OF ____

TOTAL SUSPENDED SOLIDS (TSS) DATA FOR LOCATION TN RIVER MILE (TRM) 529.9 (WATTS BAR DAM TAIL RACE) FOR 1973 - 1978

COMPUTED ____ DATE ____

CHECKED ____ DATE WBN

TABLE 371.31-1

DATE	TIME	FLOW (cfs) AVG HOURLY	FLOW (cfs) AVG DAILY	TSS (mg/l)
1-30-73		43,900		4
4-18-73		20,800		11
8-27-73	1310		33,300	11
8-29-73	1311		33,300	8
11-13-73	1305	32,800		6
11-13-73	1306		24,800	6
1-20-74		46,000		9
1-28-74		87,300		12
2-12-74	1140		75,300	14
2-13-74	1141		75,300	14
3-18-74		37,800		6
4-15-74		55,700		14
5-15-74	1130		34,800	4
5-15-74	1131		34,800	4
6-17-74	800	35,500		10
7-22-74	704	37,700		6
8-13-74	1300		31,000	7
8-13-74	1301		31,000	7
9-16-74	1200	33,100		5
10-23-74	800	21,900		3
12-6-74	800	43,900		3
2-4-75	1215	45,800		12
2-4-75	1216	45,800		12
3-17-75		69,700		13
4-14-75		41,400		10
5-19-75	1147	33,600		8
5-19-75	1148	33,600		9
6-23-75		13,100		<1
7-21-75		24,100		3
8-5-75	1210		29,300	9
8-5-75	1211		29,300	9
9-15-75		35,000		4
10-20-75		32,000		4
11-4-75	1302		24,800	4
11-4-75	1310		24,800	5
12-15-75		14,200		9
1-17-77		45,800		7
2-9-77	1250	22,100		5
2-9-77	1300	22,100		6
5-3-77	1910	35,500		7
5-3-77	1915	35,500		7
8-2-77	1123	20,600		8
8-2-77	1132	20,600		7
11-8-77	1223		36,100	6
11-8-77	1237		36,100	6
2-7-78	1245	46,300		12
2-7-78	1247	46,300		12
5-23-78	1210	18,500		4
8-8-78	1325	42,300		6
11-7-78	1010	17,200		6

SUMMARY TRM 529.9

No. OF SAMPLES	MEAN FLOW	MEAN TSS	MAX FLOW	MAX TSS
50	36,200 cfs	7.5 mg/l	87,300 cfs	14 mg/l

FOR LOCATION TN RIVER MILE (TRM) 527.4

FOR 1973 - 1977

COMPUTED ______ DATE ______

CHECKED ______ DATE WBN

TABLE ~~371.31-2~~

DATE	TIME	FLOW (cfs) AVG HOURLY	FLOW (cfs) AVG DAILY	TSS (mg/l)	DATE	TIME	FLOW (cfs) AVG HOURLY	FLOW (cfs) AVG DAILY	TSS (mg/l)
11-13-73			24,800	8	12-2-76			25,300	5
"			"	8	"			"	4
"			"	7	"			"	4
"			"	6	"			"	4
2-12-74			75,300	14	5-5-76			14,500	3
"			"	13	"			"	5
"			"	16	"			"	4
"			"	17	"			"	3
5-15-74			34,800	5	8-4-76			21,900	13
"			"	3	"			"	13
"			"	5	"			"	12
"			"	4	"			"	12
8-13-74			31,000	8	11-4-76			32,100	5
"			"	8	"			"	5
"			"	6	"			"	4
"			"	7	"			"	5
2-4-75			83,700	11	2-9-77			28,100	4
"			"	12	"			"	3
"			"	12	"			"	3
"			"	12	"			"	—
5-19-75			25,400	10	5-3-77			29,300	2
"			"	10	"			"	6
"			"	7	"			"	4
"			"	6	"			"	6
8-5-75			29,300	9	8-2-77			21,000	9
"			"	8	"			"	8
"			"	9	"			"	8
"			"	—	"			"	9
11-4-75			24,800	7	11-5-77			36,100	7
"			"	7	"			"	7
"			"	5	"			"	6
"			"	3	"			"	8

MEAN FLOW 33,700 cfs MEAN TSS 7.5 mg/l

MAX FLOW 75,300 cfs MAX TSS 17.0 mg/l

TOTAL SUSPENDED SOLIDS (TSS) AND SETTLEABLE SOLIDS (SS) DATA AT INTAKE STRUCTURE FOR 3-79 10-81

TABLE 371.31-3

DATE	Q (mgd)	T (°C)	TSS (mg/l)	SS (ml/l)
3-79	7.3	7.6	5.7	< 0.1
3-79	7.8	7.6	7.2	< 1.0
4-79	8.5	5.7	4.2	< 0.1
6-79	7.4	19.7	0.1	< 0.1
6-79	7.4	19.7	4.5	< 0.5
7-79	8.0	13.5	5.6	< 0.5
8-79	19.2	19.9	9.0	< 1.0
9-79	26.4	22.6	4.0	< 1.0
10-79	11.2	19.1	7.0	< 1.0
11-79	6.9	15.0	6.6	< 1.0
12-79	25.1	9.3	5.5	< 1.0
1-80	24.5	8.8	3.6	< 1.0
2-80	20.5	6.2	12.2	< 1.0
3-80	26.3	8.0	7.3	< 1.0
4-80	10.0	12.7	3.2	< 1.0
5-80	18.0	18.0	4.0	< 1.0
6-80	34.0	23.0	4.0	< 1.0
3-80	34.0	26.0	1.9	< 1.0
8-80	34.0	26.0	2.4	< 1.0
9-80	34.0	23.0	3.8	< 1.0
10-80	34.0	17.0	2.9	< 1.0
11-80	34.0	14.0	4.5	< 1.0
12-80	34.0	9.0	2.4	< 1.0
1-81	34.0	4.8	2.9	< 1.0
2-81	34.0	11.0	2.9	< 1.0
3-81	34.0	13.0	3.3	< 1.0
4-81	34.0	16.0	2.0	< 1.0
5-81	34.0	18.5	9.4	< 1.0
6-81	34.0	22.4	2.9	< 1.0
7-81	42.8	25.0	4.6	< 1.0
8-81	38.1	26.8	2.3	< 1.0
9-81	41.3	25.0	3.5	< 1.0
10-81	41.5	19.3	3.3	< 1.0
AVERAGE	27.5	16.0	4.6	< 1.0
	(N = 30)	(N = 30)	(N = 33)	(N = 33)

NOTE: 1 DETERMINED FROM 8 hr COMPOSITE SAMPLE

2. 1.0 ml/l IS THE ACCEPTED MINIMUM TABLE LIMIT FOR SS ACCORDING TO EPA AND USPHS'S STANDARD METHODS

4. Four 2 inch seal water supply lines. Two check valves in each line prevent backflow in these lines.

5. 3 inch normal charging line. Inside containment, this line contains three parallel check valve/flow control valve combinations in series with another check valve to prevent backflow in this line.

B. Mass of reactor coolant released during accident:

25 NOTE: these marked changes were sent to NRC (ref: 3/29/82 submittal) but haven't been changed in FSAR.

1. The sample lines are normally isolated and are only opened up to allow flow out of containment when a sample is being taken. If a line was broken, the operator would not be able to obtain a sample and would realize a problem existed and isolate the line precluding further inventory loss. Assuming the operator required 30 minutes to isolate the line, an ideal orifice, and full power operating conditions, the flow rate out of the break is 65 gpm and the total mass released is 1950 gallons.

2. Break of the CVCS letdown line. The normal letdown flow rate is 75 gpm (WBN FSAR Table 9.3-4). Assume the letdown = charging = 75 gpm when the CVCS letdown line breaks downstream of the letdown (HTX). It is assumed that the flow out of the break is limited to 75 gpm by the letdown orifice (ID of the arifice is 0.272 ± .002 inch). The inventory loss is seen in the (VCT). Assume the (VCT) was at the high level alarm setpoint (~~29~~ 65 inches ~~feet~~ increasing) before the break. At 5" ~~feet~~ inches decreasing, the VCT will be isolated (FCV-62-132 and -133 close) from charging pump suction. Suction is switched to the RWST. The mass lost from the VCT before isolation is ~~5400~~ 13,500 lbs. 47

On VCT low level, the operating instructions require the operator to isolate letdown. Assume the operator takes 10 minutes to isolate letdown changing flow from the RWST. The inventory lost is ~~isolated~~ at 6100 lbs. before operator action. From the draft WBN tech specs the maximum isolation time for the letdown isolation valves is 10 seconds, therefore 100 lbs. is lost during valve transition time. The associated piping would also empty. For conservatism, assume 500 ft. of piping is involved. Piping downstream of the letdown HTX is 3 ~~ft.~~ in. Approximately 1500 lbs. drains from the piping. Total mass of reactor coolant lost equals ~~5400~~ 13500 lbs. + 6100 lbs. + 100 lbs. + 1500 lbs. = ~~13,100~~ 21,200 lbs.

3. The excess letdown line is used to provide additional letdown capability during the final stages of plant heatup. This path removes some of the excess reactor coolant due to system expansion as a result of the RCS temperature increase. The excess letdown is normally diverted to the tritiated drain tank. The excess letdown flow path also serves as an alternate letdown path from the RCS in the event that the normal letdown path is inoperable. When the normal letdown line is not available, the normal purification path is also not in operation. This alternate condition would allow continued power operation for a limited period of time, dependent on RCS chemistry and activity. Thus, the probability of a break of the excess letdown line while in use is significantly less than the probability of a letdown line break during letdown.

4 & 5. A break in the seal water supply lines or in the normal charging line will not result in a direct loss of reactor coolant from inside containment because of the check valves which prevent backflow in these lines. The flow out these breaks will be coolant which has passed through the CVCS, including the mixed bed demineralizers, the reactor coolant filter, and the volume control tank. Therefore, the specific activity of the coolant released through these breaks will be much less than normal reactor coolant. 47

Doses have been computed for releases from the 3/4 inch sample line break, item 1, and the 2 inch CVCS letdown line break, item 2 and are shown in Table 450.1-1.

C. The normal makeup system can maintain pressurizer level and Reactor Coolant System pressure for a break through a 0.375 inch diameter hole resulting in a loss of approximately 17.5 lb/sec (WBN FSAR 15.3.1.1). Breaks in the small lines carrying primary coolant outside containment identified in part A of this question, result in loss rates less than or equal to the normal makeup flow. Loss rates due to breaks in the CVCS are assumed to be limited to 75 gpm by the letdown orifice located inside containment. Since all the breaks are isolated in 30 minutes or less, there will be no affect on the primary system iodine activity during the accident. It is assumed that the

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