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

February 15, 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

Please refer to your January 14, 1985 letter to H. G. Parris requesting additional information regarding Watts Bar Nuclear Plant (WBN) Safety Evaluation Report (SER) Open Items 13 and 14 concerning diesel generators and License Condition 21 concerning testing of the communication systems. TVA responded to NRC's concern regarding License Condition 21 by letter dated February 13, 1985. We intend to respond to Open Item 14a regarding conformance to ANSI-N-195 and Regulatory Guide 1.137 in a subsequent submittal.

Enclosed is our response to the Staff's question regarding diesel generator piping classification and crankcase explosion protection. Please note that we take issue with NRC's position regarding the necessity of crankcase explosion protection. We maintain that this additional protective device will not significantly enhance the overall safety of plant operations. Should the NRC Staff choose to uphold its position regarding this issue, we request that a meeting be arranged at the appropriate management level to resolve this dispute.

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. W. Hufham, Manager
Licensing and Regulations



Sworn to and subscribed before me
this 15th day of Feb. 1985.

Paulette N. White
Notary Public

My Commission Expires 8-24-88

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

A001

ENCLOSURE

WATTS BAR NUCLEAR PLANT
SAFETY EVALUATION REPORT OPEN ITEMS 13 AND 14

Open Item 13 - Diesel Generator Piping Classification

NRC Question:

The applicant's submittal of March 21, 1984, provided an inadequate comparison between the diesel engine skid mounted auxiliary system piping design standards and ASME Section III, Class 3 (Quality Group 3) requirements. The applicant stated in the submittal that the comparison was general in nature and "a more detailed comparison . . . would probably yield many differences . . . ." In order for the Staff to assure that the piping is equivalent to ASME Section III, Class 3 (Quality Group C) piping, the detailed comparison needs to be performed and the results (differences) submitted for evaluation by the Staff. Therefore, the applicant is requested to provide the results of a detailed comparison between the diesel generator (DG) auxiliary system design standards and ASME Section III, Class 3.

TVA Response:

References:
1. L. M. Mills' letter to you dated November 29, 1982
2. L. M. Mills' letter to you dated March 21, 1984
3. Your letter to H. G. Parris dated January 14, 1985

As indicated by previous correspondence on SER open item 13 (references 1 and 2), TVA has established that the WBN DG auxiliary systems are designed, manufactured, installed, and tested in accordance with quality requirements commensurate with the importance of the DG safety function. Therefore, the intent of Regulatory Guide (RG) 1.26 and of General Design Criteria (GDC) 1 have been met.

NRC RG 1.26 specifically excludes diesel engine auxiliaries from the need to meet the ASME Code by requiring only that quality commensurate with importance to safety be ensured. TVA has ensured that the DG auxiliaries are adequately designed, have a proven history of reliable operational experience, and will operate at pressures significantly below design capabilities. Additionally, imposition of supplemental requirements for a vendor quality assurance program and for vendor surveillance, with specification of seismic category I design, has considerably reduced the technical differences between ANSI B31.1 and ASME Section III, Class 3 requirements. Based on these considerations, it is TVA's conclusion that full compliance with Section III of the ASME Code is not necessary to achieve the requisite level of safety and is also not warranted on a cost-benefit basis.

In support of this position, and in response to the NRC request included in reference 3, TVA has performed a detailed comparison between the WBN DG piping design standards (ANSI B31.1 supplemented by contractual requirements) and ASME Section III, Class 3 requirements. Results of this comparison are outlined in the table below and detailed in the discussion following the table.

Note that the cooling water heat exchangers are in full compliance with ASME Section III, Class 3.

PIPING DESIGN COMPARISON RESULTS - TECHNICAL DIFFERENCES

| ASME Section III, Class 3 | ANSI B31.1 Plus Contractual Requirements |
|---|---|
| 1. Requires ASME materials and mill test reports for piping. | 1. Requires mill test reports and marking in accordance with the ASTM material specification. |
| 2. Requires liquid penetrant or magnetic particle examination for welds over 4" NPS. | 2. Requires only visual inspection of welds for the design pressure and temperatures of the auxiliaries. |
| 3. Requires hydrostatic test to 1.25 x design pressure. | 3. Requires initial service leak test when hydrostatic test is not specified by the owner. |

NOTE: Technical differences are distinguished from the Section III, Class 3, administrative requirements in that a technical difference may result in a difference in construction, whereas an administrative requirement provides additional documented evidence that the work was done in accordance with the Code.

The DG auxiliaries are separated into four segments based on design and procurement:

1. The auxiliaries that were supplied as a part of the DG skid.

2. The fuel oil storage tanks (provided by a tank fabricator and installed by TVA).

3. The piping that connects the fuel oil storage tanks to the DG skids, the cooling water to the cooling water heat exchanger, the diesel engine air intake and exhaust, and the starting air compressor to DG skid (all designed, supplied, and installed by TVA).

4. The diesel engine starting air compressors (provided by the DG vendor).

A discussion by segment follows.

Auxiliaries Supplied on the DG Skid

The skid mounted piping and components of the fuel oil, engine cooling water (except heat exchangers--ASME Section III, Class 3), starting air, and lubricating oil systems are seismically qualified to Category I requirements as part of the diesel engine skid. These systems, furnished with the engine, are the standard systems developed by the engine manufacturer in accordance with DEMA standards, and have a long history of service and reliability. These systems are designed, fabricated, inspected, installed, examined, and tested in accordance with the guidelines and requirements of ANSI B31.1 as supplemented by the DG contract.

It should also be noted that it would not be possible to obtain all auxiliary components to ASME Section III, Class 3 requirements. For example, the diesel oil pump, lubricating oil pump, filters and flex hoses could not be purchased to ASME Section III, Class 3, since they are unique to engine component manufacturers, who do not manufacture to ASME Section III, Class 3, requirements.

The technical differences between ASME Section III, Class 3, and B31.1 for this segment are delineated by the following, formatted consistent with the table above.

1. ASTM materials were used for the skid-mounted piping. SA material specifications have historically been identical to their ASTM counterparts for the materials used (primarily A106 Grade B, A105 Grade 2, A53, A285 Grade C, and A515 Grade 70). For the pipe sizes and schedules used in the DG auxiliaries, specific material testing in ASME Section III, ND-2000 (i.e., impact testing), are not required.

2. The only piping on the diesel engine skids that is over 4-inch NPS are the 6-inch lines between the cooling water heat exchanger, expansion tank, lube oil cooler, and engine block. These lines have been visually examined.

3. The DG auxiliary systems have been and will be at operating pressure for a considerable period of time throughout plant startup testing. This will provide an adequate test for leak tightness before the systems are put into operation. Preoperational tests have been completed on all the existing DG units and no leakage has been identified. Because of the large difference between the DG auxiliary system design pressures and the maximum working pressure of piping used in the auxiliary systems (For example; the design pressure for piping in the starting air system is 250 $lb/in^2$; the 3/4-inch schedule 40 A53 pipe material used for the system has a maximum working pressure of 3059 $lb/in^2$ for temperatures up to 650°F. Design pressure for piping in the engine oil lubricating system is less the 100 $lb/in^2g$. The 3-inch schedule 40 A106 grade B pipe has a maximum working stress of 1693 $lb/in^2$ for temperatures up to 650°F.), the chance for leakage at other than mechanical joints is very low. The time at operating pressure during preoperational testing will be as likely to expose a leak as would occur during operation at the higher pressure, but shorter duration, test time of 10 minutes required by ASME Section III, Class 3.

Fuel Oil Storage Tanks

Fuel oil storage tanks are designed for embedment within the concrete foundation of the seismic category I DG building and meet the requirements of ASME, Section VIII, Division 1, for unfired pressure vessels. Therefore, ASME materials were used and the tanks were hydrostatically tested at 1-1/2 times the design pressure.

Piping Connection to Skids

The fuel oil piping from the storage tank to the DG skid, and the cooling water system piping up to the cooling water heat exchanger, are designed, fabricated, inspected, and tested in accordance with ASME Section III, Class 3, requirements.

The connecting starting air piping from the air compressors to the skid-mounted starting air connections is designed, installed, and tested in accordance with B31.1 requirements. The piping is not essential equipment since the DG starting air skid-mounted piping, with air accumulator tanks (ASME Section VIII, Division 1), is designed to provide the required number of DG starts without recharging.

The air intake and exhaust systems piping up to the DG skid are designed, fabricated, inspected, and tested in accordance with B31.1 requirements. These systems are seismically supported in accordance with ASME Section III, Class 3. Piping is 22-inch and 24-inch nominal diameter and has received visual weld examination. The systems are open ended and therefore, system pressure testing was not performed. The extended time at operating pressure during preoperational testing should expose leaks which would occur during operation at the higher pressure but shorter duration test time of 10 minutes required by ASME Section III, Class 3. Preoperational testing has been completed on the four existing DG sets and no leakage has been identified. In addition, the intake and exhaust systems, like the other auxiliary systems, are significantly overdesigned (i.e., the 24- and 22-inch, schedule 10 A106, grade B pipe material used for the intake and exhaust systems have maximum working stresses of 276 and 259 $lb/in^2$ at operating temperatures but the design pressure of both these systems are less than 15 $lb/in^2$). This will result in high operational reliability.

Starting Air Compressors

The starting air compressors, like the connecting piping to the DG skids, is not essential equipment.

Based on the comparison above and the information previously transmitted by references 1 and 2, TVA has provided adequate technical justification that existing DG auxiliary systems are designed, manufactured, installed, and tested to acceptable quality standards. The intent of RG 1.26 and GDC 1 have been met. Accordingly, TVA requests that the staff reevaluate this matter and remove item 13 as an open SER issue.

Open Item 14 - Diesel Generator Auxiliary Design Deficiencies

NRC Question:

a. Conformance to ANSI-N-195 and Regulatory Guide 1.137

The applicant in his responses does not specify how he meets ANSI-N-195 and Regulatory Guide 1.137, "Diesel Generator Fuel Oil System Design." The Staff needs a comparison between the D/G fuel oil system design and procedures and the above referred standard and R.G. in order to evaluate the system design. Any deviations from the requirements of the ANSI standard, the R.G., and the standard technical specifications on fuel oil quality which are based on the standards needs to be identified and justified. The applicant should provide this comparison.

TVA Response:

TVA intends to respond to this concern under separate cover.

b. Crankcase Explosion Protection

The applicant states in his FSAR that a crankcase pressure detector is provided to alarm in the emergency mode and shutdown the engine in the test mode. SRP 9.5.7 acceptable criteria 4h states that in order to meet GDC 17 the following specific criteria must be met:

"Protective measures (such as relief ports) have been taken to prevent unacceptable crankcase explosions and mitigate the consequences of such an event."

The applicant has not provided any information to show that when in the test mode the pressure detector will trip the D/G before the occurrence of a crankcase explosion. Furthermore, an alarm during the emergency mode of operation is not considered a protective measure against unacceptable crankcase explosions nor does it mitigate the consequences of such an event. A more positive means of protection such as relief ports, spring loaded safety crankcase covers, etc., as provided on other EMD/GM emergency diesel generators, should be provided to mitigate the consequences of a crankcase explosion.

TVA Response:

TVA is unaware of any regulatory requirements applicable to Watts Bar which necessitate the installation of either relief ports or spring loaded safety crankcase covers on the diesel generators. TVA does not believe that use of such devices will allow continued operation of the diesel generators in the event of a crankcase explosion. TVA also does not believe these modifications would significantly enhance the overall safety of plant operations.

TVA will evaluate the effectiveness of such devices based on their economic aspects at a later date. We do, however, believe the use of relief ports may aid the mitigation of a secondary crankcase explosion and we recognize that repairs necessitated by such an event could, potentially, result in an extensive outage. TVA maintains, however, that this is merely an economic concern and does not pose an increased risk to the health and safety of the public.