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

March 21, 1984

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

By your letter to H. G. Parris dated January 12, 1984, TVA was requested to provide additional information concerning qualification of the diesel generator auxiliary system piping at Watts Bar Nuclear Plant. Enclosed is the requested information which confirms that the diesel engine auxiliary systems are acceptable based on General Design Criteria (GDC) 1 requirements.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me
this 21st day of March 1984

Paulette N. White
Notary Public
My Commission Expires 9-5-84

Enclosure
cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

B001
1/1

ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
RESPONSE TO NRC REQUEST FOR
SUPPLEMENTAL INFORMATION CONCERNING
WATTS BAR NUCLEAR PLANT DIESEL
GENERATOR AUXILIARY SYSTEMS (SER OPEN ITEM 13)

References: (1) Letter from L. M. Mills to E. G. Adensam dated November 29, 1982.

(2) Letter from E. G. Adensam to H. G. Parris dated January 12, 1984.

In response to the previous TVA position on Watts Bar SER open item 13 (reference 1), the staff has indicated (reference 2) that TVA is not obligated to implement the requirements of Regulatory Guide (RG) 1.26 as it relates to diesel generator (DG) auxiliary system piping. However, the staff further indicated that TVA is required, in accordance with GDC 1 (for systems and components important to safety) to design, fabricate, erect, and test to quality standards commensurate with the importance of the safety function to be performed. The staff reasoned that since the DG auxiliary systems are vital to operation of the DG, the auxiliary systems should be designed, manufactured, erected, and tested in accordance with ASME Section III, Class 3 (Quality Group C), requirements or equivalent.

As indicated in reference 1, the DG auxiliary systems were designed to seismic category I and ANSI B31.1 (Quality Group D) requirements which were consistent with nuclear industry practice and regulatory guidance (RG 1.26, revision 0) in effect when Watts Bar was docketed (5/71) and when TVA let the procurement specification for the DG units (2/74). At that time, the DG auxiliary system design met the NRC approved method (RG 1.26, revision 0) for implementing the requirements of GDC 1. It was not until September of 1974, that RG 1.26, Revision 1, was changed to include DG systems in the Quality Group C classification.

Reference 1 further indicated that revision 1 (and revision 2, dated June 1975) of RG 1.26 did not require compliance to the Quality Group C classification for applications docketed before January 1, 1975. This regulatory position did not change until the issuance of revision 3 to RG 1.26 in February 1976. Based on regulatory guidance in effect between February 1974 and February 1976, the as-specified DG systems were in full compliance with GDC 1 requirements.

With issuance of RG 1.26, revision 3, the staff specified compliance to the Quality Group C classification, stating that applications for operating license or construction permit would be evaluated in light of RG 1.26 (revision 3) requirements. Accordingly, TVA took the steps outlined below to ensure that the DG systems intended for Watts Bar were essentially equivalent to Quality Group C, realizing that design and fabrication of the systems were already underway.

The auxiliary support systems in question are (1) fuel oil storage and transfer, (2) cooling water, (3) starting air, (4) engine lubrication, and (5) combustion intake and exhaust. The bulk of piping and components for these systems were included in the DG package supplied by the DG vendor and were shipped assembled on the DG skid. In physical terms, the so-called auxiliary support skid is actually a continuation of the diesel engine/generator skid and contains all DG support equipment except for selected components such as air filters, mufflers, air compressors, batteries, etc. The entire DG package falls into the category of vendor-supplied safety-related equipment and is designated as TVA class D.

The class D designation entails seismic category I and ASME Section III, Class 3, design. In the DG package case (vendor-supplied safety-related), the equipment is considered equivalent to ASME Section III, Class 3. This equivalency is based on: (1) supplemental requirements placed on the equipment during procurement, (2) the fact that similar equipment from the same manufacturer has had proven reliability based on service experience ("grandfather" qualification), and (3) field installation of the equipment in accordance with the TVA quality assurance program.

The supplemental requirements (refer to item 1 above) involved with the procurement were basically two: (1) a 10 CFR 50 Appendix B vendor quality assurance program (approved by TVA), and (2) seismic category I design. Additional procurement steps taken included ASME Section III, Class 3 heat exchangers in the cooling water system and ASME Section VIII, Division 1, air accumulator tanks in the starting air system.

TVA installation of the vendor-supplied safety-related DG equipment (refer to item 3 above) was performed and documented in accordance with the TVA quality assurance program. Since the TVA connections to the DG skid did not involve welding (all are screwed or bolted connections), TVA's examinations and tests were nearly identical to examinations and tests which would have been required if the equipment was Section III, Class 3.

With three exceptions (see next paragraph below), all off-skid (physically remote to the DG unit skid) piping and components are ASME Section III, Class 3, and were supplied by TVA at the time of installation of the DG packages. This piping is associated with the cooling water and fuel oil storage and transfer systems. Cooling water piping is ASME Section III, Class 3, up to connection with the heat exchangers on the DG skid. Piping from the seven-day fuel oil storage tanks to the fuel oil transfer pump connections on the skids (including overflow piping back to the storage tanks) is Section III, Class 3, as is the skid-mounted fuel oil day tank vent lines (from the skid interface).

The TVA-supplied piping between the remote starting air compressors (DG vendor-supplied) and the starting air skid connections is TVA class G (B31.1) and is seismic category I(L). The air compressors and connecting piping are not required for the DG starting cycle. The TVA-supplied combustion air intake and exhaust piping is TVA class G (B31.1) and is

supported in accordance with Section III, Class 3, requirements. Air intake and exhaust components (filters, silencers, mufflers, etc.) are DG vendor-supplied. The TVA-supplied seven-day fuel oil storage tank fill and vent piping is TVA class G (B31.1).

The following comparison of Section III, Class 3, requirements with the standards used for the vendor-supplied safety-related DG auxiliary piping and components support TVA's class D designation for the DG equipment. The comparison may be divided into the following parts: materials, fabrication, design, installation, and examination and testing.

Materials: Section III for the most part requires use of ASME certified materials. ANSI B31.1 allows ASME or ASTM materials. For these engineering materials used for the DG equipment (A-36, A-53, A-105, A-106, A-283, etc.), the ASME material specifications are very similar and often identical to the ASTM material specifications. Material and piping sizes and schedules used in the auxiliary systems are such that fracture toughness (impact) tests on materials would not have been required even if the auxiliary systems had been Section III. In addition, procurement by the vendor was covered by an approved vendor quality assurance program.

Fabrication: Fabrication by welding does not present a comparison problem since B31.1 basically invokes ASME Section IX for welding operations. Other fabrication such as threaded pipe connections and bolting are primarily detailed by the governing ANSI specifications (i.e., B1.1) which are referenced by both Section III and B31.1. The approved vendor quality assurance program assures that appropriate requirements are met.

Design: Section III, Class 3, piping design rules are basically the same as the B31.1 piping design rules except that Section III requires seismic category I design considerations and a program to provide quality assurance for the design process. As with the diesel engines themselves, the auxiliary skid-mounted support systems were procured with an approved vendor quality assurance program and seismic category I design.

Installation: Installation of the skid-mounted auxiliary systems was substantially in accordance with Section III, Class 3, requirements in as much as all connections to the DG skid were either screwed or bolted. Installation was in accordance with the TVA quality assurance program.

Examinations and Tests: Examinations and tests by TVA were performed in accordance with the TVA quality assurance program. Examinations and tests performed by the DG vendor were those required by the contract. The contract required "first class workmanship" in accordance with best engineering practice for the entire DG package (the auxiliary systems were covered by the same contract requirements

as were the engines). The skid-mounted auxiliary piping, fittings, valves, and equipment (except the ASME equipment) are in accordance with B31.1 requirements and are also in accordance with the approved vendor quality assurance program. In addition, each of the assembled DG units were functionally tested and inspected by the vendor for the full range of design operating conditions.

The above comparison is necessarily very general in nature. A more detailed comparison between ASME Section III, Class 3, and the standards used in manufacture of the auxiliary systems would probably yield many differences in the wording of requirements and, to a lesser extent, the intent of the requirements. It is anticipated that these differences would be primarily in the areas of design rules and examinations.

In response to these anticipated differences, consider the requirements of GDC 1 which call for "commensurate" quality standards in accordance with the importance of the safety function to be performed. It is implied from this wording that a judgment on proper standards must be made based on safety function. As was discussed earlier, it was not until February of 1976 (2 years after procurement of the DG packages was initiated) that the NRC judged the importance of DG auxiliary systems to require Quality Group C classification. Given this judgment, TVA pursued the course discussed above, as supported by the following GDC 1 rationale:

1. GDC 1 requires commensurate standards in accordance with safety function. Further, GDC 1 requires that generally recognized standards (if used) shall be identified, evaluated for adequacy, and modified or supplemented as necessary. For the skid-mounted auxiliary equipment, TVA identified the generally-recognized code, B31.1. At the time, regulatory guidance indicated that B31.1 was an acceptable standard. In addition, TVA supplemented the standard with both a 10 CFR 50 Appendix B vendor quality assurance program and seismic category I design.

2. GDC 1 requires implementation of a quality assurance program to assure that the safety function will be adequately performed. TVA elected the class D designation for the DG packages. This included examination and testing in accordance with the TVA quality assurance program during installation of the DG equipment and an approved vendor quality assurance program to cover vendor activities.

3. GDC 1 requires that appropriate design, fabrication, installation, and testing records shall be maintained for the life of the plant. TVA elected to perform installation and testing of the DG equipment in accordance with the TVA quality assurance program. The supplemental vendor quality assurance program was necessary to cover design and fabrication by the vendor.

Two of the three previously noted exceptions to the class D designation for the DG auxiliary systems, the TVA-supplied intake and exhaust piping and seven-day fuel oil tanks fill and vent lines, are the only remaining auxiliary system concerns. Within the seismic category I DG building, all class G (or class H) piping is seismic category I(L). Regarding the seven-day fuel oil tanks fill and vent lines, the bulk of the piping is embedded within the DG building structure as are the seven-day tanks. The only portion of these lines which are outside the DG building structure are the vent lines above the DG building roof level. The portions above the roof level are encased in reinforced concrete. The intake and exhaust piping is 24- and 22-inch diameter, schedule 10, A-106 grade B material, which is indicative of the low system operating pressures. Both the intake and exhaust piping are supported in accordance with TVA class C (ASME Section III, Class 3) requirements. The only portions of the systems which are outside the DG building are the topmost 24 inches of the exhaust piping, which are surrounded by 36-inch-high, 24-inch-thick concrete curbs.

Based on the comparison and discussions above, TVA has established that the Watts Bar DG auxiliary systems are designed, manufactured, erected, and tested sufficiently in accordance with Quality Group C requirements to meet the intent of RG 1.26. This position is supported by a rationale developed from the requirements stated in GDC 1.