ENCLOSURE 1

PROPOSED TECHNICAL SPECIFICATIONS
UNITS 1 AND 2
SEQUOYAH NUCLEAR PLANT

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Four separate and independent diesel generator sets each with: *

1. Two diesels driving a common generator
2. Two engine-mounted fuel tanks containing a minimum volume of 250 gallons of fuel, per tank
3. A separate fuel storage system containing a minimum volume of 62,000 gallons of fuel,
4. A separate fuel transfer pump, and
5. A separate 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger.

*The C-5 Diesel Generator may be substituted for any one of the above required diesel generators.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With either an offsite circuit or diesel generator set of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour and at lease once per 8 hours thereafter and 4.8.1.1.2.a.4 within 24 hours, restore at least two offsite circuits and four diesel generator sets to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one offsite circuit and one diesel generator set of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter; restore at least one of the inoperable sources to OPERABLE status within 12 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore at least two offsite circuits and four diesel generator sets to OPERABLE status within 72 hours from the time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

ACTION (Continued)

c. With two of the above required offsite A.C. circuits inoperable, demonstrate the OPERABILITY of 4 diesel generator sets by performing Surveillance Requirement 4.8.1.1.2.a.4 within one hour and at least once per 8 hours thereafter, unless the diesel generator sets are already operating; restore at least one of the inoperable offsite sources to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours. With only one offsite source restored, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With either diesel generator sets 1A-A and/or 2 A-A inoperable simultaneous with 1B-B and/or 2B-B, demonstrate the OPERABILITY of two offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter; restore at least 1) 1A-A and 2A-A or 2) 1B-B and 2B-B to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore at least four diesel generator sets to OPERABLE status within 72 hours from time of initial loss or be in least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With one or more diesel generators inoperable solely because the fuel levels in one or more tank(s) is (are) below the minimum, restore the 10 above the minimum within 24 hours, otherwise comply with action statements a, b or d above.

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments, indicated power availability, and

b. Demonstrated OPERABLE at least once per 18 months during shutdown by transferring (manually and automatically) unit power supply from the normal circuit to the alternate circuit.

4.8.1.1.2 Each diesel generator set shall be demonstrated OPERABLE:#

a. In accordance with the frequency specified in Table 4.8-1 on a STAGGERED TEST BASIS by:

1. Verifying the fuel level in the engine-mounted day tanks.

2. Verifying the fuel level in the 7 day tank.

3. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the engine mounted fuel tanks.

#Surveillance requirement 4.8.1.1.2.a.4, 5, and 6 do not have to be met for the C-5 Diesel Generator unless it is being used to satisfy LCO 3.8.1.1

NOTE: This change is effective upon completion of the modification and associated post modification testing.

SURVEILLANCE REQUIREMENTS (Continued)

4. Verifying the diesel starts from standby condition and accelerates to at least 900 rpm in less than or equal to 10 seconds. The generator voltage and frequency shall be 6900 ± 690 volts and 60 ± 1.2 Hz within 10 seconds after the start signal. The diesel generator shall be started for this test by using one of the following signals with startup on each signal verified at least once per 124 days:

   a) Manual.

   b) Simulated loss of offsite power by itself.

   c) An ESF actuation test signal.

5. Verifying the generator is synchronized, loaded to greater than or equal to 4000 kw in less than or equal to 60 seconds,* and operates for greater than or equal to 60 minutes, and

6. Verifying the diesel generator is aligned to provide standby power to the associated shutdown boards.

b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the engine-mounted fuel tanks.

c. At least once per 92 days and from new fuel oil prior to addition to the 7-day tanks by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to .05 volume percent and a kinematic viscosity @ 100°F of greater than or equal to 1.8 but less than or equal to 5.8 centi-stokes when tested in accordance with ASTM-D975-77, and an impurity level of less than 2 mg. of insolubles per 100 ml. when tested in accordance with ASTM-D2274-70.

d. At least once per 18 months during shutdown by:

   1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service,

   2. Verifying the generator capability to reject a load of greater than or equal to 600 kw while maintaining voltage at 6900 ± 690 volts and frequency at 60 ± 1.2 Hz.

   3. Verifying the generator capability to reject a load of 4000 kw without tripping. The generator voltage shall not exceed 7866 volts during and following the load rejection.

*The diesel generator start (10 sec) from standby conditions shall be performed at least once per 184 days in these surveillance tests. All other engine starts for the purpose of this surveillance testing may be preceded by an engine idle start.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

SURVEILLANCE REQUIREMENTS (Continued)

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. That the parameters in Table 4.8-1a meet the Category A limits.

2. That the total battery terminal voltage is greater than or equal to 124-volts on float charge.

b. At least once per 92 days by:

1. Verifying that the parameters in Table 4.8-1a 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 x 10^{-6} ohms, and

3. Verifying that the average electrolyte temperature of 6 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 anti-corrosion material.

3. The resistance of each cell to terminal connection is less than or equal to 150 x 10^{-6} ohms.

4.8.1.1.4 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.9.2.2.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

ELECTRICAL POWER SYSTEMS

TABLE 4.8-1

Diesel Generator Reliability

No. of Failures in last 20 valid tests*	No. of Failures in last 100 valid tests*	Reliability Actions
$\leq$ 1	-	Test at least once per 31 days
$\geq$ 2	-	Test at least once per 7 days**
3	6	Within 30 days prepare a report for NRC audit, in accordance with Section 6.9.2.2
5	11	Declare the diesel generator inoperable and perform a re-qualification test for the affected diesel generator pursuant to the attachment to this table

*Criteria for determining number of failures and number of valid tests shall be in accordance with Regulatory Position C.2.e of Regulatory Guide 1.108, Revision 1, August 1977, where the number of tests and failures are determined on a per diesel generator unit basis. For the purposes of this test schedule, only valid tests conducted after the Operating License issuance date shall be included in the computation of the "last 20 valid tests". Entry into this test schedule shall be made at the 31 day test frequency.

**This test frequency shall be maintained until seven consecutive failure free demands have been performed and the number of failures in the last 20 valid demands has been reduced to one or less.

NOTE: **This change is effective upon completion of the modification and associated post modification testing.**

ATTACHMENT TO TABLE 4.8-1
DIESEL GENERATOR REQUALIFICATION PROGRAM

(1) Perform seven consecutive successful demands without a failure within 30 days of diesel generator being restored to operable status and fourteen consecutive successful demands without a failure within 75 days of diesel generator of being restored to operable status.

(2) If a failure occurs during the first seven tests in the requalification test program, perform seven successful demands without an additional failure within 30 days of diesel generator of being restored to operable status and fourteen consecutive successful demands without a failure within 75 days of being restored to operable status.

(3) If a failure occurs during the second seven tests (tests 8 through 14) of (1) above, perform fourteen consecutive successful demands without an additional failure within 75 days of the failure which occurred during the requalification testing.

(4) Following the second failure during the requalification test program, be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

(5) During requalification testing the diesel generator should not be tested more frequently than at 24-hour intervals.

After a diesel generator has been successfully requalified, subsequent repeated requalification tests will not be required for that diesel generator under the following conditions:

(a) The number of failures in the last 20 valid demands is less than 5.

(b) The number of failures in the last 100 valid demands is less than 11.

(c) In the event that following successful requalification of a diesel generator, the number of failures is still in excess of the remedial action criteria (a and/or b above) the following exception will be allowed until the diesel generator is no longer in violation of the remedial action criteria (a and/or b above).

Requalification testing will not be required provided that after each valid demand the number of failures in the last 20 and/or 100 valid demands has not increased. Once the diesel generator is no longer in violation of the remedial action criteria above the provisions of those criteria alone will prevail.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

ELECTRICAL POWER SYSTEMS

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. Diesel generator sets 1A-A and 2A-A or 1B-B and 2B-B each with:*

1. Two diesels driving a common generator,

2. Two engine-mounted fuel tanks containing a minimum volume of 250 gallons of fuel per tank,

3. A fuel storage system containing a minimum volume of 62,000 gallons of fuel,

4. A fuel transfer pump, and

5. A separate 125-volt D.C. distribution panel, 125-volt D.C. battery bank and asspciated charger.

*The C-5 diesel generator may be substituted for any one of the above required diesel generators.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1 and 4.8.1.1.2 (except for requirement 4.8.1.1.2.a.5), 4.8.1.1.3, and 4.8.1.1.4.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

SPRAY AND/OR SPRINKLER SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.11.2 The following spray and/or sprinkler systems shall be OPERABLE:

a. Reactor Building - RC pump area, Annulus

b. Auxiliary Building - Elev. 669, 690, 706, 714, 734, 749, 759, ABGTS Filters, EGTS Filters, Cont. Purge Filters, and 125V Battery Rooms.

c. Control Building - Elev. 669, Cable Spreading Room, MCR air filters, and operator living area.

d. Diesel Generator Building - Corrider Area.

e. Turbine Building - Control Building Wall.

f. Fifth Diesel Generator Building - Diesel Generator Rm., fuel oil pump, transformer, switchgear, electrical board rms., and pipe gallery.

APPLICABILITY: Whenever equipment protected by the spray/sprinkler system is required to be OPERABLE.

ACTION:

a. With one or more of the above required spray and/or sprinkler systems inoperable, within one hour establish a continuous fire watch with backup fire suppression equipment for those areas in which redundant systems or components could be damaged; for other areas establish an hourly fire watch patrol. Restore the system to OPERABLE status within 14 days or, in lieu of any other report required by Specification 6.9.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

b. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.11.2 Each of the above required spray and/or sprinkler systems shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

b. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

TABLE 3.7-5 (Continued)

FIRE HOSE STATIONS

LOCATION	ELEVATION	HOSE RACK#	
g. CCW Intake Pumping Station			
	690	0-26-867	
	690	0-26-869	
h. ERCW Pumping Station			
	688	0-26-927	
	688	0-26-926	
	688	0-26-930	
	704	0-26-931	
	704	0-26-925	
	704	0-26-928	
	720	0-26-929	
	720	0-26-924	
	720	0-26-932	
i. Fifth Diesel Generator Building			
	723	0-26-1743	*
	723	0-26-1744	
	742	0-26-1740	
	742	0-26-1741	
	742	0-26-1742	

* NOTE: This change is effective upon completion of the modification and associated post modification testing.

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

Fire Zone	Instrument Location	Minimum Instruments Operable			
		Ionization	Photoelectric	Thermal	Infrared
267	Aux. Instr. Rm. El. 685	8			
268	Aux. Instr. Rm. El. 685			9	
269	Computer Rm. El. 685	4			
270	Computer Rm. El. 685			4	
276	Intk. Pumping Sta. El. 690 & 670.5	15			
354	Upr. Compt. Coolers, El. 778		4		
352	Lwr. Compt. Coolers, El. 693		4		
356	RCP 2, El. 693				2
357	RCP 2, El. 693			2	
360	RCP 1, El. 693				2
361	RCP 1, El. 693			2	
364	RCP 3, El. 693				2
365	RCP 3, El. 693			2	
368	RCP 4, El. 693				2
369	RCP 4, El. 693			2	
372	Reactor Bldg. Annulus		18		
373	Reactor Bldg. Annulus		18		
1	Diesel Gen. Rm. 2B-B, El. 722			5	
2	Diesel Gen. Rm. 2B-B, El. 722			5	
3	Diesel Gen. Rm. 1B-B, El. 722			5	
4	Diesel Gen. Rm. 1B-B, El. 722			5	
5	Diesel Gen. Rm. 2A-A, El. 722			5	
6	Diesel Gen. Rm. 2A-A, El. 722			5	
7	Diesel Gen. Rm. 1A-A, El. 722			5	
8	Diesel Gen. Rm. 1A-A, El. 722			5	
410	Diesel Gen Interface Rm El. 722	9			
403	Additional Diesel Gen. El. 723			8	
404	Additional Diesel Gen. El. 723			8	
405	Additional Diesel Gen. El. 723/741	4			
406	Additional Diesel Gen. El. 723/741	4			
408	Additional Diesel Gen. El. 723/741	4			

NOTE: This change is effective upon completion of the modification and associated post modification testing.

RADIAL PEAKING FACTOR LIMIT REPORT

6.9.1.14 The W(z) function for normal operation shall be provided to the Director, Nuclear Reactor Regulation, Attention, Chief of the Core Performance Branch, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555 at least 60 days prior to cycle initial criticality. In the event that these values would be submitted at some other time during core life, it will be submitted 60 days prior to the date the values would become effective unless otherwise exempted by the Commission.

Any information needed to suport W(z) will be by request from the NRC and need not be included in this report.

SPECIAL REPORTS

6.9.2.1 Special reports shall be submitted to the Director of the Office of Inspection and Enforcement Regional Office within the time period specified for each report.

6.9.2.2 Diesel Generator Reliability Improvement Program

As a minimum the Reliability Improvement Program report for NRC audit, required by LCO 3.8.1.1, Table 4.8-1, shall include:

(a) a summary of all tests (valid and invalid) that occurred within the time period over which the last 20/100 valid tests were performed

(b) analysis of failures and determination of root causes of failures

(c) evaluation of each of the recommendations of NUREG/CR-0660, "Enchancement of Onsite Emergency Diesel Generator Reliability in Operating Reactors," with respect to their application to the Plant

(d) identification of all actions taken or to be taken to 1) correct the root causes of failures defined in b) above and 2) achieve a general improvement of diesel generator reliability

(e) the schedule for implementation of each action from d) above

(f) an assessment of the existing reliability of electric power to engineered-safety-feature equipment

Once a licensee has prepared and maintain an initial report detailing the diesel generator reliability improvement program at his site, as defined above, the licensee need prepare only. A supplemental report shall be prepared within 30 days after each subsequent failure during a valid demand for so long as the affected diesel generator unit continues to violate the criteria (3/20 or 6/100) for the reliability improvement program remedial action. The supplemental report need only update the failure/demand history for

NOTE: This change is effective upon completion of the modification and associated post modification testing.

the affected diesel generator unit since the last report for that diesel generator. The supplemental report shall also present an analysis of the failure(s) with a root cause determination, if possible, and shall delineate any further procedural, hardware or operational changes to be incorporated into the site diesel generator improvement program and the schedule for implementation of those changes.

In addition to the above, submit a yearly data report on the diesel generator reliability.

6.10 RECORD RETENTION

In addition to the applicable record retention requirements of Title 10, Code of Federal Regulations, the following records shall be retained for at least the minimum period indicated.

6.10.1 The following records shall be retained for at least five years:

a. Records and logs of unit operation covering time interval at each power level.
b. Records and logs of principal maintenance activities, inspections, repair and replacement of principal items of equipment related to nuclear safety.
c. All REPORTABLE EVENTS submitted to the Commission.
d. Records of surveillance activities, inspections and calibrations required by these Technical Specifications.
e. Records of changes made to the procedures required by Specification 6.8.1 and 6.8.4.
f. Records of radioactive shipments.
g. Records of sealed source and fission detector leak tests and results.
h. Records of annual physical inventory of all sealed source material of record.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Four separate and independent diesel generator sets each with:

1. Two diesels driving a common generator
2. Two engine-mounted fuel tanks containing a minimum volume of 250 gallons of fuel, per tank
3. A separate fuel storage system containing a minimum volume of 62,000 gallons of fuel,
4. A separate fuel transfer pump, and
5. A separate 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger.

*The C-5 diesel generator may be substituted for any one of the above required diesel generators.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With either an offsite circuit or diesel generator set of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter and 4.8.1.1.2.a.4 within 24 hours; restore at least two offsite circuits and four diesel generator sets to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one offsite circuit and one diesel generator set of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter; restore at least one of the inoperable sources to OPERABLE status within 12 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore at least two offsite circuits and four diesel generator sets to OPERABLE status within 72 hours from the time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

ACTION (Continued)

c. With two of the above required offsite A.C. circuits inoperable, demonstrate the OPERABILITY of 4 diesel generator sets by performing Surveillance Requirement 4.8.1.1.2.a.4 within one hour and at least once per 8 hours thereafter, unless the diesel generator sets are already operating; restore at least one of the inoperable offsite sources to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours. With only one offsite source restored, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With either diesel generator sets 1A-A and/or 2 A-A inoperable simultaneous with 1B-B and/or 2B-B, demonstrate the OPERABILITY of two offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter; restore at least 1) 1A-A and 2A-A or 2) 1B-B and 2B-B to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore at least four diesel generator sets to OPERABLE status within 72 hours from time of initial loss or be in least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With one or more diesel generators inoperable solely because the fuel levels in one or more tank(s) is (are) below the minimum, restore the levels to above the minimum within 24 hours otherwise comply with ACTION statements a, b or d above.

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments, indicated power availability, and

b. Demonstrated OPERABLE at least once per 18 months during shutdown by transferring (manually and automatically) unit power supply from the normal circuit to the alternate circuit.

4.8.1.1.2 Each diesel generator set shall be demonstrated OPERABLE:#

a. In accordance with the frequency specified in Table 4.8-1 on a STAGGERED TEST BASIS by:

1. Verifying the fuel level in the engine-mounted day tanks.

2. Verifying the fuel level in the 7 day tank.

3. Verifying the fuel transfer pump starts and transfers fuel from the storage system to the engine mounted fuel tanks.

#Surveillance Requirements 4.8.1.1.2.a.4, 5, and 6 do not have to be met for the C-5 Diesel Generator unless it is being used to satisfy LCO 3.8.1.1.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

SURVEILLANCE REQUIREMENTS (Continued)

4. Verifying the diesel starts from standby condition and accelerates to at least 900 rpm in less than or equal to 10 seconds.* The generator voltage and frequency shall be 6900 ± 690 volts and 60 ± 1.2 Hz within 10 seconds after the start signal. The diesel generator shall be started for this test by using one of the following signals with startup on each signal verified at least once per 124 days:

   a) Manual.

   b) Simulated loss of offsite power by itself.

   c) An ESF actuation test signal by itself.

5. Verifying the generator is synchronized, loaded to greater than or equal to 4000 kw in less than or equal to 60 seconds,* and operates for greater than or equal to 60 minutes, and

6. Verifying the diesel generator is aligned to provide standby power to the associated shutdown boards.

b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the engine-mounted fuel tanks.

c. At least once per 92 days and from new fuel oil prior to addition to the 7-day tanks by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to .05 volume percent and a kinematic viscosity @ 100°F of greater than or equal to 1.8 but less than or equal to 5.8 centistokes when tested in accordance with ASTM-D975-77, and an impurity level of less than 2 mg. of insolubles per 100 ml. when tested in accordance with ASTM-D2274-70.

d. At least once per 18 months, during shutdown, by:

   1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service,

   2. Verifying the generator capability to reject a load of greater than or equal to 600 kw while maintaining voltage at 6900 ± 690 volts and frequency at 60 ± 1.2 Hz.

   3. Verifying the generator capability to reject a load of 4000 kw without tripping. The generator voltage shall not exceed 7866 volts during and following the load rejection.

*The diesel generator start (10 sec) from standby conditions shall be performed at least once per 184 days in these surveillance tests. All other engine starts for the purpose of this surveillance testing may be preceded by an engine idle start.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

SURVEILLANCE REQUIREMENTS (Continued)

4.8.1.1.4 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.9.2.2.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

ELECTRICAL POWER SYSTEMS

TABLE 4.8-1

Diesel Generator Reliability

No. of Failures in last 20 valid tests*	No. of Failures in last 100 valid tests*	Reliability Actions
$\leq$ 1	-	Test at least once per 31 days
$\geq$ 2	-	Test at least once per 7 days**
3	6	Within 30 days prepare a report for NRC audit, in accordance with Section 6.9.2.2
5	11	Declare the diesel generator inoperable and perform a re-qualification test for the affected diesel generator pursuant to the attachment to this table

*Criteria for determining number of failures and number of valid tests shall be in accordance with Regulatory Position C.2.e of Regulatory Guide 1.108, Revision 1, August 1977, where the number of tests and failures are determined on a per diesel generator unit basis. For the purposes of this test schedule, only valid tests conducted after the Operating License issuance date shall be included in the computation of the "last 20 valid tests". Entry into this test schedule shall be made at the 31 day test frequency.

**This test frequency shall be maintained until seven consecutive failure free demands have been performed and the number of failures in the last 20 valid demands has been reduced to one or less.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

ATTACHMENT TO TABLE 4.8-1
DIESEL GENERATOR REQUALIFICATION PROGRAM

(1) Perform seven consecutive successful demands without a failure within 30 days of diesel generator being restored to operable status and fourteen consecutive successful demands without a failure within 75 days of diesel generator of being restored to operable status.

(2) If a failure occurs during the first seven tests in the requalification test program, perform seven successful demands without an additional failure within 30 days of diesel generator of being restored to operable status and fourteen consecutive successful demands without a failure within 75 days of being restored to operable status.

(3) If a failure occurs during the second seven tests (tests 8 through 14) of (1) above, perform fourteen consecutive successful demands without an additional failure within 75 days of the failure which occurred during the requalification testing.

(4) Following the second failure during the requalification test program, be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

(5) During requalification testing the diesel generator should not be tested more frequently than at 24-hour intervals.

After a diesel generator has been successfully requalified, subsequent repeated requalification tests will not be required for that diesel generator under the following conditions:

(a) The number of failures in the last 20 valid demands is less than 5.

(b) The number of failures in the last 100 valid demands is less than 11.

(c) In the event that following successful requalification of a diesel generator, the number of failures is still in excess of the remedial action criteria (a and/or b above) the following exception will be allowed until the diesel generator is no longer in violation of the remedial action criteria (a and/or b above).

Requalification testing will not be required provided that after each valid demand the number of failures in the last 20 and/or 100 valid demands has not increased. Once the diesel generator is no longer in violation of the remedial action criteria above the provisions of those criteria alone will prevail.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. Diesel generator sets 1A-A and 2A-A or 1B-B and 2B-B each with:*

1. Two diesels driving a common generator,

2. Two engine-mounted fuel tanks containing a minimum volume of 250 gallons of fuel per tank,

3. A fuel storage system containing a minimum volume of 62,000 gallons of fuel,

4. A fuel transfer pump, and

5. A separate 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger.

*The C-5 diesel generator may be substituted for any one of the above required diesel generators.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4 8.1.1.1 and 4.8.1.1.2 (except for requirement 4.8.1.1.2.a.5), 4.8.1.1.3, and 4.8.1.1.4.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

SPRAY AND/OR SPRINKLER SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.11.2 The following spray and/or sprinkler systems shall be OPERABLE:

a. Reactor Building - RC pump area, Annulus

b. Auxiliary Building - Elev. 669, 690, 706, 714, 734, 749, 759, ABGTS Filters, EGTS Filters, Cont. Purge Filters, and 125V Battery Rooms.

c. Control Building - Elev. 669, Cable Spreading Room, MCR air filters, and operator living area.

d. Diesel Generator Building - Corridor Area.

e. Turbine Building - Control Building Wall.

f. Fifth Diesel Generator Building - Diesel Generator Rm., fuel oil pump, transformer, switchgear, electrical board Rms, and pipe gallery.

APPLICABILITY: Whenever equipment protected by the spray/sprinkler system is required to be OPERABLE.

ACTION:

a. With one or more of the above required spray and/or sprinkler systems inoperable, within one hour establish a continuous fire watch with backup fire suppression equipment for those areas in which redundant systems or components could be damaged; for other areas establish an hourly fire watch patrol. Restore the system to OPERABLE status within 14 days or, in lieu of any other report required by Specification 6.9.1, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 30 days outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

b. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.11.2 Each of the above required spray and/or sprinkler systems shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

b. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

Table 3.7-5 (Continued)

FIRE HOSE STATIONS

LOCATION	ELEVATION	HOSE RACK#
g. CCW Intake Pumping Station		
	690	0-26-867
	690	0-26-869
h. ERCW Pumping Station		
	688	0-26-927
	688	0-26-926
	688	0-26-930
	704	0-26-931
	704	0-26-925
	704	0-26-928
	720	0-26-929
	720	0-26-924
	720	0-26-932
i. Fifth Diesel Generator Building	723	0-26-1743
	723	0-26-1744
	742	0-26-1740
	742	0-26-1741
	742	0-26-1742

NOTE: This change is effective upon completion of the modification and associated post modification testing.

TABLE 3.3-11 (Continued)

FIRE DETECTION INSTRUMENTS

FIRE ZONE	INSTRUMENT LOCATION	MINIMUM INSTRUMENTS OPERABLE Ionization	Photoelectric	Thermal	Infrared
296	Aux. CR Bds. L-4B, 4D, & 11B El 732	6			
297	Main CR Bds. El. 732	9			
298	Common MCR Bds. El 732	9			
387	Turbine Cont. Bldg. Wall, El. 706			18	
353	Lwr. Compt. Coolers, El. 693		4		
355	Upr. Compt. Coolers, El. 778		4		
374	Reactor Building Annulus		18		
375	Reactor Building Annulus		18		
362	RCP 1 El. 693				2
363	RCP 1 El. 693			2	
358	RCP 2 El. 693				2
359	RCP 2 El. 693			2	
366	RCP 3 El. 693				2
367	RCP 3 El. 693			2	
370	RCP 4 El. 693				2
371	RCP 4 El. 693			2	
403	Additional Diesel Gen. El. 723			8	
404	Additional Diesel Gen. El. 723			8	
405	Additional Diesel Gen. El. 723/741	4			
406	Additional Diesel Gen. El. 723/741	4			
408	Additional Diesel Gen. El. 723/741	4		10	
410	Diesel Gen. Interface Rm. El. 722	9			

NOTE: This change is effective upon completion of the modification and associated post modification testing.

RADIAL PEAKING FACTOR LIMIT REPORT

6.9.1.14 The W(z) function for normal operation shall be provided to the Director, Nuclear Reactor Regulation, Attention, Chief of the Core Performance Branch, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555 at least 60 days prior to cycle initial criticality. In the event these values would be submitted at some other time during core life, it will be submitted 60 days prior to the date the values would become effective unless otherwise exempted by the Commission.

Any information needed to support W(z) will be by request from the NRC and need not be included in this report.

SPECIAL REPORTS

6.9.2.1 Special reports shall be submitted to the Director of the Office of Inspection and Enforcement Regional Office within the time period specified for each report.

6.9.2.2 Diesel Generator Reliability Improvement Program

As a minimum the Reliability Improvement Program report for NRC audit, required by LCO 3.8.1.1, Table 4.8-1, shall include:

(a) a summary of all tests (valid and invalid) that occurred within the time period over which the last 20/100 valid tests were performed

(b) analysis of failures and determination of root causes of failures

(c) evaluation of each of the recommendations of NUREG/CR-0660, "Enchancement of Onsite Emergency Diesel Generator Reliability in Operating Reactors," with respect to their application to the Plant

(d) identification of all actions taken or to be taken to 1) correct the root causes of failures defined in b) above and 2) achieve a general improvement of diesel generator reliability

(e) the schedule for implementation of each action from d) above

(f) an assessment of the existing reliability of electric power to engineered-safety-feature equipment

Once a licensee has prepared and maintain an initial report detailing the diesel generator reliability improvement program at his site, as defined above, the licensee need prepare only. A supplemental report shall be prepared within 30 days after each subsequent failure during a valid demand for so long as the affected diesel generator unit continues to violate the criteria (3/20 or 6/100) for the reliability improvement program remedial action. The supplemental report need only update the failure/demand history for

NOTE: This change is effective upon completion of the modification and associated post modification testing.

the affected diesel generator unit since the last report for that diesel generator. The supplemental report shall also present an analysis of the failure(s) with a root cause determination, if possible, and shall delineate any further procedural, hardware or operational changes to be incorporated into the site diesel generator improvement program and the schedule for implementation of those changes.

In addition to the above, submit a yearly data report on the diesel generator reliability.

6.10 RECORD RETENTION

In addition to the applicable record retention requirements of Title 10, Code of Federal Regulations, the following records shall be retained for at least the minimum period indicated.

6.10.1 The following records shall be retained for at least five years:

a. Records and logs of unit operation covering time interval at each power level.

b. Records and logs of principal maintenance activities, inspections, repair and replacement of principal items of equipment related to nuclear safety.

c. All REPORTABLE EVENTS submitted to the Commission.

d. Records of surveillance activities, inspections and calibrations required by these Technical Specifications.

e. Records of changes made to the procedures required by Specification 6.8.1 and 6.8.4.

f. Records of radioactive shipments.

g. Records of sealed source and fission detector leak tests and results.

h. Records of annual physical inventory of all sealed source material of record.

NOTE: This change is effective upon completion of the modification and associated post modification testing.

ENCLOSURE 2

JUSTIFICATIONS FOR PROPOSED
TECHNICAL SPECIFICATIONS
UNITS 1 AND 2

DESCRIPTION AND JUSTIFICATION OF PROPOSED CHANGE

This proposed change would delete hose stations 0-26-866, 868, and 870 from SQN Technical Specification LCO 3.7.11.4 table 3.7-5.g. This equipment was installed to protect the auxiliary essential raw cooling water (AERCW) system. The AERCW system was superceded by a fully qualified ERCW system. The AERCW pumps have been removed. The two hose stations not deleted from table 3.7-5 item g, 0-26-867 and 869 will be maintained to provide backup protection to the high-pressure fire protection (HPFP) system components. Requiring 0-26-867 and 869 to be operable will ensure operability of a normal and an alternate hose station as backup to the HPFP system components.

Removal of extraneous surveillance requirements will give more relative importance to the remaining requirements and will allow plant personnel to concentrate their efforts on essential equipment. These hose stations should have been deleted during the switchover from the AERCW to the ERCW, but they were retained due to an administrative oversight.

Attachment 2 to Enclosure 2

SEQUOYAH NUCLEAR PLANT

FIFTH DIESEL GENERATOR

TECHNICAL SPECIFICATION CHANGE PROPOSAL
JUSTIFICATION

Table of Contents

SEQUOYAH NUCLEAR PLANT
FIFTH DIESEL GENERATOR
TECHNICAL SPECIFICATION
CHANGE PROPOSAL

DESCRIPTION OF THE CHANGE

This change will allow the fifth standby diesel generator (D/G) to be used to satisfy limiting conditions for operation (LCO) 3.8.1.1 and LCO 3.8.1.2 for Sequoyah units 1 and 2 when one of the trained D/Gs is out of service. The change will require that those systems and subsystems which are necessary to ensure operability of the fifth D/G (designated C-S) will be operable whenever the C-S D/G is used as a substitute for a trained standby ac power source.

The following LCOs will ensure operability of required subsystems when the C-S D/G is required. The surveillance requirements on these subsystems will be waived for the C-S D/G when it is not being substituted for a trained D/G.

LCO 3.8.1.1	AC Power Sources, Modes 1, 2, 3, 4
LCO 3.8.1.2	AC Power Sources, Modes 5, 6
LCO 3.7.11.2.	D/G HPFP
LCO 3.7.11.4	Hose Stations
LCO 3.3.3.8	Fire Detectors

This change will also affect the time requirement in ACTIONS a, b, and c of LCO 3.8.1.1, and it will change the requirement on starting the D/Gs within one hour, to starting within 24 hours when one ac power source is declared inoperable. For two offsite sources inoperable, eight hours is

allowed. For one offsite and one D/G set inoperable Surveillance Requirement (SR) 4.8.1.1.2.a.4 is deleted. The change proposes to substitute a program of demonstrated D/G reliability in return for a reduction in the frequency of fast starts required by the technical specifications.

When any D/G is inoperable solely due to a low fuel oil tank level, 24 hours will be allowed to return the levels to the acceptable range.

REASON FOR THE CHANGE

As currently designed, all four D/Gs are required to satisfy the licensing design bases accidents while assuming a single failure. When any one of the four trained D/Gs (1A-A, 2A-A, 1B-B, 2B-B) is declared inoperable, the ACTION statements of LCO 3.8.1.1 allow only 72 hours to return all D/Gs to operability. This time constraint limits the magnitude of any maintenance and/or repair that can be completed while either nuclear unit is at power. Operating experience at Sequoyah has indicated that there is a significant probability of exceeding this 72-hour limit and incurring the cost of lost production due to a forced unit shutdown.

The addition of the C-S D/G will preclude this loss of production by providing an alternate which can be substituted for any trained D/G. This will also strengthen the unit against a long-term loss of offsite power.

The reduction in the number of required D/G fast starts will reduce the wear and stress on mechanical components. The relaxation in the number of fast starts required has been reduced in favor of the same number of

slow starts where prestart preparations are allowed. The time to full speed and load have been relaxed accordingly. Allowing the majority of required D/G starts to be preceded by vendor-prescribed preparations will reduce the wear on components and increase D/G reliability. Relaxation of the D/G ACTION statements when inoperability is due solely to inadequate levels will allow more time to finish fuel oil testing and return the levels to greater than the minimum required.

DESIGN DESCRIPTION AND JUSTIFICATION FOR THE CHANGE

TVA has designed and constructed the fifth D/G in accordance with the applicable design criteria as noted in the design description in attachment 1. This additional D/G is believed to be equivalent to the existing trained D/Gs, with the exception of the C-S generator continuous rating which is 4400 kW rather than 4000 kW.

The basic concept of the design is to make maximum use of the existing Class 1E components. This minimizes the amount of new controls in the main control room, and it provides the C-S D/G with control and accident logic circuits which are currently on the plant surveillance program.

The switching required to substitute the C-S D/G for a trained D/G will require the transfer of control cables at two isolation points. At the disabled D/G control and annunciator panel, the control and annunciation cables will be switched from the connections of the disabled D/G to the alternate D/G connections. As an example, if the 1 A-A D/G is inoperable, the operators would disconnect the 48-pin, keyed, screw-type connectors

from the 1A-A contacts on the 1A-A control and annunciator panel and then reconnect them to the contacts for the C-S D/G which are located on the same panel. At the additional D/G building, the operators would then connect the C-S D/G controls to the keyed, screw-type connections for the 1A-A D/G.

When all the control and annunciator connectors are in their correct positions, a circuit is completed and an annunciator in the main control room notifies the operator which D/G the C-S D/G is replacing.

This design provides separation of trained equipment by energizing only one set of C-S control connectors at a time and providing two isolation points to preclude a single failure from affecting all four D/Gs. A simplified diagram of this is provided by sketches 1 and 2.

The C-S D/G will use essential raw cooling water (ERCW) to cool the engine during operation. The logic circuitry for the ERCW supply valves is provided by the switching procedure outlined above. This ensures that upon receipt of an automatic D/G start the ERCW valves will open to provide cooling water. Since the output of the logic circuitry for the inoperable trained D/G is used for the C-S D/G, the ERCW valves for the inoperable trained D/G will not automatically open. This will preclude supplying ERCW to an inoperative D/G and possibly impacting the capability of the ERCW to provide a heat sink for other safety-related equipment.

The ERCW valves for the inoperative D/G may be opened manually to supply cooling water during testing before returning the unit to service. TVA will provide administrative controls to ensure that the ERCW supply valves to the inoperative D/G will be closed when the other four D/Gs have started unless ERCW capacity is sufficient to provide cooling to all safety-related loads.

The surveillance requirements of SR 4.8.1.1.2 and SR 4.8.1.1.3 will be used to verify operability when the fifth D/G is required to be OPERABLE. Before initial use as a substitute for any trained D/G, the C-S D/G will be tested in a program similar to that used to verify the four existing D/Gs. The postmodification testing program described below will provide a baseline verification of the fifth D/G design adequacy.

POSTMODIFICATION TEST (PMT) PROGRAM

TVA will demonstrate the adequacy of the C-S D/G design by performing a series of PMTs. The test program will first verify the adequacy of the support subsystems required for C-S D/G operation. Then the D/G itself will be functionally tested in accordance with Regulatory Guide 1.108. A brief description of each section of the test program (not in order of performance) is provided below:

PMT-22A This test will verify proper response of the following C-S D/G components and subsystems as well as the C-S D/G itself:

Generator Differential Relay

Generator differential tests shall be simulated on the 6.9-kV equipment. This test shall confirm that the appropriate breakers are tripped and locked out.

Remote Control and Annunciation Circuits

Remote control and annunciation circuits will be verified with the diesel generator connected as a replacement for each of the four existing D/Gs.

D/G Blackout Test

This test will demonstrate that the D/G will start and attain rated voltage and frequency within acceptable time limits on a simulated blackout. This test will be performed with the D/G connected in place of each of the four existing D/Gs. The test will be acceptable if the D/G starts and attains rated voltage and frequency and connects to the shutdown board in 10 seconds or less, measured from the diesel-start signal. At least one of the tests must be performed at full-load temperature.

D/G Accident Loading Sequence

The D/G shall be started by creating a blackout followed by a simulated safety injection signal and will automatically connect

to the 6.9-kV shutdown board. The accident loads will be sequenced to the board. This test will be required on only one of the power trains. The test will be acceptable if the D/G accepts the loads, and voltage and frequency are restored within 10 percent and 2 percent of nominal, respectively, within 60 percent of each load sequence time interval. The test should be performed at full-load operating temperature.

24-Hour Load Test

The D/G will be paralleled with offsite power and loaded to full-rated load. After operating temperatures have stabilized, the generator shall be loaded to the short-time rating for a period of 2 hours followed by 22 additional hours at the full-load rating. The test will be acceptable if the D/G performs within the prescribed limits for this period. Voltage and frequency shall be monitored during the test.

D/G Load Shedding

This test requires load shedding of the largest single load connected to the generator and shedding of the full load. The test will be acceptable if the speed does not exceed 75 percent of the difference between nominal speed and the overspeed trip setpoint or 115 percent of nominal, whichever is lower. Voltage

shall be restored to within 10 percent of nominal and frequency should be restored to within 2 percent of nominal in less than 60 percent of each load sequence time interval.

D/G Start and Load Test

Twenty-three start and load tests are to be performed on the D/G set. The D/G set is to be automaticlly started and manually paralleled with the system and then loaded to approximately 50 percent of rated capacity (2750 kVA). The test will be considered acceptable if the D/G completes the required 23 start and load tests without a failure. The D/G voltage, frequency, current output, lube oil outlet temperature, jacket water outlet temperature, lube oil pressure, and fuel oil pressure shall be recorded and compared with data taken at the factory where applicable. Each start shall be initated with the engines at standby temperatures.

Synchronizing with Offsite Power

This test will demonstrate the ability to (a) synchronize the D/G with offsite power while the unit is connected to the emergency load, (b) transfer the load to offsite power, (c) isolate the diesel generator unit (DGU), and (d) restore to a standby status.

Blackout with D/G in the Test Mode

This function was tested on one of the four existing diesels in preoperational test TVA-13 to verify that the overload incurred on loss of offsite power would cause the emergency feeder breaker to trip, creating a blackout. For this test, the D/G will be connected in parallel with offsite power and a simulated overcurrent on device 50 will be used to verify that the emergency feeder breaker will trip on overcurrent while in the test mode only.

6.9-kV D/G Board

Verify that the input breaker to the 6.9-kV D/G board will trip on a differential current. Verify proper tripping of the feeder breaker supply for the diesel auxiliary supply board.

480-V Diesel Auxiliary Supply Board

Verify that the interlocks in the breaker control circuits perform as designed.

480-V Diesel Auxiliary Board Undervoltage

Verify undervoltage annunciation on diesel auxiliary boards C1-S and C2-S.

PMT-22B This test will verify that the D/G fuel oil system can transfer oil from the unloading station to the yard or D/G building storage tanks. The system will also enable transfer between different D/G fuel oil tanks. The test will probe the system's ability to transfer fuel oil in all operational modes and verify the proper functioning of the associated controls, annunciators, and interlocks.

The portion of the fuel oil system from the day tanks to the fuel oil injectors will be verified by successful completion of integrated test PMT-22F. The following systems, subsystems, and components will be tested to verify acceptable performance.

Yard Transfer Pump

The yard transfer pump will be used to transfer fuel oil from either storage tank to the additional 7-day storage tank and to reject oil through the reject connection. Annunciators for low level/high level on the 1-C-S 7-day tank will be tested by level manipulation.

Additional Diesel Generator (ADG) Building Transfer Pump

The ADG building transfer pump will demonstrate the capability to transfer fuel oil from the 1-C-S 7-day tank to any other 7-day tanks. Transfer capability from any 7-day tank to the 1-C-S tank will also be tested. This pump can also transfer oil from the 7-day tanks back to the yard storage tank.

Diesel Skid-Mounted, Motor-Driven Pumps

These pumps will be tested to demonstrate their capability to transfer fuel oil from the 1-C-S 7 day tank to the diesel engine day tanks 1C1 and 1C2. The automatic start and automatic shutoff will also be tested. At test initiation, the day tank levels will be below pump shutoff. The day tank high- and low-level alarms will be checked by tank level manipulation.

PMT-22C This test verifies the proper functioning of the D/G starting air system. The air compressors, receivers, motors, and dryers will be shown sufficient to meet the design criteria.

Starting Air System Compressor Control

The automatic start and stop features will be verified to show automatic control of receiver pressure with proper annunciator function. The capacity will be shown sufficient to recharge a receiver in 30 minutes.

Air Receiver and Air-Start Motor

The alarms will be shown to operate correctly on low pressure and reset upon restoration of normal air-receiver pressure. At the low-pressure limit, the air-receiver capacity will be shown sufficient for five start attempts.

Air-Start Motor Cycle

The solenoid valves on the air receiver outlet will demonstrate acceptable cycling to attempt a D/G start then cycle closed and remain closed until the next start attempt. An annunciator will alarm after the third cycle without a D/G start.

Air Dryer

The effectiveness of the air dryers will be tested to show that the outlet air dewpoint is trending toward a dewpoint of -10°F.

PMT-22D This test section will verify proper operation of the additional D/G building heating and ventilation system. The starting of the C-S D/G will initiate opening of the intake and exhaust dampers and starting of an exhaust fan. On high room temperature or low air flow, the second fan will start.

On low temperature the fans will stop, and the dampers will close. The capability to meet heat load rejection criteria will be verified.

PMT-22E The adequacy of the 125-V diesel generator batteries for the C-S D/G will be verified in accordance with IEEE 450-1980, and the capacity of the associated battery chargers will be demonstrated. The 125-V DC diesel generator controls, battery and charger, instruments, and annunciators will be verified operable. The time to recharge the diesel generator batteries will be determined.

PMT-22F This section will demonstrate that the interlock, logic, relay actuation actions, and indicating lights and alarms function as designed for the engine controls and alarms, the D/G exciter and regulator, the protective relays, the motor-driven fuel oil pump relays, the D/G remote circuitry relays, and the preheat system.

The D/G will be manually started and stopped with the generator deenergized to check for proper operation. This will be repeated with the generator energized and again using automatic control. A 24-hour run will be conducted which consists of 2 hours at approximately 4840 kW (.8 power factor) and 22 hours at approximately 4400 kW (.8 power factor).

This test will also verify that on receipt of an emergency start signal, the D/G will start, come up to rated speed and voltage, and close the diesel breaker to the shutdown board in 10 seconds.

PMT-22G The fire protection system for the additional D/G building will be shown to perform according to design criteria. The operability of the hose stations, sprinklers, and detector system control and alarm functions will be verified. A minimum high-pressure fire protection (HPFP) system pressure will be determined, and the capability to manually start a HPFP pump locally will be demonstrated.

PMT-22H The capability of the ERCW system will be shown by manually operating the ERCW supply valves to the D/G heat exchangers both from the main control room and locally. Automatic opening will be verified on a D/G start signal. The capability to provide sufficient ERCW flow will also be checked.

RELIABILITY

TVA maintains a log in the main control room to record each start of a DGU. The log identifies the unit tested, the date, whether the test was valid in accordance with Regulatory Guide 1.108, and whether the test was successful. TVA has reviewed the data and tabulated the results in table 1.

TABLE 1

Sequoyah D/G Reliability
March 5, 1980 to May 15, 1984

Unit	Total Number of Valid Tests	Total Number of Valid Failures	Reliability
1 A-A	132	4	.969
2 A-A	128	2	.984
1 B-B	147	2	.986
2 B-B	132	0	1.000

For the last 100 valid tests (table 2), the results show improvement as improved maintenance techniques were incorporated. The reliability for the last 20 valid tests is shown in table 3.

TABLE 2

Sequoyah D/G Reliability
(last 100 starts)

Unit	Number of Valid Tests	Number of Valid Failures	Reliability
1 A-A	100	3	.970
2 A-A	100	0	1.000
1 B-B	100	0	1.000
2 B-B	100	0	1.000

TABLE 3

Sequoyah D/G Reliability
(last 20 starts)

Unit	Number of Valid Tests	Number of Valid Failures	Reliability
1 A-A	20	1	.950
2 A-A	20	0	1.000
1 B-B	20	0	1.000
2 B-B	20	0	1.000

This data shows that the aggregate reliability for the last 400 valid tests has been greater than the .99 goal set in Regulatory Guide 1.108. This provides long-term proof of the standby ac power supply at Sequoyah. This data base will be used as a baseline data for the reliability program specified in the attached technical specification changes to LCO 3.8.1.1.

SUMMARY

The exception to ACTION statements a, b, and d, when inoperability is due solely to low fuel tank levels, will allow a reasonable amount of time to test fuel oil in the yard storage tank before transfer to the D/G fuel tanks. The provision that requires a start of all D/Gs would not give added assurance that low fuel levels will not hamper their function. The required D/G starts would use up remaining fuel oil which may be needed during a loss of offsite power.

Since the Sequoyah operating licenses have been issued, TVA has undertaken a program to improve the offsite power source availability. The previous configuration had two common station service transformers (CSST) feeding two unit start buses. The start buses supplied normal and alternate feeds to the four Class 1E 6900-V shutdown boards. TVA has added a third common station service transformer capable of supplying offsite power to any of four start buses which supply power to the four Class 1E 6900-V shutdown boards. This new configuration is shown on the attached TVA drawing 15E500-1.

The additional CSST is not normally in use, but it can be racked in and thus provides added assurance that Sequoyah will have ac power available. Drawing 15E500 also shows the additional D/G power connections to the onsite power distribution system.

TVA believes the addition of a fifth D/G and the addition of an extra CSST have strengthened the ac power supply system for Sequoyah. It is

TVA's intention to maintain the fifth D/G in a ready state such that it would be available for emergency use on a short-term basis to provide added protection against a long-term loss of offsite power.

Sequoyah's operating experience has shown that the plant is vulnerable to the 72-hour ACTION statement of LCO 3.8.1.1 and that without this relief a significant probability exists that this ACTION statement will result in a forced-unit shutdown. Pursuing this change at this time is consistent with the procedural rules associated with the SHOLLY amendment in that a potential problem exists, and this change identifies the problem and proposes use of additional safety grade equipment to preclude a forced unit shutdown.

This change will satisfy the concerns of the NRC on D/G reliability as stated in TVA's response to Generic Letter 84-15.

Appendix 1

Tennessee Valley Authority

Sequoyah Nuclear Plant Units 1 and 2

DESCRIPTION OF THE PROPOSED ELECTRICAL POWER SYSTEM FOR THE ADDITIONAL DIESEL GENERATOR SYSTEM

DESCRIPTION OF THE PROPOSED ELECTRIC
POWER SYSTEM FOR THE ADDITIONAL DIESEL
GENERATOR SYSTEM

ABBREVIATIONS

ADGS - Additional Diesel Generator System

ANS - American Nuclear Society

ANSI - American National Standards Institute

ASTM - American Society for Testing Materials

DEMA - Diesel Engine Manufacturers Association

DGU - Diesel Generator Unit

EDGU - Existing Diesel Generator Unit

GDC - General Design Criteria Appendix A to 10 CFR Part 50

IEEE - Institute of Electrical & Electronic Engineers

MCR - Main Control Room

NEMA - National Electric Manufacturers Association

NFPA - National Fire Protection Association

DESCRIPTION OF THE PROPOSED ELECTRIC

POWER SYSTEM FOR THE ADDITIONAL DIESEL

GENERATOR SYSTEM

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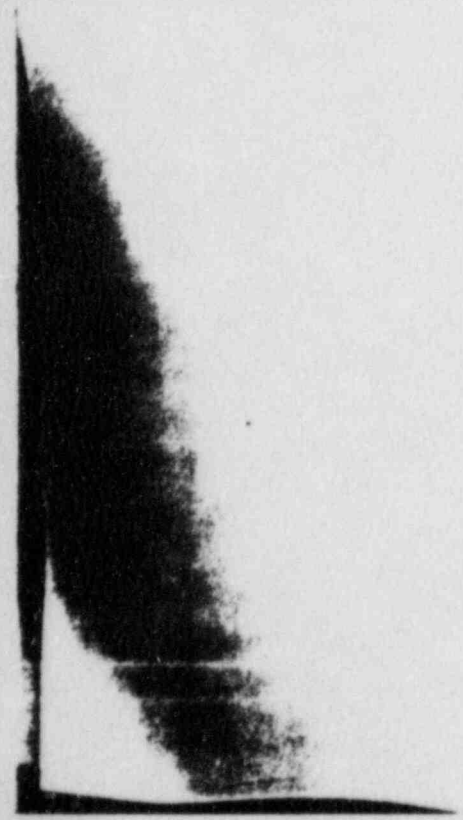

DESCRIPTION OF THE PROPOSED ELECTRIC
POWER SYSTEM FOR THE ADDITIONAL DIESEL
GENERATOR SYSTEM

1.0 PURPOSE

One of the limiting conditions for operation at Sequoyah Nuclear Plant requires that four separate and independent diesel generator units (DGU) be operable to provide a power source for the Class 1E ac auxiliary power system. If one of the four DGUs is in an inoperable status for more than 72 hours (due to maintenance or repairs), both units of the plant must be shut down. In the event that any one of the four existing DGUs is inoperable, the additional diesel generator system (ADGS), when manually aligned to replace the inoperable DGU, will provide unrestricted operation of both reactor units. Hence, the addition of the ADGS to the onsite Class 1E ac power system at Sequoyah is to eliminate the two-unit technical specification requirement when one D/G is out of service.

2.0 SCOPE

This document describes the design and equipment application for the ADGS at Sequoyah Nuclear Plant.

DESCRIPTION OF THE PROPOSED ELECTRIC POWER SYSTEM FOR THE ADDITIONAL DIESEL GENERATOR SYSTEM

2.1 System Identification

a. D/G Unit

Two diesel engines driving one generator directly connected to form a single-shaft arrangement complete with all auxiliaries necessary to make the unit a self-sufficient power source.

b. A category I structure (additional D/G building) to contain the unit and auxiliary equipment, the requirements of which are not covered in this document.

3.0 DESIGN REQUIREMENTS

The ADGS shall serve as a replacement for any one of the existing DGUs; therefore, it has no train designation until it has been manually aligned (electrically, mechanically, etc.) to replace an existing DGU. It will then assume the train requirements of the unit being replaced. Hence, the ADGS shall be considered to be part of the engineered safeguards and vital to plant operation during its mode of operation as described. It will be under the quality assurance program. References made herein to Regulatory Guides or industry standards refer to those revisions used in the original design.

DESCRIPTION OF THE PROPOSED ELECTRIC POWER SYSTEM FOR THE ADDITIONAL DIESEL GENERATOR SYSTEM

3.1 D/G Unit

a. The diesel engine-driven generator unit is similar to the units installed at TVA's Watts Bar Nuclear Plant. The primary difference between the ADGU and the existing four DGUs installed at Sequoyah is that the size and kW capability of the generator is larger than the original four generators. The engine-generator unit is furnished by Power Systems Division of Morrison-Knudson and consists of two 16-cylinder engines (make and model No. EMD 16-645E4) directly connected to a 6.9-kV generator. The D/G unit uses a tandem arrangement; that is, each unit consists of two diesel engines with a single generator between them connected together to form a common shaft. The normal operating speed of the set is 900 r/min. The unit will have a continuous rating of 4400 kW at .8 power factor and a two-hour rating of 4840 kW, and will operate without objectionable vibration (not more than 3 mils displacement). The engines of the unit conform to the Diesel Engine Manufacturers Association (DEMA) standard practices.

b. The D/G C-S system is shown on the single-line diagram of drawing reference 6 and the schematic diagram on sheet 1 of drawing reference 9. The schematics in drawing

reference 9 for (1) the D/G engine control is on sheets 2-4, (2) the D/G excitation system is on sheets 4-5, (3) the D/G protective relays are on sheet 5, (4) the D/G remote control circuits are on sheet 6, (5) the D/G annunciation is on sheets 7-8, and (6) the D/G breaker control circuits are on sheets 9-10.

c. The governor control of the ADGUs consists of the following:

Woodward EDB-13P actuator on each engine
2301 Computer (reverse biased)
Frequency pickup

The Woodward EGB-13P actuator used with the 2301 computer is a proportional governor which moves the fuel rack in inverse proportion to the voltage signal from the computer. There is a governor actuator on each engine and they are electrically connected in series so that the loss in signal to one would also be the loss in signal to the other.

DESCRIPTION OF THE PROPOSED ELECTRIC
POWER SYSTEM FOR THE ADDITIONAL DIESEL
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Based upon the input from the generator, the electronic network sends electric signals to the actuators on the two engines. This signal goes to the coils of each actuator that are connected in series so that each coil sees the same electric signal. The terminal shaft of each actuator will move exactly the same amount for each change in signal. This means that the fuel control shaft movement on each engine will be identical.

Attached to the fuel control shaft through an appropriate linkage is an injector rack for each cylinder which, by its position, meters the fuel injected into its cylinder. This rack is set with a standard factory gauge so that each cylinder will receive the same amount of fuel. Each injector rack is spring loaded to prevent any single injector that may stick from affecting the remaining racks on that engine.

Two devices provide alarm signals should the two engines of a DGU receive different amounts of fuel. One of these devices is a synchro device that is given an alarm signal should the difference in the actuator control positions for the two engines exceed a certain tolerance. The other such device is an injector rack limit switch that will initiate an alarm should one engine be on full rack when the other is not.

The mechanical governor is set to control the unit speed at 930 r/min rather than the 900 r/min of the electrical governor. Since the governor's electrical system is reverse biased, a failure in the electrical system would cause the engine speed to increase until it reached the setpoint of the mechanical governor and at that point the mechanical governor would control the engine.

d. Accessories such as heat exchangers, oil coolers, oil pumps, sumps, day tank, oil filters, turbochargers, air filters, silencers, exhaust mufflers, air compressors, batteries, battery chargers, and controls are considered to be part of the DGU.

The diesel engine and generator components will be mounted to maintain alignment of the shaft. Controls will be mounted in cabinets and the generator will be complete with an excitation system. Protection devices are similar to those described in the Final Safety Analysis Report (FSAR) for the existing D/Gs.

e. The DGU will perform its safety function and withstand the design basis events (e.g., safe shutdown earthquake, tornado depressurization, etc.).

f. The D/G unit will be furnished with the engine manufacturer's recommended lube oil system modifications and heavy duty turbochargers.

g. The D/G auxiliaries are supplied power from the 480-V diesel auxiliary supply board located in the additional D/G building on el 747.7. (See drawing references 2, 3, 4, 7, and 10.)

3.2 Fuel System

a. Each engine of the tandem pair will have its own complete fuel system, including a day tank having a capacity for 1-1/2 hours at full-load, capable of supplying adequate fuel to the diesel engine under all operating conditions during its mode of operation. A fuel supply tank for operation at full load for a minimum of 7 days will commonly supply fuel to the individual day tanks for each DGU.

b. The ADGS building drainage system will control any lubricating or fuel oil spills.

3.3 Diesel Engine Cooling Water System

Each diesel engine will have a cooling water system capable of removing waste heat from the diesel engine block, lubrication oil system, turbocharger, and other components specified by the DGU manufacturer.

The main heat exchanger will be the sole interface between the engine water-cooled systems and the ERCW. A three-way, thermostatic control valve will provide for heat exchanger bypass to allow fast engine warmup.

The cooling water system will contain provisions to maintain the DGU in the manufacturer's recommended standby conditions.

3.4 Cooling Water System

Cooling water will be suppled to the diesel-engine heat exchangers from each of the two ERCW system headers. Cooling water piping will be arranged such that each diesel engine heat exchanger may be serviced from either header. The MOVs on the ERCW headers will be powered from the 480-V diesel auxiliary board within the additional D/G building.

3.5 Starting System

The unit will have two complete, independent, pneumatic starting systems (one per each engine) which are equivalent to those described in FSAR, section 8.3. and 9.5.6.

Two sets of accumulators will be furnished for the unit. Each set of accumulators will be of sufficient size to start the unit (manually or automatically) five times without recharging and without ac power available. One set of accumulators will serve as a standby for the other. Two 480-V ac motor-driven air compressors will be supplied for this generator unit. Each compressor will be sized to recharge its set of accumulators in 30 minutes after five consecutive starts. A dual tower dessicant-type air dryer will be installed on each compressor discharge.

3.6 Diesel Engine Air Intake

The ADGU will be equipped with a separate low-resistance oil bath air intake filter suitable for the environmental conditions encountered at the plant site. The filter will be protected from airborne debris large enough to clog the filter air

intake area. The intake piping will be cleaned and coated with epoxy paint or an equivalent corrosion inhibiter to prevent rust from damaging turbochargers.

3.7 Diesel Engine Exhaust

Each diesel engine will have a separate exhaust system capable of conveying engine exhaust gases out of the D/G building any time the ADGU is running.

3.8 Generator

The generator will be 6900-V, 3-ph, 60 Hz, have a continuous rating of 4400 kW at .8 power factor, and be sufficient to operate under all conditions of loading without exceeding its temperature limits. The generator is designed to operate over the same ambient temperature range as the prime mover. The generator is capable of being operated at 4840 kW for a period of 2 hours out of any 24 hours of operation.

3.9 Exciter

The generator will have a static-type excitation system that includes its voltage or current supply transformer, connections, bus exciter cubicle, voltage regulator, rectifiers, fuses, and all devices necessary to automatically control the generator during the loading cycle.

DESCRIPTION OF THE PROPOSED ELECTRIC POWER SYSTEM FOR THE ADDITIONAL DIESEL GENERATOR SYSTEM

3.10 Generator Control Panels

The generator control panel will be a freestanding, floor-mounted panel complete with the instruments and controls required. This panel monitors the same D/G parameters as being monitored by the control panels on the existing D/Gs.

3.11 Annunciation and Distribution Panels

The annunciation and distribution panels will be freestanding, floor-mounted panels which shall be the interface for interconnecting the instrument and controls from the disabled D/G and the ADGS. The plug connectors used and control panels are Class 1E qualified. See drawing reference 11.

3.12 D/G Control Power

The 125-V dc additional D/G's battery system is a Class 1E system whose function is to provide control power for control and field flashing for the ADGS.

The 125-V dc battery 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-V dc while supplying the largest demand of the steady-state dc loads), a battery (for control and field flashing of the generator), and

a distribution board (which facilitates the dc loads and provides circuit protection). The battery system is ungrounded and incorporates ground detection devices. The ADGS battery system is physically and electrically independent from the existing D/G 125-V dc battery system and will be located on el 723 of the ADGS building.

The ADGS battery is of the lead-acid type and has 57 cells connected in series and divided into 19 units with every unit having three cells. The battery is a type 3DCU-9 (furnished by the C&D Batteries Division of Eltra Corporation) rated at 26 ampere-hours at 60°F for a 30-minute discharge rate. With the battery in the fully charged condition, it has the capacity to supply 69 amperes (A) for one minute, and 42 amperes for 30 minutes at 60°F and 80 percent of its rated capacity. The estimated design loads on the battery, during a loss of ac power, are 48 amperes (field flash) for two seconds and 12 amperes (control) for 30 minutes. The 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 the DGU.

The normal supply of dc current to the battery board is from the battery charger. The charger maintains a floating voltage of approximately 128 V on the associated battery board bus (the battery is continuously connected to this bus also) and

is capable of maintaining 133 V during an equalizing voltage). The charger supplies normal steady-state load demand on the battery board and maintains the battery in a charged state. Ac power for the charger is supplied from the 480-V ac, 3-phase diesel auxiliary board C1-S. The charger is a solid-state type which converts a 3-phase 480-V ac input to a nominal 125-V dc output having a rated capacity of 20 amperes. Over this output current range, the dc output voltage will vary no more than ±1.0 percent for a supply voltage amplitude variation of ±10 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 V to 133 V, (2) equalize and float modes of operation (the charger normally operates in the float mode at 128 V, but can be switched to the equalize mode with an output of 133 V, (3) a current-limit feature which limits continuous overload operation to 125 percent of rated output, (4) protective devices which prevent a failed charger from discharging its associated battery and protect the charger from external overloads, and (5) metering and alarm circuits to monitor the charger output.

The ADGS 125-V dc control and field flash circuits are supplied power from the ADGS 125-V dc distribution panel located in the ADGS building on el 723. Each circuit (including the battery

charger input to the panel) is protected by a thermal-magnetic circuit breaker. The battery input circuit to the panel is protected by a thermal-magnetic circuit breaker and a coordinated fuse. Local metering on the distribution panel and battery charger includes battery and charger current, battery and charger voltage, and battery system ground detection. Low battery charger output voltage and loss of 480-V ac supply to the charger is alarmed in the main control room when the DGU is substituted for an existing DGU.

3.13 6.9-kV and 480-V Board Configuration

The key diagram of the ADGS is shown on sheet 1 of drawing reference 1. The DGU will be connected to the 6.9-kV D/G board C-S (sheet 2 of drawing reference 6) through a normally closed breaker having manual trip capability only.

Compartments E-F-H-J of the board feed the existing DGU's transfer switches. Only one breaker is used for these four compartments thus allowing only the diesel to be connected to one transfer switch at any one time when it is being substituted for an existing DGU. The D/G auxiliaries are supplied power from the 480-V diesel auxiliary board which is connected to compartment C of the 6.9-kV D/G board C-S. The 480-V board has

two buses separated by a bus tie breaker. Bus B, which has a normally closed supply breaker (NSB) and is supplied power from the 6.9-kV common board A, feeds 480-V diesel auxiliary board C2-S. Bus A of the 480-V diesel auxiliary board (C1-S) supplies the Class 1E loads required to support D/G C-S when it is used as an onsite source. The bus tie breaker (TB) is normally closed except when the D/G C-S is operating as an onsite power source. When the D/G has attained rated speed and voltage, the bus TB is tripped and the Bus A supply breaker (DSB) is closed. Thus, the diesel generator will supply the power for the Class 1E loads only. Board C2-S Bus B remains connected to 6900-V common board A. The TB cannot be manually reclosed unless the offsite supply incoming breaker (NSB) to Bus B is opened. The loads and board layouts are shown in drawing references 2, 3, 4, 7, and 10.

3.14 Aligning the DGU for Service

Should any one of the four trained DGUs become inoperable for longer than 72 hours, manual alignment of the ADGS will be necessary. The manual alignment sequence is as follows:

a. ERCW cooling water valves are aligned to open headers for the diesel-engine heat exchangers. Valve status indication and control are in the MCR.

b. The control and annunciation cables are unplugged from the disabled D/G's normal connectors on the annunciation and control distribution panel. In the additional D/G building, the C-S D/G's control and annunciation cables are connected to the disabled D/G train annunciation and control distribution panel. When the connections are correctly made, it is annunciated in the main control room. The connectors are keyed to assure that each plug can only be plugged into the correct receptacle.

c. The disabled D/G 6.9-kV disconnect switch is opened and then the transfer switch to the ADGS is closed. The disconnect and transfer switches are Class 1E qualified.

d. The 6.9-kV feeder breaker is racked into the compartment of 6.9-kV D/G board C-S for the disabled diesel and closed.

Once the ADGU has been manually aligned to replace an existing DGU, it can be controlled by the controls of the DGU being replaced in the main control room. Annunciation is provided in the MCR to indicate which DGU has been replaced by the ADGS. Panels located in the ADGS building contain all of the control necessary to permit operation and testing of the ADGU locally. Once the ADGS has replaced an existing DGU, the MCR controls permit local, remote manual, and remote automatic

starting or stopping of the diesel generator. The ADGU has the capability of being automatically transferred from manual to automatic control and will be ready to accept load within 10 seconds after receiving a start signal.

3.15 Environmental

a. The ADGU and auxiliary support systems will be designed to operate in an individual building isolated from other plant structures. Environmental conditions that the ADGS installed in this manner must withstand without impairment are:

1. Tornado

The ADGS will be designed for the design-basis tornado including the effects of external depressurization and missiles; consequently, all equipment necessary for the operation of the D/G unit will be designed to remain operable during and after this depressurization.

The ADGS equipment will be protected from credible tornado missiles.

2. Earthquake

The ADGS, auxiliary support systems, and structure will be designed to withstand and remain operable for the operating-basis earthquake and the safe shutdown earthquake.

3. Probable Maximum Flood

The ADG unit will be capable of supplying power to operable equipment (required for safe shutdown) in the event that a probable maximum flood occurs.

4. Temperature and Ventilation

Inlet air temperature variations must include extremes of high and low outdoor temperatures. The electrical board room and switchgear room temperature range will be from 40°F to 104°F. The heat and ventilation system will maintain an environment as recommended by the manufacturer of the ADGU and auxiliary equipment. Ventilation in the battery area will maintain hydrogen concentration below 2 percent volume. The fuel oil handling area's ventilation system will comply with NFPA 30.

DESCRIPTION OF THE PROPOSED ELECTRIC
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3.16 Analysis - ADGS AC Auxiliary Power System

The ADGS ac auxiliary power system will be designed to comply with requirements set forth in GDC 2, 4, 5, 17, and 18. Also, the design will conform with Regulatory Guides 1.6, 1.9, 1.32, 1.108, 1.75, 1.118, NUREG/CR 0660, and IEEE Standards 387-1977, 308-1974, 384-1974, and 338-1977. The following paragraphs discuss each of these requirements:

a. GDC 2 and 4

The systems and components of the ac ADGS will be capable of withstanding the effects of natural phenomena, missiles, and environmental conditions associated with normal operation and postulated accidents as established in chapter 3 of the FSAR.

b. GDC 5

Regulatory Guide 1.81 describes an acceptable method of satisfying GDC 5 requirements for shared shutdown electric systems. The applicable NRC positions delineated in Regulatory Guide 1.81 are positions C.2.b, c, d, e, and f.

When the ADGS is operating, it is not shared between nuclear power units. Therefore, there will be no interaction between the ADGU ac auxiliary power system and the other DGUs. This satisfies position C.2.d and makes the requirement of positon C.2.f unnecessary. Unit operator coordination is not required, although the status of the D/G is available in the common area of the MCR. This satisfies position C.2.e. Substitution of the ADGS will maintain adequate onsite power capacity without introducing safety hazards and therefore meets the position C.2.b and C.2.c requirements. Based on this information, the ADGS complies with GDC 5.

c. GDC 17

When the ADGS is substituted for one of the existing D/Gs, the onsite ac electrical power sources (diesels) and the onsite electrical distribution system have sufficient independence, redundancy, and testability to perform their safety function, assuming a single failure.

DESCRIPTION OF THE PROPOSED ELECTRIC
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1. Regulatory Guide 1.6

The only requirements of this guide which apply to the ADGS design are positions D.2 and D.4a. The design of the ADGS is as a direct replacement for an existing DGU and as such it neither has an automatic connection into any load group when it is replacing an inoperable diesel nor can it be paralleled with the standby source of another load group under accident conditions.

2. Regulatory Guide 1.9 and IEEE 387

The ADGS design conforms to all applicable positions with the exception of the following:

a. C.8 - Although a first-out surveillance system is not installed at Sequoyah, all D/G protective trips such as differential overcurrent have been provided with targets to indicate which protective device operated. In addition, the status of protective devices installed to shut down the D/G unit for generator or engine trouble are

alarmed in the main control room. Where more than one protective device target is operated, an analysis of the problem will be done to determine which device operated first.

3. Regulatory Guide 1.32 and IEEE 308

The applicable positions of Regulatory Guide 1.32 are C.1.d, e, and f. These positions require the use of Regulatory Guides 1.6, 1.75, and 1.9. Discussion of these guides is contained in other parts of this section. Sections 5.2.4 and 5.2.5 of IEEE 308-1974 apply to the ADGS. This standard criteria's requirements for function (see section 3.0), capability (see section 3.0), availability (see section 1.0), surveillance (see section 3.14), energy storage (see section 3.2), controls (see section 3.14), and control testing (see section 4.2) are met.

4. Regualtory Guide 1.108

The positions in this guide will be met except for position C.2.a(2). Justification for this exception follows.

We understand this requirement to mean that the emergency loads will be sequenced to the DGU with each load operating at its full flow. This will be done as part of the Postmodification Test Program. For subsequent periodic testing done after PREOPS, the loads will be sequenced as designed except the pumps will be operated with their miniflow connection open and not at full flow.

The most severe disturbance of voltage and frequency for a DGU occurs when starting a motor. Whether a motor is operating at full flow or miniflow, this disturbance is the same. Therefore, the capacity of a DGU to maintain frequency and voltage can be proved with the pumps operating at miniflow. The voltage and frequency will be monitored by control board meters during periodic testing to assure that the frequency and voltage are maintained within design limits.

5. Regulatory Guide 1.75 and IEEE 384-1974

The ADGS complies with Regulatory Guide 1.75 and IEEE 384-1974 with one exception. The Trains A and B cable trays in the conduit entry room of the existing D/G building (drawing reference 10), the electrical manhold (drawing reference 11), and the additional D/G building (drawing reference 12) are not separated by the minimum horizontal distance or by barriers.

Justification for Exception--It is not necessary for these trays to be separated by the minimum distance because no more than one train will be operational at any given time. During normal operations, the four cable sets (one set per each two for Train B) routed through trays A or B, respectively, will not be energized or electrically connected at either end (drawing references 3 and 4). The only time any of the four cable sets can be energized is after the ADGU has been manually aligned to replace an EDGU. During this time, only one of the four cable sets (Trains A or B) can be energized because it is physically impossible to connect more than one of the four cable sets simultaneously. If a single

event destroyed all the trays in the subject areas during normal operation or during the time the ADGU has replaced one of the EDGUs, the ADGU is the only unit that could be affected. Therefore, the plant could be brought to safe shutdown with the three remaining EDGUs.

6. NUREG/CR 0660 has been reviewed previously for Sequoyah. TVA has revised procedures and modified equipment in order to improve D/G performance.

d. GDC 18, Regulatory Guide 1.118, and IEEE 338

Electric power systems important to safety are designed to permit appropriate periodic inspection and testing of important areas and features. In particular, the systems are designed with capability for periodic testing of the operability and functional performance of the components of the systems, such as onsite power sources, relays, switches, buses, and the operability of the systems as a whole. In addition, under conditions as close to design as practical, the full operational sequence that brings the systems into operation will be tested periodically including applicable portions of the protection system, the transfer of power among the nuclear power units, the offsite power system, and the onsite power system.

The distribution system is monitored to the extend that it is shown to be ready to perform its intended function.

Status indicators are provided to monitor the standby power supply continuously. Annunicators are provided in the control room to monitor and alarm the status of the standby power supply.

3.17 Analysis - ADGS 125-V DC Control Power System

The ADGS 125-V dc control power system will be designed to comply with the requirements set forth in GDC 2, 4, 5, 17, and 18. Also, the design will conform with Regulatory Guides 1.32, 1.6, 1.118, 1.75, 1.81, and 1.129 and IEEE Standards 308-1974, 338-1977, IEEE 384-1974, and 450-1975.

The following paragraphs discuss each of these requirements:

a. GDC 2 and 4

The systems and components of the ADGS control power system will be capable of withstanding the effects of natural phenomena,

missiles, and environmental conditions associated with normal operation and postulated accidents as established in chapter 3 of the FSAR.

b. GDC 5

The ADGS control power system will be physically and electrically independent from the existing D/G 125-V dc control power system. Therefore, upon substitution of the ADGS with one of the existing D/Gs, the structures, systems, and components required for safe operation at the ADGS control power system will not be shared with the existing D/G battery systems.

c. GDC 17

This criteria will be applicable upon substitution of the ADGS for one of the existing D/Gs. At this time, the D/G 125-V dc control power system has sufficient independence (physically and electrically), redundancy, and testability to perform its intended safety function, assuming a single failure.

d. GDC 18, Regulatory Guide 1.118, and IEEE 338-1977

The ADGS 125-V 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, before 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 will be tested periodically as a part of the D/G periodic system test.

e. Regulatory Guide 1.32

The ADGS 125-V dc battery system's charger has the capacity to continuously supply all steady-state loads and maintain the battery in the design maximum charged state or to fully recharge the battery 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 the ADGS battery system as recommended by IEEE 450-1980.

f. Regulatory Guide 1.6

The ADGS battery system will supply power only to the loads of the ADGS. Therefore, upon substitution of the ADGS, the plant D/G battery system's 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.

g. Regulatory Guide 1.81

Position C1: As stated previously, the ADGS control power system will supply power only to the loads of the ADGS. Therefore, this position does not apply.

h. Regulatory Guide 1.129 and IEEE 450-1980

The ADGS battery system will be maintained, tested, and replaced (when required) under the guidelines set forth in the above documents.

i. IEEE 308-1974

As discussed in the above paragraphs, the overall system design of the ADGS 125-V dc control power system will incorporate appropriate function requirements, capability, and surveillance in order to comply with this criteria. In addition, the system design will be such that the battery is immediately available during normal operations and following loss of power from the ac system. Also, the system's battery will have sufficient capacity to meet the power demand and time requirement of each connected load.

j. Regulatory Guide 1.75 and IEEE 384-1974

See degree of compliance as stated in section 3.16c-5.

4.0 TESTS (ADGS)

The power package will be completely assembled and shop tested together with its subsystems before delivery. The test program will cover the following items.

DESCRIPTION OF THE PROPOSED ELECTRIC
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4.1 Shop Test

a. Verify that all components are correctly installed and interconnected.

b. Verify that each subsystem is complete and functions according to design criteria.

c. Individually test each protective device and verify the accuracy of instrumentation setpoints.

d. Operate the unit from 0 to 100 percent load starting at no load and increasing in increments of 33-1/3 percent. Check at each load point for stable operation, fuel consumption, engine performance, and generator performance.

e. Perform full-load transient tests verifying that voltage and frequency transient characteristics are within the requirements of specification.

f. Start, load, and operate the engine-generator unit at its continuous rating (section 3.1) for a period of 72 hours.

g. In addition to the above and before delivery, the unit will be set up ready to operate and tested for reliability of starting. The starting signal will be activated and the unit will demonstrate by engine starting and obtaining operating speed within a 10-second period. This test will be repeated 25 consecutive times without failure.

4.2 Field Test

Field testing of the unit, auxiliary equipment, and associated systems will be scoped in TVA's Post-Modification Test Program and will comply with Regulatory Guide 1.108 (reference 5.7).

Before placing the 125-V dc D/G battery system into service, the system components will be tested to ensure their proper operation. The D/G battery will be preoperationally tested for the following conditions:

1. To verify that the D/G battery capacity will meet the manufacturer's guaranteed performance.

2. To verify that the D/G battery system has the ability to supply power before, during, and after loss of the 480-V ac power supply to the D/G battery charger in the worst case condition.

3. To verify that the battery charger will recharge the D/G battery from the design minimum charge state to the nominal fully charged condition regardless of the plant status.

4. To verify that the D/G is able to start, come to speed, flash the generator field, and build up voltages when the D/G battery is on equalize charge.

5.0 REFERENCES

5.1 Sequoyah Nuclear Plant FSAR, Chapter 8, TVA, Knoxville, Tennessee.

5.2 Separation of Electric Equipment and Wiring, Design Criteria SQN-DC-V-12.2, issued August 23, 1974, TVA Electrical Engineering Branch, Knoxville, Tennessee.

5.3 IEEE Standard 387-1977, "Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generator Stations," The Institute of Electrical & Electronic Engineers, Inc.: New York.

5.4 IEEE Standard 323-1974, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations," The Institute of Electrical & Electronic Engineers, Inc.: New York 1974.

5.5 Regulatory Guide 1.9, Rev. 2, "Selection of Diesel-Generator Set Capacity for Standby Power Supplies," Nuclear Regulatory Commission: Washington, March 1971.

5.6 Code of Federal Regulations 10CFR50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," Appendix B, Nuclear Regulatory Commission: Washington.

5.7 Regulatory Guide 1.108, Rev. 1 - Periodic Testing of Diesel Generators Used as Onsite Electrical Power Systems at Nuclear Power Plants, U.S. Regulatory Commission, August 1977.

5.8 GDC 2, "Design Bases for Protection Against Natural Phenomena."

5.9 GDC 4, "Environmental and Missile Design Bases."

5.10 GDC 5, "Sharing of Structures, Systems, and Components."

5.11 GDC 17, "Electric Power Systems."

5.12 GDC 18, "Inspection and Testing of Electrical Power Systems."

5.13 Regulatory Guide 1.32 "Use of IEEE Standard 308, Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

5.14 Regulatory Guide 1.6, "Independence Between Redundant Standby (onsite) Power Sources and Between their Distribution Systems."

5.15 IEEE 308-1974, "Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

5.16 Additional Diesel-Generator Building Environmental Control System, SQN-DC-V-11.1.2 issued 1981, TVA Nuclear Engineering Branch.

5.17 NUREG/CR 0660, "Enhancement of Onsite Emergency Diesel Generator Reliability."

5.18 Regulatory Guide 1.75, "Physical Independence of Electric Systems."

5.19 Regulatory Guide 1.81, "Shared Emergency and Shutdown Electric Systems for Multi-unit Nuclear Power Plants."

5.20 Regulatory Guide 1.118, "Periodic Testing of Electric Power and Protection Systems."

5.21 IEEE 384-1974, "IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits."

5.22 IEEE 338-1977, "IEEE Standard Criteria for the Periodic Testing of Nuclear Power Generating Station Safety Systems."

6.0 DRAWING REFERENCES

Ref. No.	Dwg. No.	Sht No.	Title
1	15E500	1, 2	Key Diagram - Station Aux Power Sys
2	15N219		Outline and General Arrangement - 6.9-kV Board C-S, 6900-V - 480-V Transformers, and 480-V Main EDS C1-S and C2-S

DESCRIPTION OF THE PROPOSED ELECTRIC
POWER SYSTEM FOR THE ADDITIONAL DIESEL
GENERATOR SYSTEM

3	15N215		Equipment Layout - 480-V Diesel Aux BD C1-S
4	15N217		Equipment Layout - 480-V Diesel Aux BD C2-S
5	45N727		Single Line - 6900-V Diesel Generators
6	45N728	1	Single Line - 6900-V Diesel Generator C-S
	"	2	Single Line - 6900-V Diesel Generator BD C-S
7	45N733	1, 2	Single Line - 480-V Diesel Aux BD C1-S
	"	3, 4	Single Line - 480-V Diesel Aux BD C2-S
	"	5	Single Line - 480-V Diesel Aux Supply BD C-S

DESCRIPTION OF THE PROPOSED ELECTRIC
POWER SYSTEM FOR THE ADDITIONAL DIESEL
GENERATOR SYSTEM

8	45N767	1-5	Schematics - 6.9-kV Diesel Generators
9	45W774	1-10	Schematics - 6.9-kV Diesel Generators C-S
10	45N772	1-8	Schematics - 480-V Diesel Aux BD's
11	45DS480	1, 2	DG Ann and Control Distribution Panels
12	45N832	1, 2	Conduit and Grounding Floor El. 722.0 Floor Plan
13	15W810	34	Conduit and Grounding Details - Sheet 31
14	45W835	1-6	Conduit and Grounding Floor El. 723.2 and 741.7

ENCLOSURE 3

SIGNIFICANT HAZARDS CONSIDERATION DETERMINATIONS FOR
PROPOSED CHANGES TO TECHNICAL SPECIFICATIONS

Attachment 1 to Enclosure 3

SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

1. The probability of a previously analyzed accident will not be significantly increased by removing hose stations 0-26-866, 868, and 870 from the technical specifications (T/S). These hose stations were installed to provide protection to the auxiliary essential raw cooling water (AERCW). The AERCW has been superceded by the essential raw cooling water (ERCW).

   The two remaining hose stations in LCO 3.7.11.4 table 3.7-5 item g will provide the necessary normal and alternate backup protection for the fire protection components. The only safety-related equipment remaining in the condenser circulating water intake (CCWI) station is covered by these two hose stations.

2. Removal of these hose stations will not significantly increase the probability of an accident, not previously evaluated in the SQN FSAR, since the safety-related equipment is still protected by fire protection features with a normal and alternate manual backup.

3. As stated in 1 above, the necessary fire protection capability will be available to protect the remaining safety-related equipment in the CCW intake station.

Attachment 2 to Enclosure 3

SIGNIFICANT HAZARDS CONSIDERATIONS

1. Is the probability of an occurrence or are the consequences of an accident previously evaluated in the safety analysis report significantly increased?

   No, the C-S D/G and the associated physical interconnections with the existing onsite power distribution system have not been previously analyzed in the safety analyses. Using an alternate D/G with electrical connections designed according to applicable standards, to replace an inoperable D/G will not significantly increase the probability of loss of onsite ac power.

2. Is the possibility for an accident of a new or different type than evaluated previously in the safety analysis report created?

   No, the use of applicable design criteria should preclude any increase in the probability of loss of onsite power. The dual isolation point design effectively separates the C-S D/G from the trained D/Gs so that no new accident scenarios are created.

3. Is the margin of safety significantly reduced?

   No, this system has not been previously reviewed nor have any of the technical specifications been submitted. The additional power source provides increased flexibility in handling a postulated loss of one train of onsite power. The net impact of the C-S D/G should be to increase the margin of safety, due to greater onsite ac power supply capabilities.