



Engineering and Regulatory Approaches to New and Innovative Design Submittals:
Extended Duty Cycle Batteries and
Gas Turbine Generators

NRO/DE/EEB
Tania Martinez Navedo
March 10, 2010




U.S. NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment




Agenda

- Regulatory approach to new and different electrical equipment applications
- Examples
 - Extended Duty Cycle Batteries for Passive Reactor Designs
 - Gas Turbine Generator as Class 1E AC Power Source for the US-APWR Design
- Conclusion




U.S. NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment




Regulatory approach to new and different electrical equipment applications

- Goal: To establish a licensing basis where there is no precedence in support of making a reasonable assurance finding
- Primary call: Safety
 - Review efforts will be focused on safety may result in longer review time





U.S. NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment



Extended Duty Cycles Batteries


- Safety Significance
 - New designs extend duty cycle range (24 to 72 hours). Operating reactors use batteries with duty cycles ranging from 4 to 8 hours.
 - Passive reactor designs have a unique need for battery power different from active reactor designs.






Extended Duty Cycles Batteries


- Issue
 - The passive reactor designs' unique reliance on batteries as part of the safe shutdown of the plants.
 - Qualification of electrical equipment important to safety is required per GDC 1 and GDC 4.
 - Existing regulatory guidance and industry standards only contemplate battery duty cycles with durations of 8 hours or less.

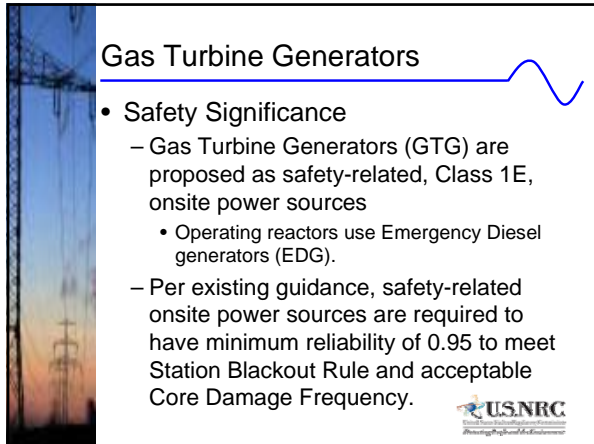




Extended Duty Cycles Batteries


- Regulatory approach followed:
 - Verify
 - Develop
 - Inquire
 - Review
 - Present findings

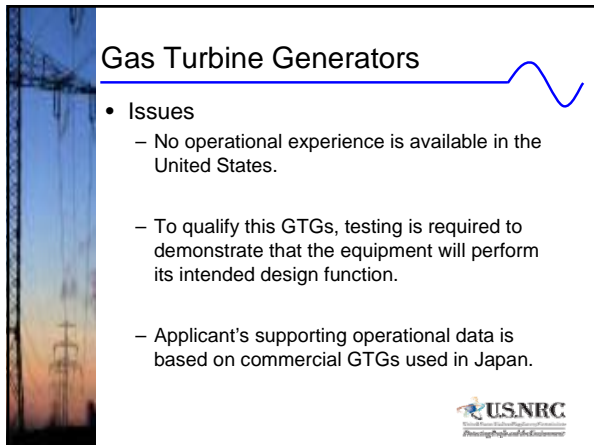




Gas Turbine Generators


- Safety Significance
 - Gas Turbine Generators (GTG) are proposed as safety-related, Class 1E, onsite power sources
 - Operating reactors use Emergency Diesel generators (EDG).
 - Per existing guidance, safety-related onsite power sources are required to have minimum reliability of 0.95 to meet Station Blackout Rule and acceptable Core Damage Frequency.

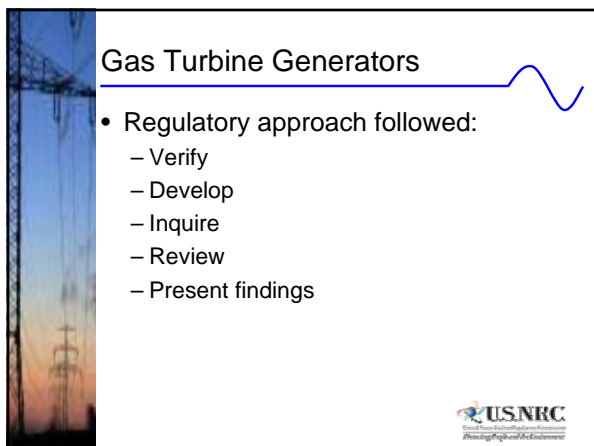




Gas Turbine Generators


- Issues
 - No operational experience is available in the United States.
 - To qualify this GTGs, testing is required to demonstrate that the equipment will perform its intended design function.
 - Applicant's supporting operational data is based on commercial GTGs used in Japan.





Gas Turbine Generators

- Regulatory approach followed:
 - Verify
 - Develop
 - Inquire
 - Review
 - Present findings





Conclusion

- NRO's goal with regards to new and different equipment applications is to establish a licensing basis where there is no precedence in support of making a reasonable assurance finding.
- NRO's primary call is safety.
- Our success path to review new and different equipment applications is based on a 5-step approach: verify, develop, inquire, review and present findings.