Proposed Regulatory Guide 1.137, Revision 2 "Fuel Oil Systems for Emergency Power Supplies"

"Fuel Oil Systems for Standby Diesel Generators"
Revision 1, October 1979

Diesel Fuel Owners Group Meeting

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July 19, 2012

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Disclaimer

The content of this presentation is based on the draft Regulatory Guide (RG) that will be going out for public comment. The Nuclear Regulatory Commission positions on the RG will consider all public feedback and may change from those presented in this presentation.

Summary of Changes

- Address the differences between Revision 1 and the updated consensus standards

- Include gas turbines & non-safety-related generators

- ANSI/ANS-59.51-1997 - basis for complying with GDC 17

- Appendix C of ANSI/ANS-59.51-1997 - basis for maintaining fuel oil quantity & quality (with exceptions)

- Address the evolution of fuel oil chemistry
  - Sulfur content
  - Biodiesel

- Numerous clarifications and updates

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Disconnect Between Revision 1 and Industry Standards

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Year	NRC Guidance	Industry Standard
1979	RG 1.137, Endorses ANSI N195-1976	ANSI N195-1976
1989	RG 1.137, Endorses ANSI N195-1976	ANSI N195-1989
1997	RG 1.137, Endorses ANSI N195-1976	ANSI/ANS-59.51-1997

- ANSI/ANS-59.51-1997 was reaffirmed in 2007

- RG 1.137, Revision 1 states: "Appendix B to ANSI N195-1976 addresses recommended fuel oil practices."

- Background
  - Position on ANSI/ANS-59.51, Appendix C for fuel oil practices
  - Gas turbine caveats
- Guidance for references to other codes standards
  - Some incorporated by reference into regulations
  - Some endorsed in NRC guidance
  - Some are neither incorporated nor endorsed
- Harmonization with international standards
  - Beneficial and consistent with NRC standardization goals
  - ASTM International and NACE International

Section C: Staff Regulatory Guidance

- ANSI/ANS -59.51-97 provides an acceptable methodology for complying with GDC 17
  - Safety-related diesel generators
  - Safety-related gas turbines

- Revision 2 contains 13 positions supplementing ANSI/ANS-59.51
  - This presentation provides an overview of all of these positions but focuses on changes to the fuel oil quality section

Proposed Staff Positions

1. For referenced standards, use the edition/revision in ANSI/ANS-59.51-1997 unless the stated otherwise

2. Specifies quality and seismic classifications

3. Clarifies design and quality assurance requirements

4. Clarifies onsite storage capacity requirements

5. Describes how to calculate the fuel oil storage requirement

6. Describes physical arrangements

7. Describes applicability of the ASME B&PV and OM Codes

Proposed Staff Positions (continued)

8. Heating requirement updated to match ASTM D975-11 changes

9. Corrosion protection requirements updated

10. Identifies fire protection guidance as RG 1.189

11. Summarizes objectives of the requirements for controls, instrumentation, and alarms

12. Reminder to ensure maintenance practices follow manufacturer recommendations

13. Identifies ANSI/ANS-1997, Appendix C and ASTM D975-11 as the basis for initial and continuing quality of the fuel oil

C13– Fuel Oil Quality

- Based on
  - ANSI/ANS-59.51-1997, Appendix C
  - ASTM D975-11, including Table 1
- Supplemented with 11 provisions
  - Sampling procedures
  - Fuel properties to measure
  - ASTM standards referenced
  - Condensate removal period
  - Awareness of low-sulfur and biodiesel issues

13.1: Use ASTM D4057-06 (2011) for periodic manual sampling of stored fuel and new fuel

- Replaces D2276-94 referenced in ANSI/ANS-59.51-1997

13.2: Measure API gravity or specific gravity using ASTM D1298-99 (2005)

- Exception to ASTM D975-11, which does not include API or specific gravity

- Exception to ANSI/ANS-59.51, Appendix C, which refers to D975-94 for test methods

- Acceptable range in accordance with ANSI/ANS-59.51, Appendix C

Fuel Oil Quality (continued)

13.3: Add flash point as a fuel property to measure prior to adding the new fuel to the supply tank

- Not included in RG 1.137, Revision 1
- Specified in ANSI/ANS-59.51-1997

13.3: Measure remaining properties within 31 days of fuel delivery

- Properties listed in ASTM D975-11, Table 1
- Techniques and acceptance criteria in ASTM D975-11 or ANSI/ANS-59.51-1997
- 31 days consistent with technical specifications

Fuel Oil Quality (continued)

13.4: Remove accumulated condensate monthly,
not quarterly

- Frequency no longer dependent on groundwater table
- 31 days is the base value in the standard TS

13.5: Check at least monthly for water

- Use ASTM D2709-96 or D1796-97 test methods
- Maximum water level specified in D975-11, Table 1
- Remove accumulated water immediately

13.6: 10-year tank cleaning includes interior inspection

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13.10: Fuel oil sulfur content

- NRC does not recommend a fuel sulfur content
- ASTM D975-11 includes requirements for ultra-low sulfur diesel
- The process used to reduce sulfur may affect other properties
  - Energy content
  - Lubricity
  - Compatibility with gaskets, seals, etc.
- NRC Information Notice 2006-22 discusses the issues
- Licensees should be aware of these issues and verify the quality and quantity of the fuel

Fuel Oil Quality (continued)

13.11: Biologically based diesel fuels ("biodiesel")

- Biodiesel has uncertain effects on diesel performance and fuel oil system components
- A blend with up to 5% biodiesel (by volume) is not classified as a biodiesel grade by ASTM D975-11
- Seek verification from the supplier
- Information Notice 2009-02 identifies potential problems with 5% biodiesel (B5) and suggests actions to mitigate
- EPRI reports contain additional details on the use of B5 in emergency diesel generators

Conclusion

- Revision 2 updates Regulatory Guide 1.137 to current industry standards and addresses ongoing changes in fuel oil chemistry.

- Update would not effect GALL XI.M30 Revision 2 , except for updating standards

- Issue for public comment - Summer 2012

- Comment period typically closes after 60 days

- ACRS Subcommittee Meeting

- ACRS Full Committee Meeting (if required)