

February 20, 2009

TSTF-09-02
PROJ0753U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001SUBJECT: Transmittal of TSTF-501, Revision 1, "Relocate Stored Fuel Oil and Lube Oil
Volume Values to Licensee Control"

Dear Sir or Madam:

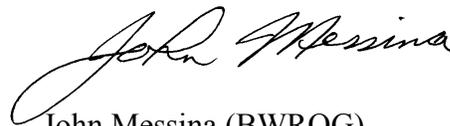
Enclosed for NRC review is Revision 1 of TSTF-501, "Relocate Stored Fuel Oil and Lube Oil Volume Values to Licensee Control." TSTF-501 was revised to address NRC comments and is applicable to all plant types.

Any NRC review fees associated with the review of TSTF-501 should continue to be billed to the Boiling Water Reactor Owners Group.

Should you have any questions, please do not hesitate to contact us.



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Enclosure

cc: Robert Elliott, Technical Specifications Branch, NRC
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Technical Specification Task Force Improved Standard Technical Specifications Change Traveler

Relocate Stored Fuel Oil and Lube Oil Volume Values to Licensee Control

NUREGs Affected: 1430 1431 1432 1433 1434

Classification 1) Technical Change

Recommended for CLIP?: Yes

Correction or Improvement: Improvement

NRC Fee Status: Not Exempt

Benefit: Avoids Future Amendments

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1.0 Description

This Traveler revises Specification 3.8.3, "Diesel Fuel Oil, Lube Oil, and Starting Air," to replace the numerical volume requirements for stored diesel fuel oil and lube oil inventory with the requirement that a [7] day supply be available. The diesel fuel oil and lube oil numerical volumes equivalent to a [6] day supply, used in the Actions, are replaced with a statement that there is a [6] day supply. The diesel fuel oil and lube oil numerical volumes equivalent to a [7] day and [6] day supply are stated in the Bases and will be controlled under the Technical Specification Bases Control Program.

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2.0 Proposed Change

Surveillance Requirement 3.8.3.1 states, "Verify each fuel oil storage tank contains \geq [33,000] gal of fuel." The bracketed value is a place-holder and is typically calculated on a plant-specific basis to be the volume equivalent to a [7] day supply of fuel oil. The proposed change revises SR 3.8.3.1 to state, "Verify each fuel oil storage tank contains \geq a [7] day supply of fuel." The Bases of SR 3.8.3.1 are revised to state "The fuel oil level equivalent to a [7] day supply is [33,000] gallons when calculated in accordance with References 2 and 3" and to provide additional detail on the calculation of the required volume. References 2 and 3 are Regulatory Guide 1.137 and ANSI N195-1976. The bracketed volume is calculated on a plant-specific basis. The Bases note that these calculations use the most limiting energy content allowed for the stored fuel.

Surveillance Requirement 3.8.3.2 states, "Verify lube oil inventory is \geq [500] gal." The bracketed value is a place-holder and is calculated on a plant-specific basis to be the volume equivalent to a [7] day supply of lube oil. The proposed change revises SR 3.8.3.2 to state, "Verify lube oil inventory is \geq a [7] day supply." The Bases of SR 3.8.3.2 are revised to state "The lube oil level equivalent to a [7] day supply is [500] gallons." The bracketed volume is calculated on a plant-specific basis.

Condition A states, "One or more DGs with fuel oil level $<$ [33,000] gal and $>$ [28,285] gal in storage tank." The bracketed values are place-holders and are calculated on a plant-specific basis to be the volume equivalent to a [7] day and [6] day fuel oil supply, respectively. The proposed change revises Condition A to state, "One or more DGs with fuel oil level less than a [7] day supply and greater than a [6] day supply in storage tank." The Bases of Required Action A.1 are revised to state "The fuel oil level equivalent to a [6] day supply is [28,285] gallons." The bracketed volume is calculated on a plant-specific basis.

Condition B states, "One or more DGs with lube oil inventory $<$ [500] gal and $>$ [425] gal." The bracketed values are place-holders and are calculated on a plant-specific basis to be the inventory equivalent to a [7] day and [6] day lube oil supply, respectively. The proposed change revises Condition B to state, "One or more DGs with lube oil inventory less than a [7] day supply and greater than a [6] day supply." The Bases of Required Action B.1 are revised to state "The lube oil inventory equivalent to a [6] day supply is [425] gallons." The bracketed volume is calculated on a plant-specific basis.

The licensing basis for most licensees requires a 7 day supply of fuel oil and lube oil. Some plants have received NRC approval of a current license basis volume less than 7 days. Licensees should insert the number of days of fuel oil and lube oil required by the current licensing basis for the bracketed value of [7] days. Licensees should insert one day less than their current licensing basis required volume for the bracketed value of [6] days in Conditions A and B.

The Background section of the Bases is revised to reference Regulatory Guide (RG) 1.137 in discussing fuel oil capacity. The Bases reference RG 1.137 twice in discussions of fuel oil quality and of testing frequency, but never in reference to fuel oil volume. The NRC requested the bracketed Bases addition to highlight that the RG addresses volume.

3.0 Background

In January 2001 and in June 2004, the U.S. Environmental Protection Agency (EPA) finalized the Clean Diesel Trucks and Buses Rule and the Clean Nonroad Diesel Rule, respectively, with more stringent standards for new diesel engines and fuels (See NRC Information Notice 2006-22, "New Ultra-Low-Sulfur Diesel Fuel Oil Could Adversely Impact Diesel Engine Performance," October 12, 2006.) The EPA rules require a reduction in the sulfur content of highway diesel fuel from its current level of 500 parts per million (ppm) (low sulfur diesel, or LSD) to 15 ppm (Ultra Low Sulfur Diesel or ULSD). Refiners were required to start producing the cleaner-burning diesel fuel ULSD, for use in highway vehicles beginning June 1, 2006. The EPA requires sulfur reductions for land-based nonroad diesel fuel to be accomplished in two steps, with an interim step from currently uncontrolled levels to a 500 ppm cap starting in June 2007 and the final step to 15 ppm in June 2010. Although the EPA requirements for the 15 ppm ULSD do not take effect until 2010 for nonroad diesel fuel, several nuclear power plant licensees have received shipments of ULSD. The California Air Resources Board regulations required that all California users of diesel fuel oil transition to ULSD fuel oil by June 1, 2006.

In general, the processing required to reduce sulfur in ULSD also reduces the aromatics content and density of diesel fuel, resulting in a reduction in volumetric energy content (BTU/gallon). The reduced energy capacity of the ULSD may result in increased fuel consumption such that the Technical Specification limit on diesel fuel oil storage level in Technical Specification 3.8.3 would be insufficient to ensure that the diesel generator can operate for at least [7] days, as described in the Bases for the LCO. Therefore, it is anticipated that many nuclear plant licensees will submit a license amendment request to increase the required amount of stored diesel fuel oil if the current required volume will no longer be equivalent to a [7] day supply of ULSD. Some plants have already submitted such amendments. (See ADAMS accession number ML061590319).

The requirements on diesel fuel oil may continue to change in the future and the addition of additives to compensate for the issues associated with ULSD discussed in Information Notice 2006-022 may further affect the volumetric energy content (and, as a result, the stored diesel fuel oil volume requirements). These changes would result in future license amendments to revise the stored fuel oil volume in order to ensure that the volume provides for at least [7] days of diesel generator operation. In order to facilitate the expeditious revision of the fuel oil volume requirement when needed and to avoid the unnecessary expenditure of licensee and NRC resources to prepare and review future license amendment requests that simply revise the volume equivalent to a [7] day supply, the proposed change places the requirement to have stored fuel oil sufficient to support [7] days of diesel generator operation in the Technical Specifications with the equivalent numerical volume under licensee control in the Technical Specification Bases (or the volume equivalent to the number of days supply required by their licensing basis).

The Technical Specification requirements on lube oil are also based on maintaining a [7] day supply. To maintain consistency within the Specification and to avoid future amendments to the lube oil inventory numerical value equivalent to a [7] day supply, the proposed change places the requirement to have lube oil inventory sufficient to support [7] days of diesel generator operation in the Technical Specifications with the equivalent numerical volume in the Technical Specification Bases.

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4.0 Technical Analysis

Regulatory Guide 1.137, (Ref. 1), Regulatory Position 1 states that ANSI N195-1976 provides a method acceptable to the NRC staff for complying with the pertinent requirements of General Design Criterion 17 of Appendix A to 10 CFR Part 50. Regulatory Position 1.c states that the fuel oil storage requirements should either be based on the assumption that the diesel generator operates continuously for 7 days at its rated capacity or calculations based on the time-dependent loads of the diesel generator. The NRC's Standard Review Plan, NUREG-0800, Section 9.5.4, paragraph I.d, states that one of the areas of review by the NRC is to ensure "A minimum of seven days' supply of fuel oil, for each redundant diesel generator system, has been provided onsite to meet the engineered safety feature load requirements following a loss of offsite power and a design basis accident." The Specification 3.8.3 LCO Bases states, "Stored diesel fuel oil is required to have sufficient supply for 7 days of full load operation." From these sources, it is clear that the principal safety concern with the volume of the stored diesel fuel oil is that there is a 7 day supply. Some licensees are required to maintain a stored diesel fuel oil volume equivalent to a different number of days. The proposed change does not alter the licensing basis of the plant, but only revises the presentation of the licensing basis assumption (days versus gallons).

Historically, the specific volume of fuel oil required to provide a 7 day supply was specified in the Technical Specifications to facilitate the comparison by the operator of the indicated tank level to the volume limit. However, recent state and federal regulatory changes that affect diesel fuel oil energy content and the anticipation of future changes, supports the relocation of the specific volume limit to licensee control and placing the basis of the limit in the Technical Specifications. There is ample precedent for this type of relocation of specific limits to licensee control while retaining the requirement in the Technical Specifications, such as Generic Letter 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications," Generic Letter 96-03, "Relocation of the Pressure Temperature Limit Curves and Low Temperature Overpressure Protection System Limits," and TSTF-2-A, "Relocate the 10 year sediment cleaning of the fuel oil storage tank to licensee control."

The methodology for calculating the fuel oil storage volume equivalent to a [7] day supply is well established. The Bases will state that the fuel oil level equivalent to a [7] day supply is calculated in accordance with Regulatory Guide 1.137 and ANSI N195-1976. The volume will be stated in the Technical Specification Bases and changes to the volume must be reviewed under the Technical Specification Bases Control Program, located in the Administrative Controls chapter of the Technical Specifications, which requires changes to be evaluated under 10 CFR 50.59. Future changes to the fuel oil volume or method of calculation that do not meet the criteria in 10 CFR 50.59 will be submitted to the NRC for prior review under 10 CFR 50.90.

The [7] day diesel fuel oil inventory requirement is based on the concept of supporting diesel generator operation for [7] days without requiring resupply. To support that goal, a [7] day supply of lube oil for the diesel generators must also be available. The volume equivalent to a [7] day supply is based on supporting at least [7] days of full load operation for each DG at the diesel generator manufacturer's lube oil consumption values for the diesel generator under those conditions. It is proposed to relocate the specific value of lube oil equivalent to a [7] day supply to the Bases in order to be consistent with the diesel fuel oil requirements. In addition, NRC Information Notice 96-67, "Vulnerability of Emergency Diesel Generators to Fuel Oil/Lubricating Oil Incompatibility," noted

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that the reduced amount of sulfur in ULSD will result in more unreacted additive in the lubricating oil. This may result in the formation of deposits when some of the oil is burned, which may affect the volume of lube oil required to support [7] day operation. Relocating the specific volume of lube oil equivalent to a [7] day supply to licensee control will allow licensees to adjust the required volume without submitting a license amendment request to the NRC.

The Technical Specifications provide a limited Completion Time to continue to operate with available diesel fuel oil or lube oil inventory less than the [7] day supply, but greater than a [6] day supply. These circumstances may be caused by events such as full load operation required for an inadvertent start while at minimum required level, or feed and bleed operations that may be necessitated by increasing particulate levels or any number of other oil quality degradations. This restriction allows sufficient time to obtain the requisite replacement volume and to perform the analyses required prior to addition of the fuel oil to the tank. The calculation of the volume equivalent to a [6] day supply is performed in the same manner as the calculation of the [7] day supply. Relocating the specific volume in the Technical Specifications with the condition that a [6] day supply is available and placing the numerical value in the Bases is acceptable for the same reasons provided above for relocating the [7] day limit.

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5.0 Regulatory Analysis

5.1 No Significant Hazards Consideration

The TSTF has evaluated whether or not a significant hazards consideration is involved with the proposed generic change by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed change relocates the volume of diesel fuel oil and lube oil required to support [7] day operation of the onsite diesel generators, and the volume equivalent to a [6] day supply, to licensee control. The specific volume of fuel oil equivalent to a [7] and [6] day supply is calculated using the NRC approved methodology described in Regulatory Guide 1.137, Revision 1, "Fuel Oil Systems for Standby Diesel Generators" and ANSI N195-1976, "Fuel Oil Systems for Standby Diesel Generators." The specific volume of lube oil equivalent to a [7] and [6] day supply is based on the DG manufacturer's consumption values for the run time of the DG. Because the requirement to maintain a [7] day supply of diesel fuel oil and lube oil is not changed and is consistent with the assumptions in the accident analyses, and the actions taken when the volume of fuel oil and lube oil are less than a [6] day supply have not changed, neither the probability or the consequences of any accident previously evaluated will be affected.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The change does not involve a physical alteration of the plant (i.e., no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. The change does not alter assumptions made in the safety analysis but ensures that the diesel generator operates as assumed in the accident analysis. The proposed change is consistent with the safety analysis assumptions.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

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The proposed change relocates the volume of diesel fuel oil and lube oil required to support [7] day operation of the onsite diesel generators, and the volume equivalent to a [6] day supply, to licensee control. As the bases for the existing limits on diesel fuel oil and lube oil are not changed, no change is made to the accident analysis assumptions and no margin of safety is reduced as part of this change.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, the TSTF concludes that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements / Criteria

General Design Criterion (GDC) 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," requires that an onsite electric power system and an offsite electric power system be provided to permit functioning of structures, systems, and components important to safety. In addition, GDC 17 contains requirements concerning system capacity, capability, independence, redundancy, availability, testability, and reliability.

Regulatory Guide 1.137, Revision 1, "Fuel Oil Systems for Standby Diesel Generators" dated October 1979, describes a method acceptable to the NRC staff for complying with the Commission's regulations regarding diesel fuel oil systems for standby diesel generators and assurance of adequate diesel fuel oil quality. Regulatory Guide 1.137 states that Appendix B to ANSI N195-1976 should be used as a basis for a program to ensure the initial and continuing quality of diesel fuel oil as supplemented by eight additional provisions described in the Regulatory Guide for maintaining the properties and quality of diesel fuel oil.

ANSI N195-1976, "Fuel Oil Systems for Standby Diesel Generators," requires that onsite fuel oil storage shall be sufficient to operate the minimum number of diesel generators following the limiting design basis accident for either seven (7) days, or the time required to replenish the oil from sources outside the plant site following any limiting design basis event without interrupting the operation of the diesel, whichever is longer. The ANSI standard also provides guidance for calculating storage requirements.

The proposed change does not affect the design of the onsite electric power system, the quality of the onsite electric power system, or the method of determining the necessary quantity of onsite diesel fuel oil or lube oil.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the approval of the proposed change will not be inimical to the common defense and security or to the health and safety of the public.

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6.0 Environmental Considerations

A review has determined that the proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed change.

7.0 References

1. Regulatory Guide 1.137, Revision 1, "Fuel Oil Systems for Standby Diesel Generators" dated October 1979.
2. ANSI N195-1976, "Fuel Oil Systems for Standby Diesel Generators."
3. NRC Information Notice 2006-22, "New Ultra-Low-Sulfur Diesel Fuel Oil Could Adversely Impact Diesel Engine Performance," October 12, 2006

Revision History

OG Revision 0

Revision Status: Closed

Revision Proposed by: TSICC

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 06-Apr-07

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 11-Jul-07

TSTF Review Information

TSTF Received Date: 02-Jul-07 Date Distributed for Review 02-Jul-07

OG Review Completed: BWOG WOG CEOG BWROG

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 19-Jul-07

20-Feb-09

OG Revision 0**Revision Status: Closed****NRC Review Information**

NRC Received Date: 20-Jul-07

Final Resolution: NRC Requests Changes: TSTF Will Revise Final Resolution Date: 19-Jan-09

TSTF Revision 1**Revision Status: Active**

Revision Proposed by: NRC

Revision Description:

The Bases are revised to address NRC questions.

The Background section of the Bases is revised to reference Regulatory Guide (RG) 1.137 in discussing fuel oil capacity. The Bases reference RG 1.137 twice in discussions of fuel oil quality and of testing frequency, but never in reference to fuel oil volume. The NRC requested the bracketed Bases addition to highlight that the RG addresses volume.

The Bases of SR 3.8.3.1 are revised to provide more information on the calculation of fuel oil volume equivalent to the required DG run time.

TSTF Review Information

TSTF Received Date: 19-Jan-09

Date Distributed for Review 02-Feb-09

OG Review Completed: BWOG WOG CEOG BWROG

TSTF Comments:

(No Comments)

TSTF Resolution: Approved

Date: 20-Feb-09

NRC Review Information

NRC Received Date: 20-Feb-09

Affected Technical Specifications

Bkgnd 3.8.3 Bases Diesel Fuel Oil, Lube Oil, and Starting Air

Action 3.8.3.A Diesel Fuel Oil, Lube Oil, and Starting Air

Action 3.8.3.A Bases Diesel Fuel Oil, Lube Oil, and Starting Air

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Action 3.8.3.B	Diesel Fuel Oil, Lube Oil, and Starting Air
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Action 3.8.3.B Bases	Diesel Fuel Oil, Lube Oil, and Starting Air
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SR 3.8.3.1	Diesel Fuel Oil, Lube Oil, and Starting Air
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SR 3.8.3.1 Bases	Diesel Fuel Oil, Lube Oil, and Starting Air
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SR 3.8.3.2	Diesel Fuel Oil, Lube Oil, and Starting Air
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SR 3.8.3.2 Bases	Diesel Fuel Oil, Lube Oil, and Starting Air
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3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

LCO 3.8.3 The stored diesel fuel oil, lube oil, and starting air subsystem shall be within limits for each required diesel generator (DG).

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each DG.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more DGs with fuel level <u>less than a [7] day supply and greater than a [6] day supply</u> <[33,000] gal and >[28,285] gal in storage tank.	A.1 Restore fuel oil level to within limits.	48 hours
B. One or more DGs with lube oil inventory <u>less than a [7] day supply and greater than a [6] day supply</u> <[500] gal and >[425] gal.	B.1 Restore lube oil inventory to within limits.	48 hours
C. One or more DGs with stored fuel oil total particulates not within limit.	C.1 Restore fuel oil total particulates to within limits.	7 days
D. One or more DGs with new fuel oil properties not within limits.	D.1 Restore stored fuel oil properties to within limits.	30 days
E. One or more DGs with	E.1 Restore starting air receiver	48 hours

CONDITION	REQUIRED ACTION	COMPLETION TIME
starting air receiver pressure < [225] psig and ≥ [125] psig.	pressure to ≥ [225] psig.	

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>F. Required Action and associated Completion Time not met.</p> <p><u>OR</u></p> <p>One or more DGs with diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than Condition A, B, C, D, or E.</p>	F.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.3.1	Verify each fuel oil storage tank contains \geq a <u>[7] day supply</u> [33,000] gal of fuel.	31 days
SR 3.8.3.2	Verify lube oil inventory is \geq a <u>[7] day supply</u> [500] gal .	31 days
SR 3.8.3.3	Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.4	Verify each DG air start receiver pressure is \geq [225] psig.	31 days
SR 3.8.3.5	Check for and remove accumulated water from each fuel oil storage tank.	[31] days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

BASES

BACKGROUND

Each diesel generator (DG) is provided with a storage tank having a fuel oil capacity sufficient to operate that diesel for a period of [7] days while the DG is supplying maximum post loss of coolant accident load demand discussed in the FSAR, Section [9.5.4.2] (Ref. 1) [\[and Regulatory Guide 1.137 \(Ref. 2\)\]](#). The maximum load demand is calculated using the assumption that at least two DGs are available. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

Fuel oil is transferred from storage tank to day tank by either of two transfer pumps associated with each storage tank. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve or tank to result in the loss of more than one DG. All outside tanks, pumps, and piping are located underground.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the fuel oil. Regulatory Guide 1.137 (Ref. 2) addresses the recommended fuel oil practices as supplemented by ANSI N195 (Ref. 3). The fuel oil properties governed by these SRs are the water and sediment content, the kinematic viscosity, specific gravity (or API gravity), and impurity level.

The DG lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated DG under all loading conditions. The system is required to circulate the lube oil to the diesel engine working surfaces and to remove excess heat generated by friction during operation. Each engine oil sump contains an inventory capable of supporting a minimum of [7] days of operation. [The onsite storage in addition to the engine oil sump is sufficient to ensure [7] days of continuous operation.] This supply is sufficient to allow the operator to replenish lube oil from outside sources.

Each DG has an air start system with adequate capacity for five successive start attempts on the DG without recharging the air start receiver(s).

BASES

APPLICABLE SAFETY ANALYSES The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter [6] (Ref. 4) and Chapter [15] (Ref. 5), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

Since diesel fuel oil, lube oil, and the air start subsystem support the operation of the standby AC power sources, they satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO Stored diesel fuel oil is required to have sufficient supply for [7] days of full load operation. It is also required to meet specific standards for quality. Additionally, sufficient lube oil supply must be available to ensure the capability to operate at full load for [7] days. This requirement, in conjunction with an ability to obtain replacement supplies within [7] days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an anticipated operational occurrence (AOO) or a postulated DBA with loss of offsite power. DG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources - Operating," and LCO 3.8.2, "AC Sources - Shutdown."

The starting air system is required to have a minimum capacity for five successive DG start attempts without recharging the air start receivers.

APPLICABILITY The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an AOO or a postulated DBA. Since stored diesel fuel oil, lube oil, and the starting air subsystem support LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil, lube oil, and starting air are required to be within limits when the associated DG is required to be OPERABLE.

ACTIONS The ACTIONS Table is modified by a Note indicating that separate Condition entry is allowed for each DG. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DG subsystem. Complying with the Required Actions for one inoperable DG subsystem may allow for continued operation, and subsequent inoperable DG subsystem(s) are governed by separate Condition entry and application of associated Required Actions.

BASES

ACTIONS (continued)

A.1

In this Condition, the [7] day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions, that maintain at least a [6] day supply. The fuel oil level equivalent to a [6] day supply is [28,285] gallons. These circumstances may be caused by events, such as full load operation required after an inadvertent start while at minimum required level, or feed and bleed operations which may be necessitated by increasing particulate levels or any number of other oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> [6] days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

B.1

~~In this Condition, the [7] day With~~ lube oil inventory ~~< 500 gal, i.e.,~~ sufficient lube oil to support [7] days of continuous DG operation at full load conditions ~~is may not be~~ available. However, the Condition is restricted to lube oil volume reductions that maintain at least a [6] day supply. The lube oil inventory equivalent to a [6] day supply is [425] gallons. This restriction allows sufficient time to obtain the requisite replacement volume. A period of 48 hours is considered sufficient to complete restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> [6] days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.3. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of

BASES

ACTIONS (continued)

particulates does not mean failure of the fuel oil to burn properly in the diesel engine, particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling, and re-analysis of the DG fuel oil.

D.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.3 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or to restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is a high likelihood that the DG would still be capable of performing its intended function.

E.1

With starting air receiver pressure < [225] psig, sufficient capacity for five successive DG start attempts does not exist. However, as long as the receiver pressure is > [125] psig, there is adequate capacity for at least one start attempt, and the DG can be considered OPERABLE while the air receiver pressure is restored to the required limit. A period of 48 hours is considered sufficient to complete restoration to the required pressure prior to declaring the DG inoperable. This period is acceptable based on the remaining air start capacity, the fact that most DG starts are accomplished on the first attempt, and the low probability of an event during this brief period.

F.1

With a Required Action and associated Completion Time not met, or one or more DGs with fuel oil, lube oil, or starting air subsystem not within limits for reasons other than addressed by Conditions A through E, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

BASES

SURVEILLANCE
REQUIREMENTSSR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each DG's operation for [7] days at full load. The fuel oil level equivalent to a [7] day supply is [33,000] gallons when calculated in accordance with References 2 and 3. The required fuel storage volume is determined using the most limiting energy content of the stored fuel. Using the known correlation of diesel fuel oil absolute specific gravity or API gravity to energy content, the required diesel generator output, and the corresponding fuel consumption rate, the onsite fuel storage volume required for [7] days of operation can be determined. SR 3.8.3.3 requires new fuel to be tested to verify that the absolute specific gravity or API gravity is within the range assumed in the diesel fuel oil consumption calculations. The [7] day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.3.2

This Surveillance ensures that sufficient lube oil inventory is available to support at least [7] days of full load operation for each DG. The lube oil inventory equivalent to a [7] day supply is [500] gallons and ~~The [500] gal requirement~~ is based on the DG manufacturer consumption values for the run time of the DG. Implicit in this SR is the requirement to verify the capability to transfer the lube oil from its storage location to the DG, when the DG lube oil sump does not hold adequate inventory for [7] days of full load operation without the level reaching the manufacturer recommended minimum level.

A 31 day Frequency is adequate to ensure that a sufficient lube oil supply is onsite, since DG starts and run time are closely monitored by the unit staff.

SR 3.8.3.3

The tests listed below are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate, detrimental impact on diesel engine combustion. If results from these tests are within acceptable limits, the fuel oil may be added to the storage tanks without concern for contaminating the entire volume of fuel oil in the storage tanks. These tests are to be conducted prior to adding the new fuel to the storage

tank(s), but in no case is the time between receipt of new fuel and conducting the tests to exceed 31 days. The tests, limits, and applicable ASTM Standards are as follows:

- a. Sample the new fuel oil in accordance with ASTM D4057-[] (Ref. 6),

BASES

SURVEILLANCE REQUIREMENTS (continued)

- b. Verify in accordance with the tests specified in ASTM D975-[] (Ref. 6) that the sample has an absolute specific gravity at 60/60°F of ≥ 0.83 and ≥ 0.89 or an API gravity at 60°F of $\geq 27^\circ$ and $\leq 39^\circ$ when tested in accordance with ASTM D1298-[] (Ref. 6), a kinematic viscosity at 40°C of ≥ 1.9 centistokes and ≤ 4.1 centistokes, and a flash point of $\geq 125^\circ\text{F}$, and
- c. Verify that the new fuel oil has a clear and bright appearance with proper color when tested in accordance with ASTM D4176-[] or a water and sediment content within limits when tested in accordance with [ASTM D2709-[]] (Ref. 6).

Failure to meet any of the above limits is cause for rejecting the new fuel oil, but does not represent a failure to meet the LCO concern since the fuel oil is not added to the storage tanks.

Within 31 days following the initial new fuel oil sample, the fuel oil is analyzed to establish that the other properties specified in Table 1 of ASTM D975-[] (Ref. 7) are met for new fuel oil when tested in accordance with ASTM D975-[] (Ref. 6), except that the analysis for sulfur may be performed in accordance with ASTM D1552-[], ASTM D2622-[], or ASTM D4294-[] (Ref. 6). The 31 day period is acceptable because the fuel oil properties of interest, even if they were not within stated limits, would not have an immediate effect on DG operation. This Surveillance ensures the availability of high quality fuel oil for the DGs.

Fuel oil degradation during long term storage shows up as an increase in particulate, due mostly to oxidation. The presence of particulate does not mean the fuel oil will not burn properly in a diesel engine. The particulate can cause fouling of filters and fuel oil injection equipment, however, which can cause engine failure.

Particulate concentrations should be determined in accordance with ASTM D5452-[] (Ref. 6). This method involves a gravimetric determination of total particulate concentration in the fuel oil and has a limit of 10 mg/l. It is acceptable to obtain a field sample for subsequent laboratory testing in lieu of field testing. [For those designs in which the total stored fuel oil volume is contained in two or more interconnected tanks, each tank must be considered and tested separately.]

The Frequency of this test takes into consideration fuel oil degradation trends that indicate that particulate concentration is unlikely to change significantly between Frequency intervals.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for a minimum of [five] engine start cycles without recharging. [A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed.] The pressure specified in this SR is intended to reflect the lowest value at which the [five] starts can be accomplished.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

SR 3.8.3.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during performance of the Surveillance.

BASES

REFERENCES

1. FSAR, Section [9.5.4.2].
 2. Regulatory Guide 1.137.
 3. ANSI N195, -1976, ~~Appendix B~~.
 4. FSAR, Chapter [6].
 5. FSAR, Chapter [15].
 6. ASTM Standards: D4057-[]; D975-[]; D1298-[]; D4176-[];
[D2709-[];] D1552-[]; D2622-[]; D4294-[]; D5452-[].
 7. ASTM Standards, D975-[], Table 1.
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3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

LCO 3.8.3 The stored diesel fuel oil, lube oil, and starting air subsystem shall be within limits for each required diesel generator (DG).

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each DG.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more DGs with fuel level <u>less than a [7] day supply and greater than a [6] day supply</u> <[33,000] gal and >[28,285] gal in storage tank.	A.1 Restore fuel oil level to within limits.	48 hours
B. One or more DGs with lube oil inventory <u>less than a [7] day supply and greater than a [6] day supply</u> <[500] gal and >[425] gal.	B.1 Restore lube oil inventory to within limits.	48 hours
C. One or more DGs with stored fuel oil total particulates not within limit.	C.1 Restore fuel oil total particulates to within limits.	7 days
D. One or more DGs with new fuel oil properties not within limits.	D.1 Restore stored fuel oil properties to within limits.	30 days
E. One or more DGs with	E.1 Restore starting air receiver	48 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>F. Required Action and associated Completion Time not met.</p> <p><u>OR</u></p> <p>One or more DGs with diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than Condition A, B, C, D, or E.</p>	F.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.3.1	Verify each fuel oil storage tank contains \geq a <u>[7] day supply</u> [33,000] gal of fuel.	31 days
SR 3.8.3.2	Verify lubricating oil inventory is \geq a <u>[7] day supply</u> [500] gal .	31 days
SR 3.8.3.3	Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.4	Verify each DG air start receiver pressure is \geq [225] psig.	31 days
SR 3.8.3.5	Check for and remove accumulated water from each fuel oil storage tank.	[31] days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

BASES

BACKGROUND

Each diesel generator (DG) is provided with a storage tank having a fuel oil capacity sufficient to operate that diesel for a period of [7] days while the DG is supplying maximum post loss of coolant accident load demand discussed in the FSAR, Section [9.5.4.2] (Ref. 1) [\[and Regulatory Guide 1.137 \(Ref. 2\)\]](#). The maximum load demand is calculated using the assumption that a minimum of any two DGs is available. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

Fuel oil is transferred from storage tank to day tank by either of two transfer pumps associated with each storage tank. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve or tank to result in the loss of more than one DG. All outside tanks, pumps, and piping are located underground.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the fuel oil. Regulatory Guide 1.137 (Ref. 2) addresses the recommended fuel oil practices as supplemented by ANSI N195 (Ref. 3). The fuel oil properties governed by these SRs are the water and sediment content, the kinematic viscosity, specific gravity (or API gravity), and impurity level.

The DG lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated DG under all loading conditions. The system is required to circulate the lube oil to the diesel engine working surfaces and to remove excess heat generated by friction during operation. Each engine oil sump contains an inventory capable of supporting a minimum of [7] days of operation. [The onsite storage in addition to the engine oil sump is sufficient to ensure [7] days of continuous operation.] This supply is sufficient to allow the operator to replenish lube oil from outside sources.

Each DG has an air start system with adequate capacity for five successive start attempts on the DG without recharging the air start receiver(s).

BASES

APPLICABLE SAFETY ANALYSES The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter [6] (Ref. 4), and in the FSAR, Chapter [15] (Ref. 5), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, Reactor Coolant System and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

Since diesel fuel oil, lube oil, and the air start subsystem support the operation of the standby AC power sources, they satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO Stored diesel fuel oil is required to have sufficient supply for [7] days of full load operation. It is also required to meet specific standards for quality. Additionally, sufficient lubricating oil supply must be available to ensure the capability to operate at full load for [7] days. This requirement, in conjunction with an ability to obtain replacement supplies within [7] days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an anticipated operational occurrence (AOO) or a postulated DBA with loss of offsite power. DG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources - Operating," and LCO 3.8.2, "AC Sources - Shutdown."

The starting air system is required to have a minimum capacity for five successive DG start attempts without recharging the air start receivers.

APPLICABILITY The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an AOO or a postulated DBA. Since stored diesel fuel oil, lube oil, and the starting air subsystem support LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil, lube oil, and starting air are required to be within limits when the associated DG is required to be OPERABLE.

ACTIONS The ACTIONS Table is modified by a Note indicating that separate Condition entry is allowed for each DG. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DG subsystem. Complying with the Required

BASES

ACTIONS (continued)

Actions for one inoperable DG subsystem may allow for continued operation, and subsequent inoperable DG subsystem(s) are governed by separate Condition entry and application of associated Required Actions.

A.1

In this Condition, the [7] day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions that maintain at least a [6] day supply. The fuel oil level equivalent to a [6] day supply is [28,285] gallons. These circumstances may be caused by events, such as full load operation required after an inadvertent start while at minimum required level, or feed and bleed operations, which may be necessitated by increasing particulate levels or any number of other oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> [6] days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

B.1

In this Condition, the [7] day ~~With~~ lube oil inventory < 500 gal, i.e., sufficient lubricating oil to support [7] days of continuous DG operation at full load conditions ~~is may not be~~ available. However, the Condition is restricted to lube oil volume reductions that maintain at least a [6] day supply. The lube oil inventory equivalent to a [6] day supply is [425] gallons. This restriction allows sufficient time to obtain the requisite replacement volume. A period of 48 hours is considered sufficient to complete restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> [6] days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.3. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling),

BASES

ACTIONS (continued)

contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, and particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling and re-analysis of the DG fuel oil.

D.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.3 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or to restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is a high likelihood that the DG would still be capable of performing its intended function.

E.1

With starting air receiver pressure < [225] psig, sufficient capacity for five successive DG start attempts does not exist. However, as long as the receiver pressure is > [125] psig, there is adequate capacity for at least one start attempt, and the DG can be considered OPERABLE while the air receiver pressure is restored to the required limit. A period of 48 hours is considered sufficient to complete restoration to the required pressure prior to declaring the DG inoperable. This period is acceptable based on the remaining air start capacity, the fact that most DG starts are accomplished on the first attempt, and the low probability of an event during this brief period.

BASES

ACTIONS (continued)

F.1

With a Required Action and associated Completion Time not met, or one or more DG's fuel oil, lube oil, or starting air subsystem not within limits for reasons other than addressed by Conditions A through D, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

SURVEILLANCE
REQUIREMENTSSR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each DG's operation for [7] days at full load. The fuel oil level equivalent to a [7] day supply is [33,000] gallons when calculated in accordance with References 2 and 3. The required fuel storage volume is determined using the most limiting energy content of the stored fuel. Using the known correlation of diesel fuel oil absolute specific gravity or API gravity to energy content, the required diesel generator output, and the corresponding fuel consumption rate, the onsite fuel storage volume required for [7] days of operation can be determined. SR 3.8.3.3 requires new fuel to be tested to verify that the absolute specific gravity or API gravity is within the range assumed in the diesel fuel oil consumption calculations. The [7] day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.3.2

This Surveillance ensures that sufficient lube oil inventory is available to support at least [7] days of full load operation for each DG. The lube oil inventory equivalent to a [7] day supply is [500] gallons and ~~The [500] gal requirement~~ is based on the DG manufacturer consumption values for the run time of the DG. Implicit in this SR is the requirement to verify the capability to transfer the lube oil from its storage location to the DG, when the DG lube oil sump does not hold adequate inventory for [7] days of full load operation without the level reaching the manufacturer recommended minimum level.

A 31 day Frequency is adequate to ensure that a sufficient lube oil supply is onsite, since DG starts and run time are closely monitored by the unit staff.

SR 3.8.3.3

The tests listed below are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate, detrimental impact on diesel engine combustion. If results from these tests are within acceptable limits, the fuel oil may be added to the storage tanks without concern for

BASES

SURVEILLANCE REQUIREMENTS (continued)

contaminating the entire volume of fuel oil in the storage tanks. These tests are to be conducted prior to adding the new fuel to the storage tank(s), but in no case is the time between receipt of new fuel and conducting the tests to exceed 31 days. The tests, limits, and applicable ASTM Standards are as follows:

- a. Sample the new fuel oil in accordance with ASTM D4057-[] (Ref. 6),
- b. Verify in accordance with the tests specified in ASTM D975-[] (Ref. 6) that the sample has an absolute specific gravity at 60/60°F of ≥ 0.83 and ≤ 0.89 or an API gravity at 60°F of $\geq 27^\circ$ and $\leq 39^\circ$ when tested in accordance with ASTM D1298-[] (Ref. 6), a kinematic viscosity at 40°C of ≥ 1.9 centistokes and ≤ 4.1 centistokes, and a flash point of $\geq 125^\circ\text{F}$, and
- c. Verify that the new fuel oil has a clear and bright appearance with proper color when tested in accordance with ASTM D4176-[] or a water and sediment content within limits when tested in accordance with [ASTM D2709-[]] (Ref. 6).

Failure to meet any of the above limits is cause for rejecting the new fuel oil, but does not represent a failure to meet the LCO concern since the fuel oil is not added to the storage tanks.

Within 31 days following the initial new fuel oil sample, the fuel oil is analyzed to establish that the other properties specified in Table 1 of ASTM D975-[] (Ref. 7) are met for new fuel oil when tested in accordance with ASTM D975-[] (Ref. 6), except that the analysis for sulfur may be performed in accordance with ASTM D1552-[], ASTM D2622-[], or ASTM D4294-[] (Ref. 6). The 31 day period is acceptable because the fuel oil properties of interest, even if they were not within stated limits, would not have an immediate effect on DG operation. This Surveillance ensures the availability of high quality fuel oil for the DGs.

Fuel oil degradation during long term storage shows up as an increase in particulate, due mostly to oxidation. The presence of particulate does not mean the fuel oil will not burn properly in a diesel engine. The particulate can cause fouling of filters and fuel oil injection equipment, however, which can cause engine failure.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Particulate concentrations should be determined in accordance with ASTM D5452-[] (Ref. 6). This method involves a gravimetric determination of total particulate concentration in the fuel oil and has a limit of 10 mg/l. It is acceptable to obtain a field sample for subsequent laboratory testing in lieu of field testing. [For those designs in which the total stored fuel oil volume is contained in two or more interconnected tanks, each tank must be considered and tested separately.]

The Frequency of this test takes into consideration fuel oil degradation trends that indicate that particulate concentration is unlikely to change significantly between Frequency intervals.

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for a minimum of [five] engine start cycles without recharging. [A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed.] The pressure specified in this SR is intended to reflect the lowest value at which the [five] starts can be accomplished.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

SR 3.8.3.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may

BASES

SURVEILLANCE REQUIREMENTS (continued)

come from any of several sources, including condensation, ground water, rain water, and contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during performance of the Surveillance.

REFERENCES

1. FSAR, Section [9.5.4.2].
 2. Regulatory Guide 1.137.
 3. ANSI N195.1-1976, ~~Appendix B~~.
 4. FSAR, Chapter [6].
 5. FSAR, Chapter [15].
 6. ASTM Standards: D4057-[]; D975-[]; D1298-[]; D4176-[]; [D2709-[];] D1552-[]; D2622-[]; D4294-[]; D5452-[].
 7. ASTM Standards, D975-[], Table 1.
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3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

LCO 3.8.3 The stored diesel fuel oil, lube oil, and starting air subsystem shall be within limits for each required diesel generator (DG).

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each DG.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more DGs with fuel level <u>less than a [7] day supply and greater than a [6] day supply</u> <[33,000] gal and >[28,285] gal in storage tank.	A.1 Restore fuel oil level to within limits.	48 hours
B. One or more DGs with lube oil inventory <u>less than a [7] day supply and greater than a [6] day supply</u> <[500] gal and >[425] gal.	B.1 Restore lube oil inventory to within limits.	48 hours
C. One or more DGs with stored fuel oil total particulates not within limits.	C.1 Restore fuel oil total particulates to within limits.	7 days
D. One or more DGs with new fuel oil properties not within limits.	D.1 Restore stored fuel oil properties to within limits.	30 days
E. One or more DGs with	E.1 Restore starting air receiver	48 hours

CONDITION	REQUIRED ACTION	COMPLETION TIME
starting air receiver pressure < [225] psig and \geq [125] psig.	pressure to \geq [225] psig.	

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>F. Required Action and associated Completion Time not met.</p> <p><u>OR</u></p> <p>One or more DGs with diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than Condition A, B, C, D, or E.</p>	F.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.3.1	Verify each fuel oil storage tank contains \geq a [7] day supply [33,000] gal of fuel.	31 days
SR 3.8.3.2	Verify lubricating oil inventory is \geq a [7] day supply [500] gal .	31 days
SR 3.8.3.3	Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.4	Verify each DG air start receiver pressure is \geq [225] psig.	31 days
SR 3.8.3.5	Check for and remove accumulated water from each fuel oil storage tank.	[31] days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

BASES

BACKGROUND Each diesel generator (DG) is provided with a storage tank having a fuel oil capacity sufficient to operate that diesel for a period of [7] days, while the DG is supplying maximum post loss of coolant accident load demand as discussed in the FSAR, Section [9.5.4.2] (Ref. 1) [\[and Regulatory Guide 1.137 \(Ref. 2\)\]](#). The maximum load demand is calculated using the assumption that at least two DGs are available. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

Fuel oil is transferred from storage tank to day tank by either of two transfer pumps associated with each storage tank. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve, or tank to result in the loss of more than one DG. All outside tanks, pumps, and piping are located underground.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the fuel oil. Regulatory Guide 1.137 (Ref. 2) addresses the recommended fuel oil practices as supplemented by ANSI N195-1976 (Ref. 3). The fuel oil properties governed by these SRs are the water and sediment content, the kinematic viscosity, specific gravity (or API gravity), and impurity level.

The DG lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated DG under all loading conditions. The system is required to circulate the lube oil to the diesel engine working surfaces and to remove excess heat generated by friction during operation. Each engine oil sump contains an inventory capable of supporting a minimum of [7] days of operation. [The onsite storage in addition to the engine oil sump is sufficient to ensure [7] days of continuous operation.] This supply is sufficient supply to allow the operator to replenish lube oil from outside sources.

Each DG has an air start system with adequate capacity for five successive start attempts on the DG without recharging the air start receiver(s).

BASES

APPLICABLE SAFETY ANALYSES The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter [6] (Ref. 4), and in the FSAR, Chapter [15] (Ref. 5), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, Reactor Coolant System and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for LCO Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

Since diesel fuel oil, lube oil, and the air start subsystems support the operation of the standby AC power sources, they satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO Stored diesel fuel oil is required to have sufficient supply for [7] days of full load operation. It is also required to meet specific standards for quality. Additionally, sufficient lubricating oil supply must be available to ensure the capability to operate at full load for [7] days. This requirement, in conjunction with an ability to obtain replacement supplies within [7] days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an anticipated operational occurrence (AOO) or a postulated DBA with loss of offsite power. DG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources - Operating," and LCO 3.8.2, "AC Sources - Shutdown."

The starting air system is required to have a minimum capacity for five successive DG start attempts without recharging the air start receivers.

APPLICABILITY The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an AOO or a postulated DBA. Since stored diesel fuel oil, lube oil, and starting air subsystems support LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil, lube oil and starting air are required to be within limits when the associated DG is required to be OPERABLE.

ACTIONS The ACTIONS Table is modified by a Note indicating that separate Condition entry is allowed for each DG. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DG subsystem. Complying with the Required Actions for one inoperable DG subsystem may allow for continued operation, and subsequent inoperable DG subsystem(s) are governed by separate Condition entry and application of associated Required Actions.

BASES

ACTIONS (continued)

A.1

In this Condition, the [7] day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions, that maintain at least a [6] day supply. The fuel oil level equivalent to a [6] day supply is [28,285] gallons. These circumstances may be caused by events such as full load operation required after an inadvertent start while at minimum required level; or feed and bleed operations, which may be necessitated by increasing particulate levels or any number of other oil quality degradations. This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (\geq [6] days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

B.1

In this Condition, the [7] day With-lube oil inventory < 500 gal, i.e., sufficient lubricating oil to support [7] days of continuous DG operation at full load conditions may is not be available. However, the Condition is restricted to lube oil volume reductions that maintain at least a [6] day supply. The lube oil inventory equivalent to a [6] day supply is [425] gallons. This restriction allows sufficient time to obtain the requisite replacement volume. A period of 48 hours is considered sufficient to complete restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity ($>$ [6] days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.3. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, and particulate concentration is unlikely to change

BASES

ACTIONS (continued)

significantly between Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling, and re-analysis of the DG fuel oil.

D.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.3 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is a high likelihood that the DG would still be capable of performing its intended function.

E.1

With starting air receiver pressure < [225] psig, sufficient capacity for five successive DG start attempts does not exist. However, as long as the receiver pressure is > [125] psig, there is adequate capacity for at least one start attempt, and the DG can be considered OPERABLE while the air receiver pressure is restored to the required limit. A period of 48 hours is considered sufficient to complete restoration to the required pressure prior to declaring the DG inoperable. This period is acceptable based on the remaining air start capacity, the fact that most DG starts are accomplished on the first attempt, and the low probability of an event during this brief period.

F.1

With a Required Action and associated Completion Time not met, or one or more DGs with diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than addressed by Conditions A through E, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

BASES

SURVEILLANCE
REQUIREMENTSSR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each DG's operation for [7] days at full load. The fuel oil level equivalent to a [7] day supply is [33,000] gallons when calculated in accordance with References 2 and 3. The required fuel storage volume is determined using the most limiting energy content of the stored fuel. Using the known correlation of diesel fuel oil absolute specific gravity or API gravity to energy content, the required diesel generator output, and the corresponding fuel consumption rate, the onsite fuel storage volume required for [7] days of operation can be determined. SR 3.8.3.3 requires new fuel to be tested to verify that the absolute specific gravity or API gravity is within the range assumed in the diesel fuel oil consumption calculations. The [7] day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.3.2

This Surveillance ensures that sufficient lube oil inventory is available to support at least [7] days of full load operation for each DG. The lube oil inventory equivalent to a [7] day supply is [500] gallons and ~~The [500] gal requirement~~ is based on the DG manufacturer consumption values for the run time of the DG. Implicit in this SR is the requirement to verify the capability to transfer the lube oil from its storage location to the DG, when the DG lube oil sump does not hold adequate inventory for [7] days of full load operation without the level reaching the manufacturer recommended minimum level.

A 31 day Frequency is adequate to ensure that a sufficient lube oil supply is onsite, since DG starts and run time are closely monitored by the unit staff.

SR 3.8.3.3

The tests listed below are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate, detrimental impact on diesel engine combustion. If results from these tests are within acceptable limits, the fuel oil may be added to the storage tanks without concern for contaminating the entire volume of fuel oil in the storage tanks. These tests are to be conducted prior to adding the new fuel to the storage

tank(s), but in no case is the time between receipt of new fuel and conducting the tests to exceed 31 days. The tests, limits, and applicable ASTM Standards are as follows:

- a. Sample the new fuel oil in accordance with ASTM D4057-[] (Ref. 6),

BASES

SURVEILLANCE REQUIREMENTS (continued)

- b. Verify in accordance with the tests specified in ASTM D975-[] (Ref. 6) that the sample has an absolute specific gravity at 60/60°F of ≥ 0.83 and ≤ 0.89 , or an API gravity at 60°F of $\geq 27^\circ$ and $\leq 39^\circ$ when tested in accordance with ASTM D1298-[] (Ref. 6), a kinematic viscosity at 40°C of ≥ 1.9 centistokes and ≤ 4.1 centistokes, and a flash point $\geq 125^\circ\text{F}$, and
- c. Verify that the new fuel oil has a clear and bright appearance with proper color when tested in accordance with ASTM D4176-[] or a water and sediment content within limits when tested in accordance with [ASTM D2709-[]] (Ref. 6).

Failure to meet any of the above limits is cause for rejecting the new fuel oil, but does not represent a failure to meet the LCO concern since the fuel oil is not added to the storage tanks.

Within 31 days following the initial new fuel oil sample, the fuel oil is analyzed to establish that the other properties specified in Table 1 of ASTM D975-[] (Ref. 7) are met for new fuel oil when tested in accordance with ASTM D975-[] (Ref. 6), except that the analysis for sulfur may be performed in accordance with ASTM D1552-[], ASTM D2622-[], or ASTM D4294-[] (Ref. 6). The 31 day period is acceptable because the fuel oil properties of interest, even if they were not within stated limits, would not have an immediate effect on DG operation. This Surveillance ensures the availability of high quality fuel oil for the DGs.

Fuel oil degradation during long term storage shows up as an increase in particulate, due mostly to oxidation. The presence of particulate does not mean the fuel oil will not burn properly in a diesel engine. The particulate can cause fouling of filters and fuel oil injection equipment, however, which can cause engine failure.

Particulate concentrations should be determined in accordance with ASTM D5452-[] (Ref. 6). This method involves a gravimetric determination of total particulate concentration in the fuel oil and has a limit of 10 mg/l. It is acceptable to obtain a field sample for subsequent laboratory testing in lieu of field testing. [For those designs in which the total stored fuel oil volume is contained in two or more interconnected tanks, each tank must be considered and tested separately.]

The Frequency of this test takes into consideration fuel oil degradation trends that indicate that particulate concentration is unlikely to change significantly between Frequency intervals.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for a minimum of [five] engine start cycles without recharging. [A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds or cranking) or engine cranking speed.] The pressure specified in this SR is intended to reflect the lowest value at which the [five] starts can be accomplished.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

SR 3.8.3.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, and contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventative maintenance. The presence of water does not necessarily represent failure of this SR provided the accumulated water is removed during performance of the Surveillance.

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|------------|---|
| REFERENCES | <ol style="list-style-type: none"> 1. FSAR, Section [9.5.4.2]. 2. Regulatory Guide 1.137. 3. ANSI N195, -1976, Appendix B. 4. FSAR, Chapter [6]. |
|------------|---|

BASES

REFERENCES (continued)

5. FSAR, Chapter [15].
 6. ASTM Standards: D4057-[]; D975-[]; D1298-[]; D4176-[];
[D2709-[];] D1552-[]; D2622-[]; D4294-[]; D5452-[].
 7. ASTM Standards, D975-[], Table 1.
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3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

LCO 3.8.3 The stored diesel fuel oil, lube oil, and starting air subsystem shall be within limits for each required diesel generator (DG).

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each DG.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more DGs with fuel oil level <u>less than a [7] day supply and greater than a [6] day supply < [33,000] gal and > [28,285] gal</u> in storage tank.	A.1 Restore fuel oil level to within limits.	48 hours
B. One or more DGs with lube oil inventory <u>less than a [7] day supply and greater than a [6] day supply < [500] gal and > [425] gal</u> .	B.1 Restore lube oil inventory to within limits.	48 hours
C. One or more DGs with stored fuel oil total particulates not within limit.	C.1 Restore fuel oil total particulates to within limit.	7 days
D. One or more DGs with new fuel oil properties not within limits.	D.1 Restore stored fuel oil properties to within limits.	30 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. One or more DGs with starting air receiver pressure < [225] psig and ≥ [125] psig.	E.1 Restore starting air receiver pressure to ≥ [225] psig.	48 hours
F. Required Action and associated Completion Time not met. <u>OR</u> One or more DGs with diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than Condition A, B, C, D, or E.	F.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.3.1 Verify each fuel oil storage tank contains ≥ <u>a [7] day supply [33,000] gal</u> of fuel.	31 days
SR 3.8.3.2 Verify lube oil inventory is ≥ <u>a [7] day supply [500] gal</u> .	31 days
SR 3.8.3.3 Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.4 Verify each DG air start receiver pressure is ≥ [225] psig.	31 days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

BASES

BACKGROUND Each diesel generator (DG) is provided with a storage tank having a fuel oil capacity sufficient to operate that DG for a period of [7] days while the DG is supplying maximum post loss of coolant accident (LOCA) load demand discussed in FSAR, Section [9.5.2] (Ref. 1) [\[and Regulatory Guide 1.137 \(Ref. 2\)\]](#). The maximum load demand is calculated using the assumption that at least two DGs are available. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

Fuel oil is transferred from storage tank to day tank by either of two transfer pumps associated with each storage tank. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve, or tank to result in the loss of more than one DG. All outside tanks, pumps, and piping are located underground.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the fuel oil. Regulatory Guide 1.137 (Ref. 2) addresses the recommended fuel oil practices as supplemented by ANSI N195 (Ref. 3). The fuel oil properties governed by these SRs are the water and sediment content, the kinematic viscosity, specific gravity (or API gravity), and impurity level.

The DG lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated DG under all loading conditions. The system is required to circulate the lube oil to the diesel engine working surfaces and to remove excess heat generated by friction during operation. Each engine oil sump contains an inventory capable of supporting a minimum of [7] days of operation. [The onsite storage in addition to the engine oil sump is sufficient to ensure [7] days' continuous operation.] This supply is sufficient to allow the operator to replenish lube oil from outside sources.

Each DG has an air start system with adequate capacity for five successive start attempts on the DG without recharging the air start receiver(s).

APPLICABLE SAFETY ANALYSES The initial conditions of Design Basis Accident (DBA) and transient analyses in FSAR, Chapter [6] (Ref. 4), and Chapter [15] (Ref. 5), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF

BASES

APPLICABLE SAFETY ANALYSES (continued)

systems so that fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

Since diesel fuel oil, lube oil, and starting air subsystem support the operation of the standby AC power sources, they satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Stored diesel fuel oil is required to have sufficient supply for [7] days of full load operation. It is also required to meet specific standards for quality. Additionally, sufficient lube oil supply must be available to ensure the capability to operate at full load for [7] days. This requirement, in conjunction with an ability to obtain replacement supplies within [7] days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an anticipated operational occurrence (AOO) or a postulated DBA with loss of offsite power. DG day tank fuel oil requirements, as well as transfer capability from the storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources - Operating," and LCO 3.8.2, "AC Sources - Shutdown."

The starting air system is required to have a minimum capacity for five successive DG start attempts without recharging the air start receivers.

APPLICABILITY

The AC sources (LCO 3.8.1 and LCO 3.8.2) are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an AOO or a postulated DBA. Because stored diesel fuel oil, lube oil, and starting air subsystem support LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil, lube oil, and starting air are required to be within limits when the associated DG is required to be OPERABLE.

ACTIONS

The ACTIONS Table is modified by a Note indicating that separate Condition entry is allowed for each DG. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DG subsystem. Complying with the Required Actions for one inoperable DG subsystem may allow for continued operation, and subsequent inoperable DG subsystem(s) governed by separate Condition entry and application of associated Required Actions.

BASES

ACTIONS (continued)

A.1

In this Condition, the [7] day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions that maintain at least a [6] day supply. The fuel oil level equivalent to a [6] day supply is [28,285] gallons. These circumstances may be caused by events such as either:

- a. Full load operation required for an inadvertent start while at minimum required level or
- b. Feed and bleed operations that may be necessitated by increasing particulate levels or any number of other oil quality degradations.

This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of the fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> [6] days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

B.1

In this Condition, the [7] day ~~With~~ lube oil inventory < 500 gal, i.e., sufficient lube oil to support [7] days of continuous DG operation at full load conditions, ~~is may not be~~ available. However, the Condition is restricted to lube oil volume reductions that maintain at least a [6] day supply. The lube oil inventory equivalent to a [6] day supply is [425] gallons. This restriction allows sufficient time for obtaining the requisite replacement volume. A period of 48 hours is considered sufficient to complete restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> [6] days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion for particulates. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling),

BASES

ACTIONS (continued)

contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, since particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and since proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling, and re-analysis of the DG fuel oil.

D.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.3 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or to restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combination of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is high likelihood that the DG would still be capable of performing its intended function.

E.1

With starting air receiver pressure < [225] psig, sufficient capacity for five successive DG start attempts does not exist. However, as long as the receiver pressure is > [125] psig, there is adequate capacity for at least one start attempt, and the DG can be considered OPERABLE while the air receiver pressure is restored to the required limit. A period of 48 hours is considered sufficient to complete restoration to the required pressure prior to declaring the DG inoperable. This period is acceptable based on the remaining air start capacity, the fact that most DG starts are accomplished on the first attempt, and the low probability of an event during this brief period.

BASES

ACTIONS (continued)

F.1

With a Required Action and associated Completion Time not met, or the stored diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than addressed by Conditions A through E, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

SURVEILLANCE
REQUIREMENTSSR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each DG's operation for [7] days at full load. The fuel oil level equivalent to a [7] day supply is [33,000] gallons when calculated in accordance with References 2 and 3. The required fuel storage volume is determined using the most limiting energy content of the stored fuel. Using the known correlation of diesel fuel oil absolute specific gravity or API gravity to energy content, the required diesel generator output, and the corresponding fuel consumption rate, the onsite fuel storage volume required for [7] days of operation can be determined. SR 3.8.3.3 requires new fuel to be tested to verify that the absolute specific gravity or API gravity is within the range assumed in the diesel fuel oil consumption calculations. The [7] day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.3.2

This Surveillance ensures that sufficient lubricating oil inventory is available to support at least [7] days of full load operation for each DG. The lube oil inventory equivalent to a [7] day supply is [500] gallons and The [500]-gal requirement is based on the DG manufacturer's consumption values for the run time of the DG. Implicit in this SR is the requirement to verify the capability to transfer the lube oil from its storage location to the DG, when the DG lube oil sump does not hold adequate inventory for [7] days of full load operation without the level reaching the manufacturer's recommended minimum level.

A 31 day Frequency is adequate to ensure that a sufficient lube oil supply is onsite, since DG starts and run time are closely monitored by the plant staff.

SR 3.8.3.3

The tests listed below are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate detrimental impact on diesel engine combustion. If results from these tests are within acceptable limits, the fuel oil may be added to the storage tanks without concern for

BASES

SURVEILLANCE REQUIREMENTS (continued)

contaminating the entire volume of fuel oil in the storage tanks. These tests are to be conducted prior to adding the new fuel to the storage tank(s), but in no case is the time between receipt of new fuel and conducting the tests to exceed 31 days. The tests, limits, and applicable ASTM Standards are as follows:

- a. Sample the new fuel oil in accordance with ASTM D4057-[] (Ref. 6),
- b. Verify in accordance with the tests specified in ASTM D975-[] (Ref. 6) that the sample has an absolute specific gravity at 60/60°F of ≥ 0.83 and ≤ 0.89 or an API gravity at 60°F of $\geq 27^\circ$ and $\leq 39^\circ$ when tested in accordance with ASTM D1298-[] (Ref. 6), a kinematic viscosity at 40°C of ≥ 1.9 centistokes and ≤ 4.1 centistokes, and a flash point of $\geq 125^\circ\text{F}$, and
- c. Verify that the new fuel oil has a clear and bright appearance with proper color when tested in accordance with ASTM D4176-[] or a water and sediment content within limits when tested in accordance with [ASTM D2709-[]] (Ref. 6).

Failure to meet any of the above limits is cause for rejecting the new fuel oil, but does not represent a failure to meet the LCO concern since the fuel oil is not added to the storage tanks.

Within [31] days following the initial new fuel oil sample, the fuel oil is analyzed to establish that the other properties specified in Table 1 of ASTM D975-[] (Ref. 6) are met for new fuel oil when tested in accordance with ASTM D975-[] (Ref. 6), except that the analysis for sulfur may be performed in accordance with ASTM D1552-[], ASTM D2622-[], or ASTM D4294-[] (Ref. 6). The [31] day period is acceptable because the fuel oil properties of interest, even if they were not within stated limits, would not have an immediate effect on DG operation. This Surveillance ensures the availability of high quality fuel oil for the DGs.

Fuel oil degradation during long term storage shows up as an increase in particulate, mostly due to oxidation. The presence of particulate does not mean that the fuel oil will not burn properly in a diesel engine. The particulate can cause fouling of filters and fuel oil injection equipment, however, which can cause engine failure.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Particulate concentrations should be determined in accordance with ASTM D5452-[] (Ref. 6). This method involves a gravimetric determination of total particulate concentration in the fuel oil and has a limit of 10 mg/l. It is acceptable to obtain a field sample for subsequent laboratory testing in lieu of field testing. [For those designs in which the total volume of stored fuel oil is contained in two or more interconnected tanks, each tank must be considered and tested separately.]

The Frequency of this test takes into consideration fuel oil degradation trends that indicate that particulate concentration is unlikely to change significantly between Frequency intervals.

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for a minimum of [five] engine start cycles without recharging. [A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed.] The pressure specified in this SR is intended to reflect the lowest value at which the [five] starts can be accomplished.

The [31] day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

SR 3.8.3.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and from breakdown of the fuel oil by

BASES

SURVEILLANCE REQUIREMENTS (continued)

bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during performance of the Surveillance.

REFERENCES

1. FSAR, Section [9.5.2].
 2. Regulatory Guide 1.137.
 3. ANSI N195, 1976.
 4. FSAR, Chapter [6].
 5. FSAR, Chapter [15].
 6. ASTM Standards: D4057-[]; D975-[]; D1298-[]; D4176-[]; [D2709-[];] D1552-[]; D2622-[]; D4294-[]; D5452-[].
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3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

LCO 3.8.3 The stored diesel fuel oil, lube oil, and starting air subsystem shall be within limits for each required diesel generator (DG).

APPLICABILITY: When associated DG is required to be OPERABLE.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each DG.

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>A. One or more DGs with fuel oil level <u>less than a [7] day supply and greater than a [6] day supply</u>:-</p> <p>1. For [DG 11 or 12], < [62,000] gal and ≥ [49,000] gal, and</p> <p>2. For [DG 13], < [41,200] gal and ≥ [33,500] gal.</p>	<p>A.1 Restore fuel oil level to within limits.</p>	<p>48 hours</p>
<p>B. One or more DGs with lube oil inventory <u>less than a [7] day supply and greater than a [6] day supply</u>:-</p> <p>1. For [DG 11 or 12], < [] gal and ≥ [425] gal, and</p> <p>2. For [DG 13], < [] gal and ≥ [] gal.</p>	<p>B.1 Restore lube oil inventory to within limits.</p>	<p>48 hours</p>

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or more DGs with new fuel oil properties not within limits.	D.1 Restore stored fuel oil properties to within limits.	30 days
E. One or more DGs with starting air receiver pressure < [225] psig and \geq [125] psig.	E.1 Restore starting air receiver pressure to \geq [225] psig.	48 hours
F. Required Actions and associated Completion Time not met. <u>OR</u> One or more DGs with diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than Condition A, B, C, D, or E.	F.1 Declare associated DG inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.3.1 Verify each fuel oil storage tank contains \geq a [7] day supply of fuel: a. \geq [62,000] gal of fuel for [DGs 11 and 12] and b. \geq [41,200] gal of fuel for [DG 13].	31 days

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.3.2 Verify lube oil inventory is <u>≥ a [7] day supply:</u> ————— a. ≥ [] gal for [DGs 11 and 12] and ————— b. ≥ [] gal for [DG 13].	31 days
SR 3.8.3.3 Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.4 Verify each DG air start receiver pressure is ≥ [225] psig.	31 days
SR 3.8.3.5 Check for and remove accumulated water from each fuel oil storage tank.	[31] days

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Diesel Fuel Oil, Lube Oil, and Starting Air

BASES

BACKGROUND

Each diesel generator (DG) is provided with a storage tank having a fuel oil capacity sufficient to operate that DG for a period of [7] days while the DG is supplying maximum post loss of coolant accident load demand (Ref. 1) [\[and Regulatory Guide 1.137 \(Ref. 2\)\]](#). The maximum load demand is calculated using the assumption that at least two DGs are available. This onsite fuel oil capacity is sufficient to operate the DGs for longer than the time to replenish the onsite supply from outside sources.

Fuel oil is transferred from each storage tank to its respective day tank by a transfer pump associated with each storage tank. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve, or tank to result in the loss of more than one DG. All outside tanks, pumps, and piping are located underground. The fuel oil level in the storage tank is indicated in the control room.

For proper operation of the standby DGs, it is necessary to ensure the proper quality of the fuel oil. Regulatory Guide 1.137 (Ref. 2) addresses the recommended fuel oil practices as supplemented by ANSI N195 (Ref. 3). The fuel oil properties governed by these SRs are the water and sediment content, the kinematic viscosity, specific gravity (or API gravity), and impurity level.

The DG lubrication system is designed to provide sufficient lubrication to permit proper operation of its associated DG under all loading conditions. The system is required to circulate the lube oil to the diesel engine working surfaces and to remove excess heat generated by friction during operation. Each engine oil sump contains an inventory capable of supporting a minimum of [7] days of operation. [The onsite storage in addition to the engine oil sump is sufficient to ensure [7] days continuous operation.] This supply is sufficient to allow the operator to replenish lube oil from outside sources.

Each DG has an air start system with adequate capacity for five successive start attempts on the DG without recharging the air start receiver(s).

BASES

APPLICABLE SAFETY ANALYSES The initial conditions of Design Basis Accident (DBA) and transient analyses in FSAR, Chapter [6] (Ref. 4) and Chapter [15] (Ref. 5), assume Engineered Safety Feature (ESF) systems are OPERABLE. The DGs are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that fuel, reactor coolant system, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

Since diesel fuel oil, lube oil, and starting air subsystem support the operation of the standby AC power sources, they satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO Stored diesel fuel oil is required to have sufficient supply for [7] days of full load operation. It is also required to meet specific standards for quality. Additionally, sufficient lube oil supply must be available to ensure the capability to operate at full load for [7] days. This requirement, in conjunction with an ability to obtain replacement supplies within [7] days, supports the availability of DGs required to shut down the reactor and to maintain it in a safe condition for an anticipated operational occurrence (AOO) or a postulated DBA with loss of offsite power. DG day tank fuel requirements, as well as transfer capability from the storage tank to the day tank, are addressed in LCO 3.8.1, "AC Sources - Operating," and LCO 3.8.2, "AC Sources - Shutdown."

The starting air system is required to have a minimum capacity for five successive DG start attempts without recharging the air start receivers.

APPLICABILITY The AC sources, LCO 3.8.1 and LCO 3.8.2, are required to ensure the availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an AOO or a postulated DBA. Since stored diesel fuel oil, lube oil, and starting air subsystem support LCO 3.8.1 and LCO 3.8.2, stored diesel fuel oil, lube oil, and starting air are required to be within limits when the associated DG is required to be OPERABLE.

ACTIONS The ACTIONS Table is modified by a Note indicating that separate Condition entry is allowed for each DG. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable DG subsystem. Complying with the Required Actions for one inoperable DG subsystem may allow for continued operation, and subsequent inoperable DG subsystem(s) are governed by separate Condition entry and application of associated Required Actions.

BASES

ACTIONS (continued)

A.1

In this Condition, the [7] day fuel oil supply for a DG is not available. However, the Condition is restricted to fuel oil level reductions that maintain at least a [6] day supply. The fuel oil level equivalent to a [6] day supply for [DG 11 and 12] is [49,000] gallons and for [DG 13] is [33,500] gallons. These circumstances may be caused by events such as:

- a. Full load operation required after an inadvertent start while at minimum required level, or
- b. Feed and bleed operations that may be necessitated by increasing particulate levels or any number of other oil quality degradations.

This restriction allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of the fuel oil to the tank. A period of 48 hours is considered sufficient to complete restoration of the required level prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> [6] days), the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

B.1

In this Condition, the [7] day ~~With~~ lube oil inventory ~~< 500 gal, i.e.,~~ sufficient lube oil to support [7] days of continuous DG operation at full load conditions, ~~is may not be~~ available. However, the Condition is restricted to lube oil volume reductions that maintain at least a [6] day supply. The lube oil equivalent to a [6] day supply for [DG 11 and 12] is [425] gallons and for [DG 13] is [] gallons. This restriction allows sufficient time for obtaining the requisite replacement volume. A period of 48 hours is considered sufficient to complete restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> [6] days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion for particulates. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling),

BASES

ACTIONS (continued)

contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulate does not mean failure of the fuel oil to burn properly in the diesel engine, since particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and since proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling, and re-analysis of the DG fuel oil.

D.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.3 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, to restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or a combination of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is high likelihood that the DG would still be capable of performing its intended function.

E.1

With starting air receiver pressure < [225] psig, sufficient capacity for five successive DG start attempts does not exist. However, as long as the receiver pressure is > [125] psig, there is adequate capacity for at least one start attempt, and the DG can be considered OPERABLE while the air receiver pressure is restored to the required limit. A period of 48 hours is considered sufficient to complete restoration to the required pressure prior to declaring the DG inoperable. This period is acceptable based on the remaining air start capacity, the fact that most DG starts are accomplished on the first attempt, and the low probability of an event during this brief period.

BASES

ACTIONS (continued)

F.1

With a Required Action and associated Completion Time not met, or the stored diesel fuel oil, lube oil, or starting air subsystem not within limits for reasons other than addressed by Conditions A through E, the associated DG may be incapable of performing its intended function and must be immediately declared inoperable.

SURVEILLANCE
REQUIREMENTSSR 3.8.3.1

This SR provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each DG's operation for [7] days at full load. The fuel oil level equivalent to a [7] day supply for [DG 11 or 12] is [62,000] gallons and for [DG 13] is [41,200] gallons when calculated in accordance with References 2 and 3. The required fuel storage volume is determined using the most limiting energy content of the stored fuel. Using the known correlation of diesel fuel oil absolute specific gravity or API gravity to energy content, the required diesel generator output, and the corresponding fuel consumption rate, the onsite fuel storage volume required for [7] days of operation can be determined. SR 3.8.3.3 requires new fuel to be tested to verify that the absolute specific gravity or API gravity is within the range assumed in the diesel fuel oil consumption calculations. The [7] day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.3.2

This Surveillance ensures that sufficient lube oil inventory is available to support at least [7] days of full load operation for each DG. The fuel oil level equivalent to a [7] day supply for [DG 11 or 12] is [] gallons and for [DG 13] is [] gallons and The 500-gal requirement is based on the DG manufacturer's consumption values for the run time of the DG. Implicit in this SR is the requirement to verify the capability to transfer the lube oil from its storage location to the DG when the DG lube oil sump does not hold adequate inventory for [7] days of full load operation without the level reaching the manufacturer's recommended minimum level.

A 31 day Frequency is adequate to ensure that a sufficient lube oil supply is onsite, since DG starts and run times are closely monitored by the plant staff.

SR 3.8.3.3

The tests listed below are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate detrimental impact on diesel engine combustion and operation. If results from these tests are within

BASES

SURVEILLANCE REQUIREMENTS (continued)

acceptable limits, the fuel oil may be added to the storage tanks without concern for contaminating the entire volume of fuel oil in the storage tanks. These tests are to be conducted prior to adding the new fuel to the storage tank(s), but in no case is the time between receipt of new fuel and conducting the tests to exceed 31 days. The tests, limits, and applicable ASTM Standards are as follows:

- a. Sample the new fuel oil in accordance with ASTM D4057-[] (Ref. 6),
- b. Verify in accordance with the tests specified in ASTM D975-[] (Ref. 6) that the sample has an absolute specific gravity at 60/60°F of ≥ 0.83 and ≤ 0.89 or an API gravity at 60°F of $\geq 27^\circ$ and $\leq 39^\circ$ when tested in accordance with ASTM D1298-[] (Ref. 6), a kinematic viscosity at 40°C of ≥ 1.9 centistokes and ≤ 4.1 centistokes, and a flash point of $\geq 125^\circ\text{F}$, and
- c. Verify that the new fuel oil has a clear and bright appearance with proper color when tested in accordance with ASTM D4176-[] or a water and sediment content within limits when tested in accordance with [ASTM D2709-[]] (Ref. 6).

Failure to meet any of the above limits is cause for rejecting the new fuel oil, but does not represent a failure to meet the LCO since the fuel oil is not added to the storage tanks.

Within 31 days following the initial new fuel oil sample, the fuel oil is analyzed to establish that the other properties specified in Table 1 of ASTM D975-[] (Ref. 6) are met for new fuel oil when tested in accordance with ASTM D975-[] (Ref. 6), except that the analysis for sulfur may be performed in accordance with ASTM D1522-[], ASTM D2622-[], or ASTM D4294-[] (Ref. 6). The 31 day period is acceptable because the fuel oil properties of interest, even if not within stated limits, would not have an immediate effect on DG operation. This Surveillance ensures the availability of high quality fuel oil for the DGs.

Fuel oil degradation during long term storage shows up as an increase in particulate, mostly due to oxidation. The presence of particulate does not mean that the fuel oil will not burn properly in a diesel engine. However, the particulate can cause fouling of filters and fuel oil injection equipment, which can cause engine failure.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Particulate concentrations should be determined in accordance with ASTM D5452-[] (Ref. 6). This method involves a gravimetric determination of total particulate concentration in the fuel oil and has a limit of 10 mg/l. It is acceptable to obtain a field sample for subsequent laboratory testing in lieu of field testing. [For those designs in which the total volume of stored fuel oil is contained in two or more interconnected tanks, each tank must be considered and tested separately.]

The Frequency of this Surveillance takes into consideration fuel oil degradation trends indicating that particulate concentration is unlikely to change between Frequency intervals.

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for a minimum of five engine start cycles without recharging. [A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed.] The pressure specified in this SR is intended to reflect the lowest value at which the [five] starts can be accomplished.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

SR 3.8.3.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the storage tanks once every 31 days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and from breakdown of the fuel oil by bacteria.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent a failure of this SR provided that accumulated water is removed during performance of the Surveillance.

REFERENCES

1. FSAR, Section [9.5.4].
 2. Regulatory Guide 1.137.
 3. ANSI N195, Appendix B, 1976.
 4. FSAR, Chapter [6].
 5. FSAR, Chapter [15].
 6. ASTM Standards: D4057-[]; D975-[]; D1298-[]; D4176-[]; [D2709-[];] D1552-[]; D2622-[]; D4294-[]; D5452-[].
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