

March 6, 2008

TSTF-08-02
PROJ0753

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Response to NRC December 13, 2007 Request for Additional Information Regarding TSTF-501, Revision 0, "Relocate Store Fuel Oil and Lube Oil Volume Values to Licensee Control"

REFERENCE: Letter from Timothy Kobetz (NRC) to the Technical Specifications Task Force, "Request for Additional Information Regarding TSTF-501, Revision 0, 'Relocate Stored Fuel Oil and Lube Oil Values to Licensee Control'," dated December 13, 2007.

Dear Sir or Madam:

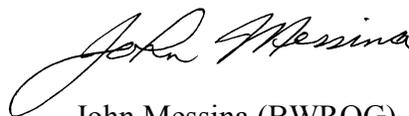
In the referenced letter, the NRC provided a Request for Additional Information (RAI) regarding TSTF-501, Revision 0, "Relocate Stored Fuel Oil and Lube Oil Volume Values to Licensee Control." This letter responds to the NRC's request.

The TSTF requests that the Traveler be made available under the Consolidated Line Item Improvement Process.

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



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Enclosure

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**Response to NRC December 13, 2007 Request for Additional Information Regarding
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Control"**

The following is the Technical Specification Task Force (TSTF) response to NRC's December 13, 2007, letter requesting the following information to complete the review of TSTF-501.

1. Discuss what effects a mixture of ULSD fuel and LSD fuel in the storage tank will have on the fuel consumption rate, in order to ensure that a [7] day supply is maintained, as required in the TS per Criterion 3 of 10 CFR 50.36(d)(2)(ii). (The discussion should include the fuel consumption rate calculations and the [7] day volume amount calculations, as well as the generic applicability of the calculations.)

Background: Criterion 3 of 10 CFR 50.36(d)(2)(ii) states a TS must be established for "a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." Since diesel fuel oil, lube oil, and the air start subsystem support the operation of the standby AC power sources, they are required per Criterion 3 of 10 CFR 50.36(d)(2)(ii). The TSTF proposes to modify Condition A and SR 3.8.3.1 in LCO 3.8.3, "Diesel Fuel Oil, Lube Oil, and Starting Air," in NUREG 1430 – 1434, to restate the fuel oil storage tank requirements in terms of a [7] day supply, as opposed to the current quantitative gallon requirement. The formula for calculating the required fuel oil storage, and therefore the [7] day supply, which is found in Section 5.4 of American National Standard N 195-1976, requires that the fuel consumption rate for the emergency diesel generator be known. It is unclear what effects a mixture of ULSD fuel and LSD fuel in the storage tank will have on the fuel consumption rate. It is also unclear if the fuel consumption rate calculations and the [7] day volume calculations are generic in nature or if the calculations require plant specific information.

Response

Diesel fuel oil delivered to nuclear plants is purchased to ASTM Standard D975, "Standard Specification for Diesel Fuel Oils." Provided that the diesel fuel delivered to a plant meets the specifications of D975, the property of diesel fuel oil having the most significant effect the plant's fuel oil storage calculations is the energy content (heating value) of the fuel. This can vary from batch-to-batch, since D975 does not place criteria on heating value. However, plant specific calculations include an acceptable range for API Gravity of the fuel, and the fuel is verified to have an API Gravity within this range prior to transfer from the delivery truck into the fuel oil storage tanks. A well-known correlation of API Gravity related to energy content was developed by the National Bureau of Standards ["Thermal Properties of Petroleum Products", US Department of Commerce Miscellaneous Publication No. 97, April 28, 1933], with a 2 degree rise in API Gravity generally corresponding to about a 1% drop in BTUs/gallon. At a minimum, plants calculate their required fuel storage values assuming the most limiting API Gravity, and therefore the most limiting fuel energy content. As long as the fuel oil placed in the storage tank is within the assumed API Gravity range, the calculations of fuel consumption and required stored volume remain valid.

For example, a typical range of API Gravity assumed in a plant-specific calculation is 27-39. In most cases, high aromatic ULSD (typically produced for use outside of California) will have an API Gravity within the existing assumed range. However, low aromatic ULSD may

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have an API Gravity greater than 39. Therefore, if necessary the licensee would recalculate the fuel consumption rate and required stored diesel fuel assuming a range of API Gravity that would include the expected ULSD API Gravity, and enveloping the range of API Gravity for the existing fuel in the storage tank.

As shown in the example, depending on the method used to refine ULSD and it's resulting properties and the assumptions made in the plant-specific fuel oil consumption calculations, the volume of fuel oil required to provide the licensing basis assumption of a number of days of operation (typically, 7 days), may not change. However, if it is anticipated that the ULSD that may be received will have properties outside the assumed set of values, the fuel consumption calculation and volume calculation are revised using a set of properties that encompass the anticipated ULSD properties.

The calculations on fuel consumption and required stored fuel oil volume are performed no differently for ULSD than for other types of fuel oil. The calculations are not based on consumption of a particular type of fuel oil or mix of fuel oils, but are based on consumption of fuel oil containing the most limiting set of diesel fuel oil characteristics. Therefore, the calculation assumes that all of the stored fuel oil has properties consistent with the limiting values assumed in the calculations and there is no need for additional assumptions regarding mixing.

Diesel manufacturers provide fuel consumption rates as a function of diesel output and corrected to standard reference values for the thermal energy content of the fuel. These values are determined at the factory and are valid in the field provided the engines are in good working order. Using the known correlation of diesel fuel oil API gravity to heat content, diesel output, and the corresponding fuel consumption rate from the particular plant's EDG manufacturer, the plant may calculate their required onsite fuel storage volume given the plant-specific fuel oil properties. Therefore, the fuel consumption rate of ULSD for a particular diesel engine is known. Furthermore, there is experience starting in 2006 with ULSD for both highway and non-road based diesels in California to validate the manufacturers correlations.

The Background section of the RAI #1 states that diesel fuel oil, lube oil, and the air start subsystem support the operation of the standby AC power sources and are required per Criterion 3 of 10 CFR 50.36(d)(2)(ii) to be in the Technical Specifications. It should noted, however, that the requirement for a [7] day supply of fuel oil and lube oil is not an accident analysis assumption, but a nominal value assumed to provide adequate time for replenishing the on-site supplies.

2. Discuss how storage tank sampling will be performed (including acceptance criteria), in order to verify that any assumptions used in the fuel consumption rate calculation are valid, thereby ensuring that a [7] day supply is maintained, as required in the TS per Criterion 3 of 10 CFR 50.36(d)(2)(ii). (The discussion should include how appropriate acceptance criteria will be developed considering transition from full LSD supply to full ULSD supply, including mixtures of the two, and steps to ensure proper mixing/homogeneity in the tank.)

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Background: Criterion 3 of 10 CFR 50.36(d)(2)(ii) states a TS must be established for "a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." Since diesel fuel oil, lube oil, and the air start subsystem support the operation of the standby AC power sources, they are required per Criterion 3 of 10 CFR 50.36(d)(2)(ii). The TSTF proposes to modify Condition A and SR 3.8.3.1 in LCO 3.8.3, "Diesel Fuel Oil, Lube Oil, and Starting Air," in NUREG 1430 – 1434, to restate the fuel oil storage tank requirements in terms of a [7] day supply, as opposed to the current quantitative gallon requirement. The formula for calculating the required fuel oil storage, and therefore the [7] day supply, which is found in Section 5.4 of American National Standard N195-1976, requires that the fuel consumption rate for the emergency diesel generator be known.

Given that it is unclear what effects a mixture of ULSD fuel and LSD fuel in the storage tank will have on the fuel consumption rate, it is also unclear how storage tank sampling will be performed in order to verify that any assumptions used in the fuel consumption rate calculation are valid.

Response

When it is necessary to perform testing of the fuel oil storage tank to verify properties, plants use an "all-levels" sample per ASTM D-4057, "Standard Practice for Manual Sampling of Petroleum and Petroleum Products" to ensure that the sample is representative of the entire contents of the tank. As discussed in the response to RAI #1, the required stored volume calculations are based on a limiting set of diesel fuel oil properties (e.g., heat content) and, therefore, there are no required assumptions regarding mixing or homogeneity of the fuel oil in the storage tank. The mixing of ULSD with the existing fuel oil has no effect on sampling acceptance criteria.

Given the uncertainty around the potentially reduced heat content of ULSD discussed in Reference 3 of TSTF-501, plants have tested their ULSD fuel deliveries for heat content using a test such as ASTM D-4809, "Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)." The results of this testing have shown that the correlations of heat content vs. API Gravity remain valid for ULSD, which supports the use of the manufacturer's fuel consumption rates.

Improved Standard Technical Specifications (ISTS) Surveillance 3.8.3.3 (and the corresponding plant-specific Surveillances) require verification of fuel oil properties of new and stored fuel oil in accordance with the Diesel Fuel Oil Testing Program. The Administrative Controls Diesel Fuel Oil Testing Program requires sampling of new fuel oil to confirm that the API gravity or absolute specific gravity are within limits (i.e., the limits assumed in the fuel consumption and stored volume calculations), the flash point and kinematic viscosity are within limits for the appropriate grade of ASTM fuel oil specified in the Diesel Fuel Oil Testing Program, and a clear and bright appearance with proper color or a water sediment content within limits. As described in the Bases for SR 3.8.3.3, the tests performed prior to adding fuel oil to the storage tank ensure fuel oil may be added to the

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storage tanks without concern for contaminating the entire volume of fuel oil in the storage tanks. The Diesel Fuel Oil Testing Program also requires verification that the new fuel meets the other limits for ASTM D975 fuel oil within 31 days of adding new fuel to the storage tank.

Note that if a licensee assumes diesel fuel oil properties outside the limits of ASTM 2D fuel, a license amendment to change to the Diesel Fuel Oil Testing Program will be required. Such a change is outside the scope of TSTF-501.

The stored fuel oil is tested for particulate concentrations. Particulates settle to the bottom of the storage tank and, therefore, mixing of ULSD and existing fuel oil is not required to obtain an adequate sample.

In summary, storage tank and new fuel sampling will be performed in the same manner that it is currently performed and the use of ULSD and mixtures of ULSD and existing fuel oil will have no effect on sampling. The acceptance criteria for new fuel are based on the limits for ASTM D975 fuel oil and the assumptions in the fuel consumption calculations, exactly as they are with non-ULSD fuel, and mixing or homogeneity of the fuel has no effect.

3. Discuss the effects of deleting the reference to Appendix B in ANSI N195-1976 on the current acceptable basis for maintaining the quality of fuel oil, as required in the TS per Criterion 3 of 10 CFR 50.36(d)(2)(ii).

Background: Criterion 3 of 10 CFR 50.36(d)(2)(ii) states a TS must be established for "a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." Since diesel fuel oil, lube oil, and the air start subsystem support the operation of the standby AC power sources, they are required per Criterion 3 of 10 CFR 50.36(d)(2)(ii). The TSTF proposes to modify Reference 3 in the Bases for LCO 3.8.3, "Diesel Fuel Oil, Lube Oil, and Starting Air," in NUREG 1430 – 1434, by deleting reference to Appendix B in ANSI N195-1976. As a result only ANSI N195-1976 will be referenced. As discussed in Regulatory Guide (RG) 1.137, "Fuel-Oil Systems for Standby Diesel Generators," Appendix B of ANSI N195-1976 currently serves as an acceptable basis for a program to maintain the quality of fuel oil. Both ANSI N195-1976 and RG 1.137 state that Appendix B is not a mandatory part of ANSI N195-1976. It is unclear why the reference to Appendix B is deleted, and how this will affect the current acceptable basis for maintaining the quality of fuel oil.

Response

The Technical Specification Bases, Background Section, states that Regulatory Guide 1.137 addresses the recommended fuel oil practices as supplemented by ANSI N195-1976. ANSI N195-1976 is referenced as Reference 3. This sentence is not altered by TSTF-501. Regulatory Guide 1.137, regulatory position 2, states that Appendix B to ANSI N195-1976 should be used as the basis for a program to ensure the initial and continuing quality of fuel oil, and provides additional requirements. Therefore, removing "Appendix B" from the

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reference has no effect as the referenced Regulatory Guide 1.137 specifically refers to Appendix B.

As described in TSTF-501, under "Proposed Change," the Bases are revised to state that the fuel oil storage volume is calculated in accordance with References 2 and 3, which are Regulatory Guide 1.137 and ANSI N195-1976. Regulatory Guide 1.137, regulatory position C.1.c references Section 5.4 of ANSI N195-1976 as providing a method acceptable to the staff. Therefore, a broader reference to ANSI N195-1976 than just Appendix B is needed to support the new Bases discussion and Regulatory Guide 1.137.

Therefore, removing the phrase "Appendix B" in the reference to ANSI N195-1976 has no effect on the existing Bases discussion of fuel oil practices and expands the reference to include the other portions of ANSI N195-1976 referenced by Regulatory Guide 1.137 and the revised Bases.

Correction to TSTF-501

Section 4.0 of TSTF-501, the second paragraph, references Generic Letter 96-06, "Relocation of the Pressure Temperature Limit Curves and Low Temperature Overpressure Protection System Limits." The correct reference for this Generic Letter is 96-03.