“Sick or Not Sick”
The Importance of Fuel Surveillance

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Disclaimer

The views and opinions expressed in this course shall not be considered the official position of any regulatory organization and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Participants are encouraged to refer to the entire text of all referenced documents. In addition, when in doubt, reach out to the Authority Having Jurisdiction.
Agenda

NFPA 110 Overview
Fuel Testing
The Power of Prevention
Results of Tentative Interim Amendment (TIA) #1388
Conclusion
NFPA 110 Overview

Standard for Emergency and Standby Power Systems

Requirements covering the performance of emergency and standby power systems providing an alternate source of electrical power to loads in buildings and facilities in the event that the primary power source fails.

Covers installation, maintenance, operation, and testing requirements as they pertain to the performance of the emergency power supply system (EPSS).

Intent of standard is to achieve maximum system reliability.
EPS
Emergency Power Source

EPSS
Emergency Power Supply System
NFPA 110 Overview

Generator Set Subsystems

Temperature Maintenance and Cooling Systems

Batteries, Starting and Charging Systems

Fuel Storage and Delivery Systems
NFPA 110 – Generator Set Subsystems

Engine Fuel System

7.9.1.2 Fuel system design shall provide for a supply of clean fuel to the prime mover

7.9.1.3 Tanks shall be sized so that the fuel is consumed within the storage life, or provisions shall be made to remediate fuel that is stale or contaminated or to replace stale or contaminated fuel with clean fuel

8.3.7 A fuel quality test shall be performed at least annually using appropriate ASTM standards or the manufacturer’s recommendations.
Fuel Quality Testing

Diesel fuel quality critical to equipment operation.

- Typical stable lifespan of diesel is 12 – 16 months in ideal conditions. (most EPSS installations NOT ideal conditions)

- Diesel sulfur content reduction (ULSD) limits fuel’s anti-microbial properties

- Bio-diesel blending may reduce fuel stability (up to 6 months), promotes water absorption and biomass growth.
The Impact of Poor Fuel Surveillance

• “During the Blackout of 2003 affecting 50 million people, …more than 20% of all backup generation systems either did not start or sputtered to a stop after just a few minutes, due to fuel issues” (Bell Performance Review, 2014)

• In 2016,”The cost of downtime ranged from $600 - $17K per minute, with the average coming in at almost $8900 dollars per minute,” (The Ponemon Institute, 2017)

• Generator Fault Codes associated with the fuel system are often a result of poor fuel, and not generator malfunction
The Power of Prevention – 3 key steps

1. **Proper Fuel**: reduces chances of contamination and deterioration

2. **Proper Sampling**: identifies issues before they become catastrophic

3. **Proper Polishing/Treatment**: cost effective alternative to replacing contaminated fuel
Tentative Interim Amendment (TIA) #1388

- Test at installation and first fill for benchmarking
- Twice annually, with a minimum of six months between testing
- Fuel testing shall be performed on all diesel fuel sources of EPSS
- Test annually if stored for 12 consecutive months
- Tests:
  - Microbial Contamination - ASTM D6469
  - Free Water and Sediment - ASTM D2709
  - Biodiesel Concentration* (FAME%) - ASTM D7371
  - PetroOxy* - ASTM D7545
  - MPC/Varnish (hot dry regions)* – ASTM D7843
  - ISO Particle Count*
  - Cloud Point – ASTM D7683 (cooler regions)

Verdict: Denied - “this appeal does not present any clear and substantial basis upon which to overturn the results yielded by the NFPA standards development process.”
Conclusion

1. Emergency Standby

2. Impacts on Operability

3. Know Your Environment

4. Test First

5. Treat the Symptoms