

# Revision 5 to Regulatory Guide 1.9, “Application and Testing of Onsite Emergency Alternating Current Power Sources in Nuclear Power Plants”

NRC Staff Presentation to the Advisory  
Committee on Reactor Safety

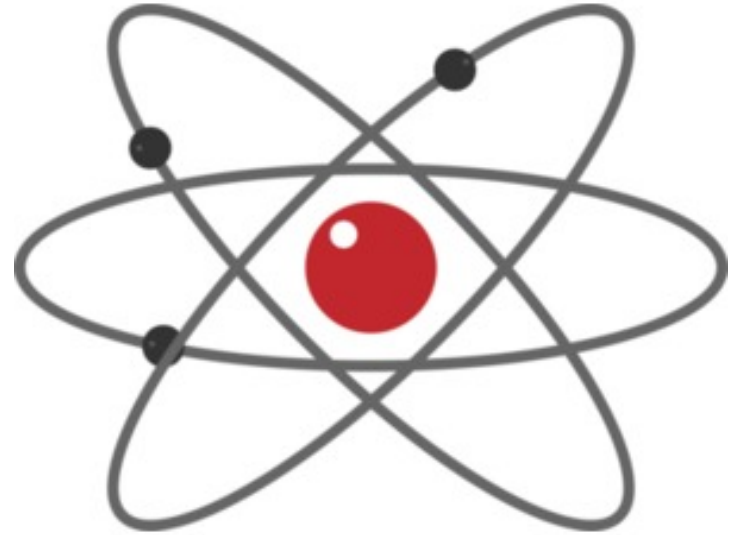
July 7, 2021

---

---

# Agenda

1. Introduction
2. Existing Guidance
3. Significant Changes
4. Proposed New Guidance
5. Public Comments and Resolutions
6. Questions and Comments



---

# Introduction

- ✓ Current NRC guidance in Regulatory Guide 1.9 has not been updated since 2007. It does not reflect all the possible types of alternative onsite emergency AC power sources.
- ✓ The NRC is issuing Revision 5 of Regulatory Guide 1.9:
  - Endorse new and updated IEEE standards
  - Introduce technology-neutral guidance other than diesels, to include combustion turbine generators (CTGs) and other types of the emergency power sources for the onsite alternative alternating current (AC) electric power system.
- ✓ Purpose of introducing technology-neutral provisions:
  - Acknowledge that future applications may use alternative onsite emergency power supplies for advanced reactors and nuclear facilities.
  - Provide an initial path in the regulatory review process for alternative power supplies.
  - Establish a foundation for alternative power supplies by describing acceptance criteria.

---

# Existing NRC Guidance

- ✓ Regulatory Guide 1.9, “Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants” was last updated in 2007 to Revision 4.
- ✓ Regulatory Guide 1.9 provides guidance that the NRC staff considers as an acceptable method for satisfying NRC regulations (mainly GDC 17 and 18) with respect to the design, qualification, and testing of emergency power sources used in onsite AC electric power systems for nuclear power facilities.

---

# Significant Changes

- ✓ This revision (Rev 5) endorses one new and updates another IEEE standard in full, with supplements and clarifications:
  - IEEE Standard 387-2017, “IEEE Standard for Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations”
    - IEEE Standard 387-2017 was updated from 1995 version
    - Includes specific details on design and testing considerations

---

# Significant Changes (cont.)

- IEEE Standard 2420-2019, “IEEE Standard Criteria for Combustion Turbine-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations”
  - Industry developed this new standard in 2019 based upon Interim Staff Guidance (DC/COL-ISG-021)
  - Specifically includes additional guidance on CTG’s principal design criteria, design features, qualification considerations, and testing requirements.

---

# Proposed New Guidance

- ✓ Includes provisions for alternatives for onsite standby emergency AC power supplies that meet the intent of 10 CFR 50 and 10 CFR Part 52 requirements in consideration for small modular reactors, advanced reactors, and other nuclear facilities.
  - Includes criteria derived from General Design Criteria (GDC) 17 and GDC 18 (e.g., information on capacity, capability, independence, redundancy, testability, inspection, qualification, etc.).
  - References applicable guidance provided in Regulatory Guides: 1.75, 1.6, 1.81, 1.118, 1.89, 1.100, 1.164, 1.28, 1.155 and 1.189
- ✓ Includes additional design and testing considerations for EDGs, CTGs, and other emergency AC power sources.

---

# Proposed New Guidance (Cont.)

- ✓ This Revision introduces a new technology-neutral concept for power sources other than EDGs and CTGs.
- ✓ Since the range of possible alternative power sources is very wide in scope, the staff provided only basic foundations identifying the regulatory requirements for an alternative onsite power sources.
- ✓ Revision 5 is only introducing guidelines for alternative power sources. The staff is open to reviewing and endorsing future industry standards for alternate onsite power sources.



---

# Proposed New Guidance (cont.)

## Sample Supplements and Clarifications to IEEE 387-2017:

- ✓ “Design and Application Considerations” for testability and synchronization capabilities was supplemented:
  - to address testing of the EDG operating in parallel with the preferred power source in the event the preferred power source has transients.
- ✓ “Design and Testing Considerations” was clarified:
  - The design should allow testing of the EDGs to envelop the parameters of operation.
- ✓ “Operations” was clarified:
  - to include that licensees should monitor EDGs cumulative operating time above the nominal rating for additional restrictions as specified in manufacturer-recommended accelerated maintenance requirements and industry consensus group recommendations.

---

# Proposed New Guidance (cont.)

- ✓ Sample Supplements and Clarifications to IEEE 2420-2019:
  - “Design and Application Considerations” for testability and synchronization capabilities was supplemented:
    - to address testing of the CTG operating in parallel with the preferred power source in the event the preferred power source has transients.
  - “Design and Testing Considerations” was clarified:
    - The exhaust system should be purged before startup or during shutdown
    - The pressure loss associated with the air intakes may be significant. Design should consider the local environment and the possibility of condensation of moisture from the ambient humidity
  - “Recommended Parameters” was clarified:
    - adding additional items to be monitored to indicate the need for an overhaul.

---

# Proposed New Guidance (cont.)

- Both IEEE standards were supplemented to include verification of all subsystems such as fuel oil, lube oil, cooling, starting, and piping systems credited for operation.
- ✓ Other important changes:
- Removal of testing and design requirements from Rev 4 because they have been incorporated in the updated IEEE 387-2017.
  - Title of Regulatory Guide 1.9 changed to be more technology neutral, “Application and Testing of Onsite Emergency Alternating Current Power Sources in Nuclear Power Plants.”

---

# Public Comments and Resolution

✓ Summary:

- Received 51 comments from NEI, IEEE, and members of public.
- One significant change made to the background section was to combine the two sections on EDGs and CTGs into one.
- The rest of the comments were minor and incorporated by editorial changes.
- Several other comments did not require changes because they were determined to be beyond the scope of this regulatory guide.

---

## Public Comments and Resolution(cont.)

- ✓ Comments of interest from NEI (Comments No. 1, 2, 3, and 5)
- Reference to a 30-day mission time for the EDGs represents a backfit concern.
  - 30-day timeframe removed. Mission time now refers to licensing bases.
- A requirement for constructing a chamber for testing various atmospheric conditions would be impractical.
  - Clarified language to state the design of EDG encompasses a temperature and humidity band of operation.
- The design requirement associated with preferred offsite power should be considered part of the remote protection system per IEEE Standard 387, hence, not within the scope of this regulatory guide.
  - EDG has adequate internal protection to sustain its mission while paralleled to grid.

---

# Public Comments and Resolution(cont.)

- ✓ Comments of interest from IEEE
  - Almost identical to NEI comments. They were addressed within the responses to NEI comments accordingly.
  
- ✓ Comments from Members of Public
  - Clarification on the use of terms “accident”
    - Terminology used was consistent with the terminology in the endorsed version of IEEE Std 387-2017.
  - Clarification for bypassing non-critical trips of EDG.
    - Bypassing of noncritical trips during accidents is expected and it is important to take measures to ensure that spurious actuation of these other protective trips does not prevent the EDGs from performing their function during accident mode of operation.

The endorsement of these IEEE standards does not add any new regulatory positions regarding design basis events (DBE), anticipated operational occurrences (AOOs), loss of offsite power (LOOP) with accident conditions.

---

# Steps Towards Issuance

- OGC has provided NLO.
- Briefed ACRS subcommittee and received feedback.
- Briefed Committee to Review Generic Requirements (CRGR) on NEI's contentions of possible backfit
- Brief ACRS full committee.
- Issuance of new guide is expected in July.

---

# Questions and Comments

?