TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

March 18, 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

During a February 28, 1985 meeting held between TVA and NRC representatives to discuss Power Systems Branch concerns regarding Watts Bar Nuclear Plant, TVA committed to provide additional information in accordance with T. J. Kenyon's meeting summary dated March 8, 1985. Enclosure 1 consists of information concerning hydrostatic testing of the diesel generator (DG) fuel oil piping, DG crankcase explosion protection, DG room temperature and performance testing of the communication systems. TVA will provide responses to the remaining items shortly.

Enclosure 2 consists of TVA's response to NRC's request for information dated January 14, 1985 concerning conformance to ANSI-N-195 and RG 1.137 (SER outstanding item 14).

If you have any questions concerning this matter, please get in touch with K. Mali at FTS 858-2682.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. A. Domer

J. A. Domer
Nuclear Engineer

Sworn to and subscribed before me
this 18th day of Mar. 1985.

Paulette H. White
Notary Public

My Commission Expires 8-24-88

Enclosures (2)

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

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ENCLOSURE 1

RESPONSES TO POWER SYSTEMS CONCERNS AS DISCUSSED IN THE TVA/NRC MEETING OF FEBRUARY 28, 1985

HYDROSTATIC TESTING OF DIESEL GENERATOR FUEL OIL PIPING

SURVEILLANCE REQUIREMENT 4.8.1.1.2.h.2

In a meeting with NRC Power Systems Branch reviewers on February 28, 1985, TVA was requested to provide additional justification for removing the technical specification requirement for hydrostatic testing of the diesel generator fuel oil piping every 10 years. The testing requirement is based on Regulatory Guide 1.137 and standard technical specifications. The Regulatory Guide 1.137 requirements for hydrostatic testing were forward-fit requirements which should not apply to Watts Bar Nuclear Plant but were incorporated into the standard technical specifications anyway.

TVA has records showing that the fuel oil system, excluding the skid-mounted portions, was pressure tested during construction; however, to pressure test the entire system every 10 years would require a major modification to the system.

The following system design features support the request to remove the pressure test requirement:

1) The system has only one valve, a check valve, at the discharge of the transfer pump to prevent the day tank from draining back into the 7-day tank.

2) The fuel oil system is completely vented to atmosphere.

3) The maximum pressure expected in the piping is 13 feet of water which corresponds to having the vent piping full of fuel oil.

4) The exposed piping is connected with threaded fittings and the embedded piping is welded.

5) The embedded 7-day tanks and piping are surrounded by concrete; therefore, a leak in this portion of the system would still be contained.

6) The embedded piping was pressure tested by TVA to 151 psi.

7) The 7-day tanks were pressure tested by the vendor to 20 psi.

The concern of the NRC Power Systems Branch was that the integrity of the fuel oil system be verified. Loss of integrity in the fuel oil piping will most likely occur through leaks at threaded fittings; therefore, TVA proposes to perform a visual inspection of exposed piping every 18 months while the diesel generator is running. This test should sufficiently ensure the integrity of the fuel oil system. Attached are the marked-up technical specification pages necessary to change the testing requirements.

FINAL DRAFT

these limits during this test. Within 5 minutes after completing this 24-hour test, perform Specification 4.8.1.1.2d.6)b);*

8) Verifying that the auto-connected loads to each diesel generator do not exceed the 2000-hour rating of 4400 kW;

9) Verifying the diesel generator's capability to:

   a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power,

   b) Transfer its loads to the offsite power source, and

   c) Be restored to its standby status.

10) Verifying that the automatic load sequence timers are OPERABLE and their Setpoints are within the specified bands; and

11) Verifying that the following diesel generator lockout features prevent diesel generator starting only when required:

   a) Engine overspeed, or

   b) 86 GA lockout relay, or

   c) Emergency stop.

12)

c. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting all diesel generators simultaneously, during shutdown, and verifying that all diesel generators accelerate to 900 ± 18 rpm in less than or equal to 10 seconds; and

*If Specification 4.8.1.1.2d.6)b) is not satisfactorily completed, it is not necessary to repeat the preceding 24-hour test. Instead, the diesel generator may be operated at 4400 kW for 1 hour or until operating temperature has stabilized.

12) Performing a visual inspection for leaks in the exposed fuel oil piping while the diesel generator is running.

SURVEILLANCE REQUIREMENTS (Continued)

h. At least once per 10 years by:

1) Draining each 7-day fuel storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite solution, and

2) Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND of the ASME Code at a test pressure equal to 110% of the system design pressure.

4.8.1.1.3 The 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger for each diesel generator shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying:

1) Correct breaker alignment, indicated power availability and voltage on the distribution panels greater than or equal to 118 volts,

2) That each battery bank and charger meet the Category A limits in Table 4.8-2 of Specification 4.8.2.1, and

3) That the total battery terminal voltage is greater than or equal to 125 volts on float charge.

b. At least once per 92 days and within 7 days after a battery discharge with a battery terminal voltage below 100 volts or a battery overcharge with a battery terminal voltage above 136 volts by:

1) Verifying that the parameters in Table 4.8-2 of Specification 4.8.2.1 meet the Category B limits,

2) Verifying there is no visible corrosion at either terminals or connectors, or the cell to terminal connection resistance of these items is less than 150×10^{-6} ohm, and

3) Verifying that the average electrolyte temperature of six connected cells is above 60°F.

c. At least once per 18 months by verifying that:

1) The cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration,

2) The battery to battery and terminal connections are clean, tight and coated with anticorrosion material, and

DIESEL GENERATOR CRANKCASE EXPLOSIONS

As stated in our February 15, 1985, letter to E. Adensam, TVA is not aware of any regulatory requirements applicable to Watts Bar which require the installation of relief ports or spring-loaded safety crankcase covers. TVA does not consider NUREG 0800 (Standard Review Plan) a regulatory requirement. TVA has, in the past, qualitatively evaluated the need for installing such devices and had decided they were not necessary.

With that aside, however, we will address item I.2.h of section 9.5.7 of NUREG 0800 R2 which states, "Protective measures (such as relief ports) have been taken to prevent unacceptable crankcase explosions and to mitigate the consequences of such an event."

TVA's design of the emergency power supply presently incorporates four totally independent diesel generator sets. The four diesel generators are housed in four separate seismically-qualified, missile-protected rooms inside the main diesel generator building. (See section 8.3.1.1 of FSAR.) Thus, a crankcase explosion in one diesel generator set cannot affect the operability of the other diesel generator sets.

Our design allows the plant to be safely shut down under all design basis events assuming the loss of one of the four diesel generator sets. Because of the extensive preventative maintenance programs outlined in Technical Specification 4.8.1.1.2, TVA considers a crankcase explosion as a single active failure. Technical Specification 3.8.1.1 requires four separate and independent diesel generator sets to be operable, thus, the loss of one diesel generator from a crankcase explosion doesn't prevent the reactor from being safely shut down.

TVA believes its diesel generator's system design and separation are the "protective measures...to prevent unacceptable crankcase explosions and mitigate the consequences of such an event."

Crankcase explosions usually result from local temperature increases due to excessive friction in areas of degraded lubrication. When this temperature reaches the ignition point of the surrounding oil vapor mixture, a crankcase explosion occurs. This explosion usually results in "drying out" the area which normally would result in diesel generator inoperability. TVA believes this process will take place with or without the use of relief ports. TVA feels the only advantage of having the relief ports is that they may prevent a secondary crankcase explosion which could result in more extensive damage to the diesel. However, since the initial explosion results in the diesel being inoperable and the secondary explosion could not affect the operability of the other diesel generator sets (see previous discussion), TVA considers the decision to install crankcase relief ports purely an economic one.

It should be noted that diesel generator crankcase explosions are unlikely events. This likelihood, however, increases with increased diesel running time. Even in the event of a total loss of offsite power, our diesel generators would realistically not be required for more than a 10-hour period (see EPRI report by H. Wyckoff dated May 1984 which discusses actual loss of offsite power events at domestic nuclear power plants). TVA feels its offsite power system is highly reliable (see section 8.2 of FSAR).

In the unlikely event that a loss of offsite power condition developed and one of our diesels developed a problem which resulted in a crankcase explosion rendering a diesel generator inoperable, there are remedial measures which could be taken in much shorter time periods than would be required to repair the damage to the diesel internals (even assuming we installed the relief ports which prevented the excessive damage from a secondary explosion). Repair of a diesel internal damage would require at least 5 full days. As demonstrated during an emergency drill at Sequoyah Nuclear Plant, a skid mounted diesel generator set can be delivered to the site and hooked up in about 3 days. Because of the proximity of the Watts Bar hydro generating station (see FSAR section 8.1), it is feasible to run a temporary power line from it. We estimate this could be accomplished within 2 days. Also, Watts Bar has incorporated a fifth "spare" diesel generator set into its design which we expect to be operational before the startup of unit 2. Although the "spare" diesel generator set (any one of the 5) will not be required "OPERABLE" by the Technical Specification and, thus, we take no specific credit for it in our accident analysis, it will normally be available to replace any diesel generator set which may be rendered inoperable (see submittal to NRC dated February 16, 1985). This switchover can normally be accomplished well within 72 hours.

In summary, TVA feels (1) there are no specific regulatory requirements which require the installation of relief ports or spring loaded safety crankcase covers; (2) the design and separation of the diesel generator sets at Watts Bar meets the intent of NUREG 0800 section 9.5.7, item I.2.h in that a crankcase explosion in any one diesel will not affect the operability of any other diesel generator set; (3) the installation of relief ports or spring loaded safety crankcase covers will not prevent a primary crankcase explosion from occurring and, thus, will not prevent the diesel generator set from becoming inoperable; (4) the damage from the initial crankcase explosion would require a period of time to repair which is longer than is necessary to replace that inoperable diesel generator with alternate sources. Thus, TVA concludes that the decision to install relief ports or spring loaded safety crankcase covers is purely an economic consideration based on the more extensive damage (and, thus, more expensive repair) that may result from the secondary crankcase explosion.

DIESEL GENERATOR ROOM TEMPERATURE

In a meeting with NRC Power Systems Branch reviewers on February 28, 1985, TVA was requested to provide additional justification for lowering the diesel generator room temperature limit from 65 degrees F to 40 degrees F. The temperature limit of 65 degrees F was based on a report from General Motors which showed that having only one engine-driven water pump instead of two would not adversely affect the warming of the engine by the immersion heater standby heating system. The test was not done to establish a minimum temperature for reliable diesel engine starting, and 66 degrees F just happened to be the ambient temperature during the test.

The following Sequoyah Nuclear Plant diesel generator starts support the lower limit of 40 degrees F:

Date	Time	Diesel Generator	Reason for Start	Ambient Room Temp
2/4/83	1045	2A-A	SI-7	29 degrees F
2/4/83	1218	1B-B	SI-7	29 degrees F
2/28/83	1128	2B-B	SI-7	26 degrees F

These successful diesel starts were identified by reviewing the Sequoyah diesel generator log for the period November 1982 through February 1984.

A minimum temperature for reliable diesel engine starting has not been determined; however, the experience at Sequoyah indicates that 40 degrees F is more appropriate than 65 degrees F. If the temperature in the diesel generator rooms falls below 40 degrees F, remedial action will be taken immediately per Watts Bar Surveillance Instruction 7.46 to restore the temperature above 40 degrees F. Additional action will be taken per the action statement for technical specification 3.7.13.

TABLE 3.7-4

AREA TEMPERATURE MONITORING

	AREA	TEMPERATURE LIMIT (°F)
1.	Aux Bldg el 722 next to 480V Sd Bd transformer 1A2-A.	≤ 104
2.	Aux Bldg el 722 next to 480V Sd Bd transformer 1B1-B.	≤ 104
3.	Aux Bldg el 772 next to 480V Rx MOV Bd 1A2-A.	≤ 104
4.	Aux Bldg el 772 across from spare 125V vital battery charger 1-S.	≤ 104
5.	Aux Bldg el 772 next to 480V Rx MOV Bd 2A2-A.	≤ 104
6.	Aux Bldg el 772 next to 480V Sd Bd transformer 2A2-A.	≤ 104
7.	Aux Bldg el 772 next to 480V Sd Bd transformer 2B2-B.	≤ 104
8.	Aux Bldg el 772 next to 480V Rx MOV Bd 2B2-B.	≤ 104
9.	Aux Bldg el 772 U1 Mech Equip Room B.	≤ 104
10.	Sd Bd room el 757 U1 behind stairs S-A3.	≤ 104
11.	Sd Bd room el 757 U2 behind stairs S-A13.	≤ 104
12.	Refueling floor el 757 U1 beside Aux boration makeup tk.	≤ 104
13.	Aux Bldg el 737 U1 outside supply fan room.	≤ 104
14.	Aux Bldg el 713 U1 across from AFW pumps.	≤ 104
15.	Aux Bldg el 692 U1 outside AFW pump room door.	≤ 104
16.	Aux Bldg el 692 U2 near boric acid concentrate filter vault.	≤ 104
17.	Aux Bldg el 676 next to 0-L-629.	≤ 104
18.	Add Equip Bldg U1 el 729 between UHI accumulators.	≥ 75 ≤ 95
19.	Main Control Room south wall.	≤ 104
20.	Main Control Room across from 1-M-9.	≤ 104
21.	D/G Bldg el 742 2B-B D/G room on wall by battery charger.	≤ 120
22.	D/G Bldg el 760.5 next to 480V diesel Aux Bd 2B1-B.	≤ 120
23.	IPS el 741 next to 1A-A ERCW-MCC transformer and board.	≤ 120
24.	IPS el 741 in B train ERCW pump room.	≤ 120
25.	IPS el 741 next to 2A-A ERCW-MCC transformer and board.	≤ 120
26.	Computer room el 708 center of room.	≥ 65 ≤ 75
27.	North steam valve vault room U1 Morgan Temp Recorder.	≥ 80
28.	South steam valve vault room U1 Morgan Temp Recorder.	≥ 80
29.	D/G Bldg el 742 1A-A D/G Room near D/G set	≥ ~~55~~ 40
30.	D/G Bldg el 742 1B-B D/G Room near D/G set	≥ ~~55~~ 40
31.	D/G Bldg el 742 2A-A D/G Room near D/G set	≥ ~~55~~ 40
32.	D/G Bldg el 742 2B-B D/G Room near D/G set	≥ ~~55~~ 40

SER LICENSE CONDITION 21

PERFORMANCE TESTING OF COMMUNICATION SYSTEMS

A thorough review of our abnormal and emergency procedures was conducted to identify any area within the plant where we specifically use two-way communication during an off-normal operation to safely shutdown or control the plant. The following is a list of those areas that were not addressed in FSAR Question 40.77 because this question mainly addressed plant shutdown from outside the main control room (MCR). Along with each area is a listing of the communication system available to the operators. It should be noted that we have not included in our list the paging system which is used extensively throughout our EOIs and AOIs. This system has already been preoperationally tested and is basically a one-way communications systems and thus is not pertinent to this discussion.

<u>Transfer Canal Wafer Valve Handwheel</u> (AOI 29D refueling cavity water seal failure)

1) Radio
2) Nearby Pax phones (2)

<u>Entrance to Valve Vault Rooms</u> (AOI-35 loss of offsite power)

1) Radio
2) Plant operation sound powered, headset jack (North vault only)
3) Pax phones (inside both vault rooms and outside near entrance of south vault room)

As can be seen from the above and FSAR Question 40.77, each area identified has at least two separate forms of two-way communication with the main or backup control room. The shutdown control center communications system (sound powered) has already been preoperationally tested. The other communication systems have been operational for a number of years and are used on a routine basis for normal plant operation and testing. Thus, they are essentially under continuous functional testing. Noise levels in these areas are similar under normal and abnormal conditions except for the valve vault rooms. However, Sequoyah Nuclear Plant (which is essentially identical Watts Bar) has successfully completed a natural circulation cooldown with loss of all AC power during startup testing (ST-7). This demonstrated adequate communication capabilities with the valve vault room during peak noise level conditions. TVA believes this adequately demonstrates their operability and meets the guidelines of standard review plan (NUREG 0800) section 9.5.2 which calls for ". . .perform(ing) a functional test . . ." of communication systems. Thus, TVA believes a formal preoperational test is not necessary.

Summary

Watts Bar has an effective integrated plant communication system for normal and abnormal plant operations. All individual communications systems have either 1) been preoperationally tested or 2) functionally tested during yearly emergency drills and/or performance of startup tests (see referenced submittal), or 3) have been used routinely over the past several years. Further specific testing of these systems is unnecessary and would be a waste of valuable time and manpower which is now being used to test systems which have a more direct impact on the safe operations of the plant.

ENCLOSURE 2

SER OPEN ITEM 14

DIESEL GENERATOR FUEL OIL SYSTEM - CONFORMANCE TO ANSI N195-1976 AND REGULATORY GUIDE 1.137

By letter dated March 17, 1982, TVA responded to NRC concerning Watts Bar Nuclear Plant's compliance with ANSI N195-1976 and Regulatory Guide 1.137 position C.2. This response is correct except for the compliance with Section 9 of ANSI N195-1976. Section of the standard requires a hydrostatic test of the diesel generator fuel oil system tanks and piping before filling the tanks. Vendor drawings for the 7-day fuel oil tanks indicate that the tanks were pressure tested to 20 psi with air. TVA Construction records show that the embedded fuel oil piping from the 7-day tanks to the diesel generator skid was hydrostatically tested to 151 psi and that the non-skid-mounted vent and supply piping was pressure tested to 20 psi with air. TVA has not tested the skid-mounted piping or the day tanks since these components are considered part of the engine assembly.

From the available information, it is evident that a hydrostatic test of all the diesel generator fuel oil system has not been performed. However, TVA has committed to perform a visual inspection of the exposed fuel oil piping every 18 months while the diesel engine is running. This inspection should provide an adequate verification of the integrity of the fuel oil system.