Response to Public Comments on Draft Regulatory Guide (DG)-1303
"Application and Testing of Onsite Emergency Alternating Current Power Sources in Nuclear Power Plants"
Proposed Revision 5 of Regulatory Guide (RG) 1.9

On January 19, 2021, the NRC published a notice in the *Federal Register* (86 FR 5267) that Draft Regulatory Guide, DG-1303, proposed revision 5 of RG 1.9 was available for public comment. The Public Comment period ended on February 18, 2021. The public comments received and the NRC staff responses to comments are in the following table.

Comments were received from the following:

Member of Public Gurcharan Singh Matharu (Lawnak90@gmail.com) Thomas Koshy (Thomask@dnfsb.gov) Roy Mathew (r.mathew@verizon.net) Adams Accession Number ML21050A427	Nuclear Energy Institute (NEI) Frances Pimentel, Senior Project Manager, Risk and Technical Support 1201 F Street, NW, Suite 1100 Washington, DC 20004 FAP@NEI.ORG Adams Accession Number ML21050A428	Institute of Electrical and Electronics Engineers (IEEE) Standards Association IEEE/PES/NPEC/SC-4, Working Group 4.2 501 Hoes Lane #3 Piscataway, NJ 08855 Adams Accession Number ML21050A429

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
1. Member of Public	Background; Emergency Diesel Generator section	Please clarify that the performance requirements for onsite power systems are limited to DBE, AOO, LOOP as well as LOOP with accident conditions. Specifically identify the sections where the usage of word "accident" is in conformance with applicable regulations. The comments below are seeking clarification on the use of terms "accident" and "DBE" as used in the Draft RG DG-1303.	The NRC staff appreciates the comment. Revision 5 of RG 1.9 is consistent with the terminology, regarding the term accident, in the endorsed version of IEEE Std 387-2017. This endorsement does not add any new regulatory positions regarding design basis events (DBE), anticipated operational occurrences (AOOs), loss of offsite power (LOOP) with accident conditions. 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 terminology in IEEE 387-2017 was determined to not conflict with the applicable regulations in regard to accident conditions. Therefore, the staff finds the proper implementation of IEEE 387-2017 by licensees to be one acceptable way of demonstrating conformance with the applicable regulations. No changes were made in response to this comment.
2. Member of Public	Background; Emergency Diesel Generator Section	Please provide clarification that the guidance provided in the draft RG for bypassing non-critical trips, when the DG is operating in response to an	The NRC staff appreciates the comment. See response to Comment No. 1.

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
		emergency operation demand conforms to the regulatory bases discussed above for all DBEs, AOOs, and accidents.	No changes were made in response to this comment.
3. Member of Public	Background; Emergency Diesel Generator Section	Shutdown operations in both PWRs and BWRs introduce a different spectrum of vulnerabilities that may not be applicable during at power operations. Specific topics included mid-loop operations, operation with potential to drain the reactor vessel, and AC power during shutdown.	The NRC staff appreciates the comment. NUREG-1449, "Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States," contains the results of the NRC staff's evaluation of shutdown and low-power operations at commercial nuclear power plants in the United States. No changes were made in response to this comment.
1.NEI/IEEE	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources: Paragraph 8, Last Sentence (Page 7), "The onsite emergency AC power source should be capable of operating for a minimum of 30 days with replenishment of fuel oil and other fluids/materials, as required." The IEEE/PES/NPEC/SC-4 WG 4.2 infers this statement refers to an EDG mission time capability of 30 days; however, it is not in Section C, "Staff Regulatory Guidance," of the Draft Guide. This was not part of any qualification type-testing and also was not part of any original design specifications used by the OEM when furnishing EDGs to the nuclear industry. This should be removed since, per PWROG PA-LSC-1707, "Unless a plant was licensed with a specific 'Mission Time' for the EDGs, there is none. The inference of a 30-day capability requirement of the EDGs is not a part of any standard plant licensing basis." If the item regarding 30-day capability for EDGs is to remain in the Reg. Guide, further clarification needs to be provided for mechanism of verification (test). This is not part of any NUREG 1431, 1432, or 1433 Tech Specs.	The NRC staff partially disagree with the comment. Revision made. The text was modified to "The offsite power source (preferred power source) is not designed to withstand external events, as discussed in 10 CFR Part 50, Appendix A, GDC 2. For a natural event that results in catastrophic failure of the offsite power system or damage to the plant infrastructure required for the offsite power system, the offsite power system may not be available for an extended time. An accident condition such as a loss-of-coolant accident may result in high dose rates in the vicinity of the plant such that it may not be feasible to evaluate the operational capability of external non-safety-related plant equipment required to restore offsite power for many days. EDG mission time refers to the amount of time the EDG is required to operate to supply power to safety systems that mitigate the effects of accidents and events delineated in the safety analysis and to power the equipment necessary for long-term cooling. The mission time is based on systems important to safety, or as required by individual licensing basis, for accidents concurrent with a LOOP, as well as time to restore offsite power from a LOOP, due to external events. For example, EDGs can support core cooling capability. In 10 CFR 50.46(b)(5), the NRC requires core cooling capability for an extended period of time (i.e., as long as radioactive materials are present in the core)" The mission time is plant-specific and therefore, a specific mission time is outside the scope of this RG. See NEI Comment #2. EDG performance and design capabilities are provided in the Updated Final Safety Analysis Report (UFSAR). For the current operating fleet, the EDG

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
			performance and design capabilities include a continuous operation, nameplate rating of 2,000 hours. Additional (higher overload) short time ratings for 168 hours, 2 hours 30 minutes and 30 minute operation are also provided. The staff disagrees and considers information provided in the UFSAR as part of any original design specifications used by the OEM when furnishing EDGs to the nuclear industry. The staff disagrees with the comment that qualification type-testing is not addressed. RG 1.9 endorses the IEEE 387-2017 recommendations and definitions related to type testing and qualification: Section 3 “Definitions” defines continuous rating (of diesel-generator unit) as: The electric power output capability that the diesel-generator unit can maintain in the service environment for 8760 h of operation per year with only scheduled outages for maintenance. Section 4.1.2 “Mechanical and electrical capabilities” which states: The diesel-generator unit shall also have each of the following specific capabilities to meet the design, application, and qualification requirements of this standard: a) Design conditions. The unit shall be capable of operating during and after any design basis event without support from the preferred power supply. The following design conditions, including appropriate margins as required by IEC/IEEE 60780-323, shall be specified by those individuals responsible for the system application and, as a minimum, shall include the following: 1) Operational cycles (e.g., 4000 starts over a period of 40 years). 2) Operating hours (e.g., 6000 h over a period of 40 years)
2. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources: Paragraph 8, Last Sentence (Page 7), “The onsite emergency AC power source should be capable of operating for a minimum of 30 days with replenishment of fuel and other fluid/materials, as required.” This sentence should be deleted. The minimum time of operation of the emergency AC power source should not be included in this RG due to the following reasons: 1) minimum EDG time of operation for some plants is established by accident analysis in their licensing basis, and 2) minimum EDG time of operation should be based on plant design and established by the nuclear vendor’s analysis vs. a common time for all.	The NRC staff partially disagree with this comment. Revision made. The text was modified to “The offsite power source (preferred power source) is not designed to withstand external events, as discussed in 10 CFR Part 50, Appendix A, GDC 2. For a natural event that results in catastrophic failure of the offsite power system or damage to the plant infrastructure required for the offsite power system, the offsite power system may not be available for an extended time. An accident condition such as a loss-of-coolant accident may result in high dose rates in the vicinity of the plant such that it may not be feasible to evaluate the operational capability of external non-safety-related plant equipment

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
		Some plants have performed site-specific plant accident analysis to determine the minimum operating time for an emergency AC power source, with results less than 30 days. One example is the Callaway analysis that was approved by the NRC. In addition, the PWROG has developed a document PWROG-20014-NP, that addresses this concept. Perhaps this document would be the place to address any concerns with the industry, vs. in the background discussion for this Regulatory Guide. In the many revisions of RG 1.9 and associated NRC documents on EDGs, the first mention of a 30 requirement was in parentheses in Revision 4 which was added following the industry review, without a chance for industry comment. The text in Section B states: "…supply power continuously to the equipment needed to maintain the plant in a safe condition if an extended (e.g., 30-day period should be considered with refueling every 7 days) LOOP occurs." The NRC was questioned in a public meeting (by NEI) on why this was added in the final version without industry review, and requested it be deleted. The NRC's written response was that "The staff intended that the 30-day mission time for EDG should be considered if an extended LOOP occurs." Though in Section B, with the use of the word "should" the statement now can be read like a requirement that will be used to challenge operating plants.	required to restore offsite power for many days. EDG mission time refers to the amount of time the EDG is required to operate to supply power to safety systems that mitigate the effects of accidents and events delineated in the safety analysis and to power the equipment necessary for long-term cooling. The mission time is based on systems important to safety, or as required by individual licensing basis, for accidents concurrent with a LOOP, as well as time to restore offsite power from a LOOP, due to external events. For example, EDGs can support core cooling capability. In 10 CFR 50.46(b)(5), the NRC requires core cooling capability for an extended period of time (i.e., as long as radioactive materials are present in the core)". 1) Minimum EDG time of operation is established by accident analysis in their current licensing basis. The accident analysis (Chapter 15 of the UFSAR) provides details on postulated design basis events (DBEs), the equipment required to mitigate the consequence of events, the duration of the events and conformance to regulation. Classification of plant conditions in accordance with American Nuclear Society (ANS) which divides plant conditions into four categories in accordance with anticipated frequency of occurrence and potential radiological consequences to the public. The four categories, defined as Conditions I, II, III, and IV events, are described in ANSI-N18.2*, "Nuclear Safety Criteria for the Design of Stationary PWR Plants," Section 5, 1973. (*superseded by ANSI/ANS 51.1 and ANSI/ANS 52.1 for BWRs) – Use of seismic Category I, Class IE, and IEEE-323 qualified equipment, instrumentation, and components in the ultimate mitigation of the consequences of Conditions II, III, and IV events. (Offsite power is not Class1E qualified) – Dose analysis in the UFSAR are calculated through a period in which offsite releases of radioactive materials are postulated to occur for approximately 30 days to demonstrate controlled safe state conditions. – Conformance with 10 CFR 50.46 "Acceptance Criteria for emergency core cooling systems (ECCS) for light water nuclear power reactors." Specifically, this chapter delineates conformance to section (b)(5) "long-term cooling" which states: After any calculated successful initial operation of the ECCS, the calculated

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
			core temperature shall be maintained at an acceptably low value and decay heat shall be removed *for the extended period of time required by the long-lived radioactivity remaining in the core.* The staff notes that for conformance with this regulation, an AC power source is required for operation of ECCS (and support systems for ECCS) for an indefinite period of time - i.e. as long as there is radioactive fuel in the core. Since the EDGs are the only qualified source of AC power credited in accident analyses, EDGs may be required indefinitely to support long term core cooling functions. The licensing basis of the current operating NPP fleet also includes a requirement for the Ultimate Heat System to be capable of supporting plant shutdown post-accident for a period of typically 30 days. The staff concludes EDG mission time can be up to 30 days and is delineated in the safety analyses. The mission time is plant-specific and therefore, a specific mission time is outside the scope of this RG. 2) The staff disagrees with the comment that minimum EDG time of operation should be based on plant design and established by the nuclear vendor's analysis vs. a common time for all. Details on consequences of a DBE and actions/equipment required for mitigating the consequences, coupled with other safety and non-safety related loads needed to assure safe shutdown and maintain safe state conditions at a nuclear power plant dictate the sizing criterion of the EDG. The duration of operation of the EDG is provided in the licensing basis of some plants and includes: The plant's capability to maintain dose rates within allowable limits over a 30 day period, as described in the accident analysis. The offsite power source (preferred power source) is not designed to withstand external events identified in 10 CFR 50 Appendix A GDC 2. Loss of offsite power events can occur for an extended duration depending on the damage to plant infrastructure and the transmission network associated with offsite power system. The EDG mission time refers to the amount of time the EDG is required to operate to supply power to safety systems that mitigate the effects of accidents and events delineated in the safety analysis and to power the equipment necessary for long term core cooling. The mission time is plant-specific and therefore, a specific mission time is outside the scope of this RG.

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
3. NEI/IEEE	Staff Regulatory Guidance: Emergency Diesel Generator Design Considerations	Staff Regulatory Guidance, Emergency Diesel Generator Design Considerations: Section 2.2 should be deleted due to the following reasons: 1. Provisions are already provided in IEEE 387-2017. 2. it is not practical to simulate environments during testing and referenced an August 22, 2007 letter in which the staff agrees to provide clarification on this issue in the next revision of the RG.	The NRC staff generally disagrees with the comment. However, minor changes made. This regulatory position is now C-2.1. Specifically, the language "simulate the parameters of operation" were deleted, and the second sentence was modified to state, "The design should allow testing of the EDGs to envelop the parameters of operation (e.g., manual start, automatic start, load sequencing, load shedding, and operation time), normal standby conditions, and environments (e.g., temperature, humidity) that would be expected if an actual demand were placed on the system. "In letter dated August 22, 2007 (ADAMS Accession No. ML072330563), the NRC states: The staff agrees that the use of the words "simulate...environments" in Regulatory Position 1.5 is subject to different interpretations. The staff intended that the effects of environments (temperature and humidity) should be considered in establishing the rating of the diesel generator. The tests should confirm that the capacity margin provided in the design of the EDG is continued to be adequate for design basis event mitigation during worst case expected temperature and humidity conditions for a given plant. The staff agrees to include this clarification in the next revision of RG 1.9. IEEE Std 387 Section 6.1 specifies qualification and verification that the EDG meets all design requirements to perform its intended function. IEEE 387 Section 6.2, Initial type testing demonstrates functionality in the service environment. IEEE Std 387 Section 6.2, addresses initial type testing. Initial type testing can be performed at the factory and/or site. Regulatory position C2.7 states, "The maximum design basis loads should be within the continuous rating (as defined in IEEE Std 387 2017, Section 3, "Definitions" and Section 4.1.2.d, "Design Load") of the EDG with margin." Thus, the staff has addressed EDG capacity with margin for design basis events. Additionally, the staff indicated in Regulatory Position C-2.1 that testing should envelop the expected environments, including temperature and humidity. Thus, the staff finds that the issue has been addressed in the current RG. Therefore, the staff will not adopt the recommendation.
4.NEI	Staff Regulatory Guidance:	Staff Regulatory Guidance, Emergency Diesel Generator Design Considerations: Section 2.3 should be removed as IEEE Std 387-2017,	The NRC staff partially agrees with the comments.

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
	Emergency Diesel Generator Design Considerations	Section 6.5.1 covers establishing a maintenance program (with sufficient technical basis) that factors in operating hours, testing, condition, operating experience, or a combination of these for emergency diesel generator units. Also consider adding language that acknowledges and accepts momentary episodes where the load is above the EDG rating.	The staff agrees to include allowance for EDG owner group recommendations for accelerated maintenance as appropriate where obtaining a valid review of rating basis is not possible due to the absence of EDG manufacturers. The proposed clarification that cumulative operating time above the nominal rating of the diesel generator should be monitored for manufacturer-recommended accelerated maintenance requirements and/or industry consensus group recommendations for accelerated maintenance as appropriate will be adopted based on the recommendation. The NRC staff disagrees to include adding language that acknowledges and accepts momentary episodes where the load is above the EDG rating. The licensing basis provides the capability (i.e., continuous and short-term rating) of the EDG, and these ratings should not be exceeded. However, the staff does not agree with the inclusion of momentary accelerated episodes. The staff will not be revising language as recommended since the EDG is tested above the 110% rating for 2 hours.
5. NEI/IEEE	Staff Regulatory Guidance: Emergency Diesel Generator Design Considerations	Staff Regulatory Guidance, Emergency Diesel Generator Design Considerations: Section 2.4 should be removed because it is out of scope for RG. 1.9 IEEE Std 387, Clause 4.4, Table 1 scope is for design considerations for the EDG. It is not intended to address considerations for off-normal preferred power supply. If protection design criteria, the EDG system boundary should be respected. Any Class 1E bus protection (IEEE Std 308) or Preferred Power Supply (IEEE Std 765) is out of scope of IEEE Std 387.	The NRC staff disagrees with the comment. No changes made as a result of this comment. Section 2.3 addresses testing in the event the offsite power source may have transients resulting in voltage and frequency perturbations. The staff will not remove the reference and will not adopt the recommendation due to the design considerations that need to still be considered for testability and synchronization capabilities, as noted in Item 47 of Table 1 in Clause 4.4.
6. NEI/IEEE	Staff Regulatory Guidance: Emergency Diesel Generator Design Considerations	Staff Regulatory Guidance, Emergency Diesel Generator Design Considerations: Section 2.8 should be deleted because it is redundant to Section 2.2.	The NRC staff generally agrees with the comment. Section 2.8 is redundant to Section 2.2 and therefore Section 2.8 will be removed based on the recommendation.
7. NEI	Staff Regulatory Guidance: Combustion Turbine Generator Design Considerations	Staff Regulatory Guidance, Combustion Turbine Generator Design Considerations: Section 3.1 should be deleted due to the following: In IEEE 387, "Continuous rating" with 8760 hours operation is defined along with "short time rating" which requires 2-hour operation in any 24-hour period. However, IEEE Std 2420 does not have "short time rating," and therefore	The NRC staff generally agrees with the comment. Section 3.1 will be deleted since the combustion turbine generator rating has already been defined in IEEE 2420 and is slightly different to the EDG continuous rating.

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
		uses only term of "rating" instead of "continuous rating." Because the "rating of combustion turbine-generator unit" is already defined in IEEE Std 2420, Section 3.1, this requirement should be removed from RG 1.9.	
8. NEI/IEEE	Staff Regulatory Guidance: Combustion Turbine Generator Design Considerations	Staff Regulatory Guidance, Combustion Turbine Generator Design Considerations: Section 3.6 needs to be supplemented and clarified as the following: Recommend the follow change to item 3.6 (blue italics): Because of the potential for explosion of residual fuel or fuel vapor remaining in the CTG, the exhaust system should be purged before startup or *during shut down*. The starting *and / or shut down sequence* should include a gas purge *process* of the turbine to prevent damage to the turbine and downstream components *by explosion.*	The NRC staff generally agrees with the comment. Section 3.6 will be supplemented and adopted as recommended.
9. NEI/IEEE	Staff Regulatory Guidance: Combustion Turbine Generator Design Considerations	Staff Regulatory Guidance, Combustion Turbine Generator Design Considerations: Section 3.8 needs to be revised as the following: Automatic switch to open the bypass door should not be required unconditionally. Consider revising with the following: "the inlet air design should consider preventing excessive increase in pressure loss due to particle deposition on inlet air filter. When increase of pressure loss is not acceptable for CTG performance, inlet air filter should be removed, replaced, or cleaned without power reduction of CTG".	The NRC staff generally agrees with the comment. Section 3.8 will be revised based on the recommendation.
10. NEI/IEEE	Staff Regulatory Guidance: Combustion Turbine Generator Design Considerations	Staff Regulatory Guidance, Combustion Turbine Generator Design Considerations: Section 3.12 needs to be revised since the item does not need to specify "under a standard load" and also it seems monitoring under standard load operation is required, but item b (deposits or deterioration of the turbine blades or vanes (as inferred from ideal model results) cannot be monitored during the operation. The following (blue italics) needs to be removed: In addition to IEEE Std 24202019, Section C.3, the following items *observed under a standard load* indicate the need for an overhaul and should be monitored when appropriate for a CTG based on the manufacturer's recommendations: a. decreasing run out time after shutdown, and b. deposits or deterioration of turbine blades or vanes (as inferred from ideal model)	The NRC staff generally agrees with the comment. Section 3.12 will be modified to include the following based on the recommendation: In addition to IEEE Std 2420-2019, Section C.3, the following items indicate the need for an overhaul and should be monitored when appropriate for a CTG based on the manufacturer's recommendations: a. decreasing run out time after shutdown, and b. deposits or deterioration of turbine blades or vanes (as inferred from ideal model results).
11. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources, Paragraph 6, Second Sentence should be revised and reference RG 1.160 as the following (blue italics): "Increased operational reliability can be achieved through appropriate testing and *maintenance per RG 1.160 "Monitoring the Effectiveness of Maintenance*	The NRC staff generally agrees with the comment. The sentence and reference addition will be adopted based on the recommendation.

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
		at Nuclear Power Plants" as well as *appropriate level causal analyses of all failures of the onsite emergency AC power source.*	
12. NEI	Staff Regulatory Guidance: Onsite AC power source design considerations other than EDGS and CTGs.	Background, Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs: Section 1.13 should be clarified by adding the as the following as shown in blue italics: "Fire protection, including but not limited to fire prevention, detection, and suppression. Address methods to minimize both the probability of occurrence and the consequences of fire and *explosion originating from the emergency AC power source*. RG 1.189 provides additional information."	The NRC staff generally agrees with the comment. The second sentence addition will be adopted based on the recommendation.
13. NEI	Staff Regulatory Guidance: Emergency Diesel Generator Design Considerations	Staff Regulatory Guidance, Emergency Diesel Generator Design Considerations: Section 2.1, should be deleted since field flashing devices are already included within the scope of IEEE Std 387-2017 (Section 1.3.1.b.1).	The NRC staff generally agrees with the comment. The section 2.1 will be deleted based on the recommendation.
14. NEI	Staff Regulatory Guidance: Emergency Diesel Generator Design Considerations	Staff Regulatory Guidance, Emergency Diesel Generator Design Considerations: Section 2.7 should be revised and supplemented with the following : "The maximum design-basis loads should be within the continuous rating (as defined in IEEE Std 387-2017, Section 3.2 and Section 4.1.2.d "design load") of the EDG with margin."	The NRC staff generally agrees with the comment. The sentence will be revised and supplemented based on the recommendation.
15. NEI	Staff Regulatory Guidance: Onsite AC power source design considerations other than EDGS and CTGs.	Staff Regulatory Guidance, Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs: Section 1.8 sentence should be removed since its not prescriptive. "If test programs are not adequately described in the COL or design control document, the creation of the detailed program should be a license condition."	The NRC staff generally disagrees with comment. The staff will not delete the sentence based on the recommendation but will instead relocate the regulatory position to that of the background section since it provides further guidance and does not impose a new requirement.
16. NEI/IEEE	Staff Regulatory Guidance: Emergency Diesel Generator Design Considerations	Staff Regulatory Guidance, Emergency Diesel Generator Design Considerations: Section 2.5 b should be revised and supplemented with the following (blue italics): "The NRC staff reviewed ANSI/ANS-59.52-1998, "Lubricating Oil Systems for Safety Related Emergency Diesel Generators" (Ref.29) and found that the standard provides the additional information and criteria for lubricating-oil systems for EDGs used in safety-related applications. However, this revision of RG 1.9 does not endorse ANSI/ANS-59.52-1998. Item b is for Lube Oil and the IEEE Std 387 Section 4.5.1.7 is solely for Fuel Oil. If this is intended to remain in the Reg. Guide, it should be its own item.	The NRC staff generally agrees with the comment. Section 2.5 b will be revised into a new section 2.6 with bullets based on the recommendation.

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
17. NEI	Staff Regulatory Guidance: Combustion Turbine Generator Design Considerations	Staff Regulatory Guidance, Combustion Turbine Generator Design Considerations: Section 3.3 a)3 needs to be revised and supplemented with the following (blue italics): "Load-run demands: To be valid, the load-run attempt should follow a successful start and meet one of the following criteria (see the exceptions below): (1) a load run of any duration that results from a real (i.e., not a test) automatic or manual signal, (2) a load-run test to satisfy the plant's load and duration test specifications, and (3) other operations (e.g., special tests) in which the CTG is *planned to run loaded for at least 1 hour with at least 50 percent continuous rating*."	The NRC staff generally agrees with the comment. The sentence will be supplemented and adopted based on the recommendation.
E1. NEI	Introduction	The Introduction, Purpose needs to be supplemented with 2nd to last paragraph from Section B of Rev. 4 Purpose: 2nd to last paragraph from Section B of Rev. 4 provides additional discussion of purpose but was not included in this draft. 1. Copy 2nd to last paragraph from Section B of Rev. 4 to make 2nd paragraph of Purpose section. 2. Change "emergency diesel generators" to "onsite emergency AC power sources (2x)	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the NRC is adding a second paragraph to the Purpose section as follows: This RG provides specific guidance in the areas of preoperational testing, periodic testing, reporting and recordkeeping requirements, and valid demands and failures. The preoperational and periodic testing provisions in this guide provide a basis for taking the corrective actions needed to maintain high inservice reliability of installed onsite emergency AC power sources. The data accumulated will assist ongoing performance monitoring for all onsite emergency AC power sources after installation and during service. In the above, the staff changed "emergency diesel generators" to "onsite emergency AC power sources" . The change was adopted based on the recommendation.
E2. NEI	Introduction	Add clarification to the introduction purpose be sure that this applies only to Class 1E GDC 17 On-site AC Emergency Power Sources.	The NRC staff generally disagrees with the comment. GDC 17 is already addressed in the applicability section; there's no need to provide further clarification.
E3. NEI	Introduction	Applicability: Be consistent with the use of "all." Use in both locations or neither one (recommended).	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The sentence will delete "all" from "…and all applicants based on the recommendation.

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
E4. NEI	Introduction	Applicability: Related Guidance: Be consistent with the use of "AC power" vs "ac power".	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Throughout the RG, "ac" has been modified to "AC."
E5. NEI	Discussion: Reason for Revision	Reason for Revision: The language not specific enough	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the first sentence of the Reason for Revision Section, states "This revision (Revision 5) of RG 1.9 endorses…."
E6. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources, Paragraph 2: The word is implied and doesn't need to be stated.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the second sentence of the second paragraph in the Background section (pg. 6) is revised as follows: In large light water nuclear power plants, the majority of the emergency loads are large induction motors.
E7. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources, Paragraph 2: Do not need to list the three types of generators every time.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the third and fourth sentences of the second paragraph in the Background section (pg. 6) is revised as follows: At full voltage, this type of motor draws a starting current of five to eight times its rated full load current. The sudden, large increase in current drawn from the onsite emergency AC power source as a result of the startup of induction motors can result in substantial voltage reduction.
E8. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources, Paragraph 2: Language not specific enough Add "of the emergency generator prime mover" after the word "overspeed" in the 7th sentence of the 2nd paragraph.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the seventh sentence of the second paragraph in the Background section (pg. 6) is revised as follows: Recovery from the transient caused by starting large motors, or from the loss of a large load, could cause overspeed of the emergency generator prime mover that, if excessive, might result in a trip (i.e., loss of the safety related power source).
E9. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources, Paragraph 3: Awkward wording Change the middle of the 2nd sentence of the 3rd paragraph to "... and selecting EDGs or CTGs with continuous ratings that exceed the sum ..."	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the second sentence in the third paragraph of the Background section (pg. 6-7) is revised as follows: Particularly for EDGs and CTGs, this margin, as discussed in IEEE Std 387 2017, Annex A, and IEEE Std 2420 2019, Annex A, can be achieved by estimating the loads conservatively and selecting EDGs or CTGS with continuous ratings that exceed the sum of the loads needed at any one time.
E10. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources, Paragraph 3: Redundant wording	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The end of the third paragraph of the Background section (pg. 7) includes the following:

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
			However, the DBE loads during the operating license or COL stages should be within the continuous (or nominal) rating of the selected onsite emergency AC power source(s) with margin.
E11. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources, Paragraph 4: Words are implied	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The second sentence of the fourth paragraph is modified as follows: Under 10 CFR 50.46, the NRC requires, in part, that each light water nuclear power reactor fueled with uranium oxide pellets within cylindrical Zircaloy or ZIRLO cladding be provided with an ECCS capable of maintaining the core temperature at an acceptably low value and removing decay heat produced from the long lived radioactivity.
E12. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources, Paragraph 4: Excessive/awkward wording	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The second sentence of the fourth paragraph is modified as follows: Under 10 CFR 50.46, the NRC requires, in part, that each light water nuclear power reactor fueled with uranium oxide pellets within cylindrical Zircaloy or ZIRLO cladding be provided with an ECCS capable of maintaining the core temperature at an acceptably low value and removing decay heat produced from the long lived radioactivity.
E13. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources, Paragraphs 4 & 5: The author is trying to convey the continuous rating should bound ECCS loads, but long-term ECCS loads are significantly lower than during the first 2-24 hrs. The previous paragraph already said DBE loads should be within the continuous rating; this is the message that needs to be conveyed. The deleted part confuses the issue. Move the 1st sentence of the 5th paragraph to the end of the 4th paragraph and delete the 2nd sentence of the 5th paragraph.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the last sentence of the fourth paragraph has been added as follows: The onsite emergency AC power system should provide Class 1E power for long term operation of the ECCS, demonstrating compliance with 10 CFR 50.46 for extended operation.
E14. NEI	Background: Onsite Emergency AC Power Sources	Background, Onsite Emergency AC Power Sources, Paragraph 6: Add "AC" for consistency Change the last part of the last sentence in paragraph 6 to "as well as effective root cause analyses of all failures of the onsite emergency AC power source."	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The last sentence of the fifth paragraph is modified as follows: Increased operational reliability can be achieved through appropriate testing and maintenance as described in RG 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," as well as the appropriate level of causal analysis of all failures of the onsite emergency AC power source.
E15. NEI	Background: Emergency Diesel Generators	Background, Emergency Diesel Generators: Information for EDGs and CTGs is redundant and should be combined into one section.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the restructuring and combination of EDG/CTG background sections is be combined into one section, as shown on page 8

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
E16. NEI	Background: Emergency Diesel Generators	Background, Emergency Diesel Generators: The concern is not limited to EDGs. Change the 1st sentence of the 1st paragraph to 2 sentences: "Motor-starting transients can also affect the frequency of the emergency AC power source. This is primarily an EDG concern but may apply to other generator types."	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The second paragraph in the EDG & CTG Section in the Background (pg. 8) is revised as follows: Motor-starting transients also affect the frequency of the emergency AC power source. This is primarily a concern with EDGs but may apply to other generator types.
E17. NEI	Background: Emergency Diesel Generators	Background, Emergency Diesel Generators: Mostly redundant/awkward wording Delete existing 2nd and 3rd sentences of 1st paragraph and move the revised sentences above to the beginning of the 2nd paragraph.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The second paragraph in the EDG & CTG Section in the Background (pg. 8) is revised as follows: Motor-starting transients also affect the frequency of the emergency AC power source. This is primarily a concern with EDGs but may apply to other generator types.
E18. NEI	Background: Emergency Diesel Generators	Background, Emergency Diesel Generators: Section is being revised to apply to more than just EDGs Change the 3 uses of "EDG" in the 2nd paragraph to "emergency AC power source" (one is plural).	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The second paragraph in the EDG & CTG Section in the Background (pg. 8) is revised as follows: Motor-starting transients also affect the frequency of the emergency AC power source. This is primarily a concern with EDGs but may apply to other generator types.
E19. NEI	Background: Emergency Diesel Generators	Background, Emergency Diesel Generators: Captures previously deleted material that was not redundant. Change the last part of the 2nd sentence in the 2nd paragraph to "... ECCS motor loads (e.g., pumps, motor-operated valves and fans) and bypass power supplies associated with uninterruptible power systems."	The staff generally agrees with the comment and the commenter's proposed resolution. Th fourth sentence in the third paragraph in the EDG & CTG Section in the Background (pg. 8) is revised as follows: The ability of the EDG to maintain steady state voltage and frequency within an acceptable band can affect the performance capabilities of the ECCS motor loads (e.g., pumps, motor operated valves, and fans) and bypass power supplies associated with uninterruptible power systems.
E20. NEI	Background: Emergency Diesel Generators	Background, Emergency Diesel Generators: Section is being revised to apply to more than just EDGs. 1. Change 1st sentence of 3rd paragraph to "Protection of an EDG or CTG from ... operation of an overspeed trip device (usually set at 115 percent of nominal speed for EDGs)." 2. Add "or CTGs" after "EDGs" in the 2nd and 3rd sentences of the 3rd paragraph.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The third paragraph in the EDG & CTG Section in the Background (pg. 8) is revised as follows: The immediate operation of an overspeed trip device (usually set at 115 percent of nominal speed for EDGs or CTGs) protects an EDG or CTG from excessive overspeed, which can result from an improperly adjusted control system or governor failure. Similarly, to prevent substantial damage to the generator, the generator differential current trip must operate immediately upon occurrence of an internal fault. Other protective trips can also safeguard the EDGs or CTGs from possible damage. Conversely, spurious operation of a trip circuit lowers EDG and CTG availability and reliability. Consequently, it is important to ensure that these other protective trips do

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
			not prevent the EDGs and CTGs from performing their safety function during the accident mode of operation.
E21. NEI	Background: Emergency Diesel Generators	Background, Emergency Diesel Generators: It is not clear the author wishes these to be Test mode-only trips. Also, a trip obviously interferes with operation; this does not need to be stated. Change the last 3 sentences of the 3rd paragraph to "Conversely, spurious operation of a trip circuit lowers EDG/CTG availability and reliability. Consequently, it is important to ensure these other protective trips are only enabled in Test mode, so they do not prevent the EDGs/CTGs from performing ..."	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The fourth paragraph in the EDG & CTG Section in the Background (pg. 8) is revised as follows: The immediate operation of an overspeed trip device (usually set at 115 percent of nominal speed for EDGs or CTGs) protects an EDG or CTG from excessive overspeed, which can result from an improperly adjusted control system or governor failure. Similarly, to prevent substantial damage to the generator, the generator differential current trip must operate immediately upon occurrence of an internal fault. Other protective trips can also safeguard the EDGs or CTGs from possible damage. Conversely, spurious operation of a trip circuit lowers EDG and CTG availability and reliability. Consequently, it is important to ensure that these other protective trips do not prevent the EDGs and CTGs from performing their safety function during the accident mode of operation.
E22. NEI	Background: Combustion Turbine Generators	Background, Combustion Turbine Generators: The concern is not limited to CTGs. 1. Move the 1st paragraph to be the 1st paragraph of the combined EDG/CTG section. 2. Add "EDGs or" before "CTGs" in the 1st and last sentences of the 1st paragraph.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The first paragraph in the EDG & CTG Section in the Background (pg. 8) is added as follows: General industry practice is to specify a voltage reduction of 10–15 percent when starting large motors from large capacity power systems and a maximum voltage reduction of 25–30 percent when starting these motors from limited capacity power sources such as EDGs or CTGs. Evaluation of voltage reduction during load sequencing should consider the plant specific equipment to prevent load interruption. Large induction motors can achieve rated speed in less than 5 seconds when powered from adequately sized EDGs or CTGs that can restore the bus voltage to 90 percent of nominal in about 1–2 seconds.
E23. NEI	Background: Combustion Turbine Generators	Background, Combustion Turbine Generators: Information is redundant for combined EDG/CTG section.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. The reorganization and combination of EDG/CTG background sections has been combined.
E24. NEI	Staff Regulatory: Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs	Staff Regulatory, Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs section title: Awkward/incomplete wording Change section title to "Design and Testing Considerations for Onsite Emergency AC Power Sources other than EDGs and CTGs"	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, Section C-1 title is revised to "Design and Testing Considerations for Onsite Emergency AC Power Sources other than EDGs and CTGs".

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
E25. NEI/IEEE	Staff Regulatory: Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs	Staff Regulatory, Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs Section 1.4: Enhancement Suggestion: Paragraph is cumbersome and contains many items.	The NRC staff generally agrees with the comment The items are delineated in the paragraph.
E26. NEI	Staff Regulatory: Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs	Staff Regulatory, Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs Section 1.4: Consistency and grammar 1. In the 5th sentence: a. Change "power AC" to "AC power" b. Replace the comma after "controls" with "and" 2. Change "internal" to "internally" in the last sentence	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the fifth and last sentences of Regulatory Position C1.4 have been revised as follows: Address automatic and manual control systems for the onsite emergency AC power system, and discuss emergency controls and trips, as necessary. If the onsite emergency AC power source has moving parts with high inertia, address the creation of internally generated missiles.
E27. NEI	Staff Regulatory: Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs	Staff Regulatory, Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs Section 1.6: Words are implied - Delete "for these plants" from the last sentence.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the last sentence of C1.6 is revised as follows: Show that the onsite emergency electric power systems are designed to minimize undesirable interaction effects
E28. NEI	Staff Regulatory: Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs	Staff Regulatory, Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs Section 1.8: Grammar Change "i.e." to "e.g." in the 2nd sentence.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the second sentence in C1.8 is revised as follows: Specify the tests performed as part of site testing, preoperational testing, and periodic testing, as well as the frequency of the tests (e.g., monthly, semiannually, at refueling).
E29. NEI	Staff Regulatory: Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs	Staff Regulatory, Onsite Alternating Current Power Source Design Considerations other than EDGs and CTGs Section 1.8: Wording not copied and modified properly from IEEE 387-2017. Add "of the system" after "status" in the 6th sentence.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the sixth sentence in Regulatory Position C1.8 is revised as follows: Confirm that the onsite emergency power system has remote indication in the control room to display status of the system and local alarms.
E30. NEI	Staff Regulatory: Emergency Diesel Generator Design Considerations	Staff Regulatory, Emergency Diesel Generator Design Considerations Section 2: Awkward/incomplete wording. Change the section title to "Design and Testing Considerations from Emergency Diesel Generators" and add "and testing" after "design" in the opening sentence.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the title and opening sentence of Section C-2 has been revised as follows:

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
			C-2. 2nd Staff Regulatory Guidance Position - Design and Testing Considerations for Emergency Diesel Generators The following regulatory positions supplement the guidelines of IEEE Std 387 2017, as related to design and testing considerations:
E31. NEI	Staff Regulatory: Emergency Diesel Generator Design Considerations	Staff Regulatory, Emergency Diesel Generator Design Considerations Section 2.5: Grammar Delete hyphen in "lubricating-oil" in subsection b.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, C2.5 is revised as follows: The NRC staff reviewed IEEE Std 387-2017, Clause 6.5.1, "Prevention, Maintenance, Inspection, Testing, and Monitoring, and ANSI/ANS 59.52 1998, "Lubricating Oil Systems for Safety Related Emergency Diesel Generators" (Ref.31), and found that the standard provides the additional information and criteria for lubricating oil systems for EDGs used in safety related applications.
E32. NEI	Staff Regulatory: Emergency Diesel Generator Design Considerations	Staff Regulatory, Emergency Diesel Generator Design Considerations Section 2.7: 2.7 refers to IEEE 387-2017, Section 3.2. There is no Section 3.2 in IEEE 387-2017. It is Definitions Clause, second definition and should be clarified as such. Refer to Section 3 definition of continuous rating (of diesel generator unit)	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, C2.7 is revised as follows: The maximum design basis loads should be within the continuous rating (as defined in IEEE Std 387 2017, Section 3, "Definitions" and Section 4.1.2.d, "Design Load") of the EDG with margin.
E33. NEI	Staff Regulatory: Emergency Diesel Generator Design Considerations	Staff Regulatory, Emergency Diesel Generator Design Considerations Section 2.9: Words are redundant to the word "independently." Delete "of the redundant units" from the end of the opening sentence.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, C2.8 is revised as follows: Design provisions should include the capability to test each EDG independently.
E34. NEI	Staff Regulatory: Combustion Turbine Generator	Staff Regulatory, Combustion Turbine Generator Section 3: Awkward/incomplete wording.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the title and opening sentence of Section C-3 has been revised as follows: C-3. 3rd Staff Regulatory Guidance Position - Design and Testing Considerations for Combustion Turbine Generators: The following regulatory positions supplement the guidelines of IEEE Std 2420 2019, as related to design and testing considerations:
E35. NEI	Staff Regulatory: Combustion Turbine Generator	Staff Regulatory, Combustion Turbine Generator Section 3.3: Language is not specific enough Add "following maintenance" after "declare the CTG operable" in the last sentence of the opening paragraph.	The NRC staff generally agrees with the comment and the commenter's proposed resolution. Thus, the end of last sentence in the opening paragraph of C3.2 is revised as follows: However, the successful test performed to declare the CTG operable following maintenance should count as a demand.

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
E36. NEI	Staff Regulatory: Combustion Turbine Generator	Staff Regulatory, Combustion Turbine Generator Section 3.3: Grammar Change “load run" to "load/run" in 3rd paragraph of subsection c. Delete hyphen in "high-lubricant" in Section 3.3 subsection c. (1). Based on the recommendation.	The NRC staff generally agrees with the comment and the commenter’s proposed resolution. Thus, C3.2c, C3.2.c - Start demands: All valid and inadvertent start demands, including all start only demands and all start demands that are followed by load/run demands, whether by automatic or manual initiation, are start demands. C.3.2.e.1 - any operation of a trip that would be bypassed in accident, LOOP, or combined accident and LOOP operation mode (e.g., high lubricant temperature trip),
E37. NEI	Staff Regulatory: Combustion Turbine Generator	Staff Regulatory, Combustion Turbine Generator Section 3.9: Redundant wording. Delete "consideration" from the opening sentence.	The NRC staff generally agrees with the comment and the commenter’s proposed resolution. In C3.8 is revised as follows: IEEE Std 2420-2019, Clause 4.4, Table 1, “Design and Application Considerations,” Item 46, on design considerations for testability and synchronizing capability, should be supplemented with the following:
E38. NEI	Staff Regulatory: Combustion Turbine Generator	Staff Regulatory, Combustion Turbine Generator Section 3.13: Words are redundant to the word "independently." Delete “of the redundant units” from the end of the opening sentence	The NRC staff generally agrees with the comment and the commenter’s proposed resolution. Thus, C3.12 is revised as follows: 3.12 Design provisions should include the capability to test each CTG independently.
E39. NEI	Staff Regulatory: Combustion Turbine Generator	Staff Regulatory, Combustion Turbine Generator Section 3.15: Grammar- proper nouns should be capitalized. Capitalize “technical specification surveillance requirements” and addition “(TSSRs)” in the 1st sentence. Change “technical specification surveillance requirement” to “TSSR” in the last sentence.	The NRC staff generally agrees with the comment and the commenter’s proposed resolution. C3.14 is revised as follows: CTG maintenance activities performed during qualification should be documented in the qualification test report and added to the Technical Specification Surveillance Requirements (TSSRs) to specify maintenance activity frequency. For example, fuel nozzle cleaning maintenance performed before conducting the start and load acceptance tests during qualification should be documented in the qualification report to demonstrate successful qualification. In this example, a TSSR was added to document and address the testing frequency of once per 50 starts required for the fuel nozzle cleaning maintenance activity.
1. IEEE	See NEI comment 1		
2. IEEE	See NEI comment E25		
3. IEEE	See NEI comment 13		
4. IEEE	See NEI comment 3		
5. IEEE	See NEI comment 4		
6. IEEE	See NEI comment 5		
7. IEEE	See NEI comment 16		

Comment No. and Commenter	Section of DG-1303	Specific Comments	NRC Resolution
8. IEEE	See NEI comment 6		
9. IEEE	See NEI comment 7		
10. IEEE	See NEI comment 8		
11. IEEE	See NEI comment 9		
12. IEEE	See NEI comment 10		