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SUBJECT: Draft Regulatory Guide DG-1172, *"Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants"*

PROJECT NUMBER: 689

The Nuclear Energy Institute (NEI)[1] is submitting these comments on behalf of the nuclear industry, in response to the *Federal Register* notice, dated September 22, 2006, *Volume 71, Number 184,* which invited written comments on the Proposed Revision 4 of Regulatory Guide 1.9 (DG-1172), *"Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants."*

The enclosure provides comments and recommendations from the industry. In several instances, DG-1172 recommends routine testing under conditions that are not consistent with guidance from the diesel generator manufacturers or IEEE. Testing under these newly postulated "worst-case" conditions instead of the currently recommended practices could potentially be destructive to the long-term function of the equipment and would not provide additional benefit.

The industry and the Commission's collective efforts over the last 20 years have resulted in dramatic improvements in EDG performance and reliability. One of the key components of this effort has been the reduction in overly harsh testing regimens that were prevalent in the 1970's and 1980's, while still maintaining an appropriate balance to nuclear safety. The industry does not see the need for nor do we understand the reasoning behind a departure from the IEEE guidance.

[1] NEI is the organization responsible for establishing unified industry policy on matters affecting the nuclear energy industry. NEI's members include all entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, nuclear material licensees, and other organizations and individuals involved in the nuclear energy industry.

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In addition, it is our understanding that this revision of Regulatory Guide 1.9 will only be applicable to designs that utilize safety related diesel generators and are submitted for Design Certification after the issuance of the new regulatory guide. Additional points regarding the need for clarification of the test descriptions and other editorial comments are provided.

We appreciate the opportunity to comment on the draft documents. If you have any questions regarding this effort please contact Leslie Kass at (202) 739-8115; lck@nei.org.

Sincerely,

Russell J. Bell

Enclosure

c: Mr. Satish K. Aggarwal
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NRC Document Control Desk

DG-1172 Comments

Section	Priority (Hi, Med, Low)	Regulatory Basis	Description of the Issue	Proposed Alternate
C.X.Y.n.m	1, 2 or 3	Cite regulatory basis if this applies	Description of the issue	Mark-up text or alternate wording, where possible
Overall comment	1	Both the AP1000 and ESBWR Design Certification submittals were docketed prior to the planned issuance of the RG 1.9 revision.	This Regulatory Guide pertains to safety-related diesel generators used in nuclear power plants.	This guide would not apply to the AP-1000 or ESBWR projects because in both designs the diesel generators are not safety-related. Both design DCDs that have been submitted to the NRC state that Reg Guide 1.9 is not applicable. Testing of the non-safety related diesel generators will be controlled by "Availability Controls" based on RTNSS evaluation results (Regulatory Treatment of Non-Safety Systems). The testing in DG-1172 is overly stringent for non safety-related applications.
2.1	3	3	Start Failures: no specified time frame	After voltage add" within specified time allowance."
2.2.1	3	3	Starting Test – no specified time frame	After frequency add "within specified time allowance."
B.1st pp (2)	3		"(2) provide power promptly to engineered safety features if a loss of offsite power and a design-basis event occur during the same time period, and…" Need to clarify here if a LOOP is considered a design basis event.	Possibly add Design Basis Event to definitions in Section C.

Section	Priority (Hi, Med, Low)	Regulatory Basis	Description of the Issue	Proposed Alternate
B.7th pp	2		"However, the design-basis event loads during the operating license or combined license stages should be within the continuous rating of the emergency diesel generators with margin." A numerical value for margin should be specified. A 5% margin is certainly adequate given that virtually all diesels can exceed continuous ratings for a period of time.	Add 5% margin
Section B. Discussion, - 7th paragraph third sentence			This sentence states "A more accurate estimate of safety loads is possible during the operating license or combined license stages of review because detailed designs have been completed and component test and preoperational test data are usually available."	This statement is not necessarily correct given the status of designs and testing at the time of license application submittals and should be corrected or clarified.
Section B, Discussion, -7th paragraph, fourth sentence –			This sentence states "However, the design basis event loads during the operating license or combined license stages should be within the continuous rating of the emergency diesel generators with margin."	The sentence should be clarified to explain the basis for the required margin.

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C.1.3	2		"During the operating license or combined license stages of review, the design-basis event loads should be within the continuous rating (as defined in Section 3.2 of IEEE Std 387-1995) of the diesel generator with margin." A numerical value for margin should be specified. A 5% margin is certainly adequate given that virtually all diesels can exceed continuous ratings for a period of time.	Add 5% margin
C.1.4	2		This clause provides specific details regarding "the starting and load-accepting capabilities of the diesel generator." Ideally, minimum voltage readings should be specified at motor terminals, however, data collection is significantly more difficult. Consequently, reasonable and conservative numbers should be specified for voltage at the diesel output breaker. The location where voltage and frequency data is	Add a sentence stating that voltage and frequency data should be collected at the diesel output breaker.

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			collected should be specified.	
C.1.4	3		The seventh and tenth sentences…" The acceptance value of the frequency and voltage should be based on plant-specific analysis to prevent load interruption."	The tenth sentence should be deleted as it is a duplicate of the seventh sentence.
C.1.5	2		"The design should allow testing of the diesel generators to simulate the parameters of operation (e.g., manual start, automatic start, load sequencing, load shedding, operation time), normal standby conditions, and environments (e.g., temperature, humidity) that would be expected if actual demand were placed on the system." Regarding "environments (e.g. temperature, humidity): Sites currently have no capability to control the environment – outside temperature and/or humidity – for current testing. For future plants controlling these parameters would be very cost prohibitive to test at these extremes. Testing from normal	Delete "…. and environments (e.g., temperature, humidity)" or better explain that this clause is not intended to have sites control DG room temperature and humidity for testing.

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			standby conditions is appropriate.	
C.1.7	2		The following new position has been added to supplement design criteria for Clause 4.1.2(a) (Mechanical and Electrical Capabilities) of 387-1995: "unit to continue operation during/after a DBA w/o support from the preferred power source and should be consistent with plant-specific conditions"	Since a 1E source is designed to operate during/after a DBA, it is not clear what this position would require for the EDG design. Does this statement mean that a backup control power system is needed that is powered directly from the emergency generator? Please provide clarification.
C.1.9.2	2		"(2) A trip may be bypassed under design-basis events, provided the operator has sufficient time to react appropriately to an abnormal diesel generator condition." This section implies trips should not be bypassed if operators cannot react in sufficient time. Under DBE conditions, operator response time cannot be assured as operators are not normally present initially or continuously at the EDG during an event. We are of the opinion that trips	IEEE 4.5.4 a and b language is sufficient. Eliminate clause on operator.

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			other than overspeed and generator differential should be bypassed during design basis events due to the possibility of a spurious trip. In addition, this reduces the complexity of the control scheme in the emergency mode.	
C.1.8-p.7	3		"1.8 Clause 4.5.2.2 of IEEE Std 387-1995 should be modified to read as follows:" The section is numbered 1.8 – it should be numbered 1.10	Clerical fix.
C.2.1	2		"component malfunctions or operating errors that did not prevent the emergency diesel generator from being restarted and brought to load within a few minutes (i.e., without corrective maintenance or significant problem diagnosis)" The term "within a few minutes" is too vague and allows for inconsistent interpretation both from the licensee and the regulator. A numerical value such as 30 minutes should be selected.	Change within a few minutes to 30 minutes

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C.2.2	2		"Test Descriptions…The following test descriptions should be used in conjunction with the preoperational and surveillance testing described in the table." This section of the document is very confusing for the following reasons: 1) The section lists only 11 tests, though 21 are listed in Table 1; 2) Many tests do not have a description, with most simply notes where the IEEE guidance should be supplemented; 3) Site acceptance tests are mixed in with availability tests. Some examples of confusion are 1) Starting test (a site acceptance test) as 2.2.1 with Slow Start test as 2.2.2., and 2) Load Run (load acceptance) Test as 2.2.3, and Rated Load Test as 2.2.4. Though these tests are similar, having them together with very vague descriptions makes the document confusing.	Please improve section by 1) Having separate sections for site acceptance tests and Availability tests; 2) Provide brief descriptions (even if repeated from IEEE) for all required tests.

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C.2.2.3	1	No regulatory basis. Not in Reg Guide 1.9 Rev 3 nor IEEE 387-1995	"This test involves demonstrating 90–100 percent of the continuous rating or worst case design-basis event loads (whichever is higher) of the emergency diesel generator,…" DBE loads in excess of continuous ratings are effectively not permitted by C.1.3 due to margin requirements – as such this should not apply to plant receiving a design certification after 2007. If the site somehow does have maximum design basis loads greater than the continuous rating (typically only for a short period of time) it is recommended that the EDG not have monthly testing at overload conditions. This is potentially destructive testing that is expected to have a significant impact on EDG reliability over time. Testing at the continuous rating monthly should be sufficient to verify successful performance of the	Eliminate "…or worst case design-based event loads (whichever is higher)…"

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			EDG – meeting DBE loading can be satisfactorily verified during part of the endurance run performed every 18-24 months. This is a significant equipment issue that has not been recommended by IEEE.	
C.2.2.4	1	No regulatory basis. Not in Reg Guide 1.9 Rev 3 nor IEEE 387-1995	"If the design-basis event loads are higher than the continuous rating of the emergency diesel generator, the test should be conducted at the worst case design-basis event loads…" DBE loads in excess of continuous ratings are effectively not permitted by C.1.3 due to margin requirements – as such this should not apply to any plant receiving a design certification after 2007; If the site somehow does have maximum design basis loads greater than the continuous rating (typically only for a short period of time) it is recommended that the EDG not have monthly testing at overload conditions. This is	Eliminate clause.

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			potentially destructive testing that is expected to have a significant impact on EDG reliability over time. Testing at the continuous rating monthly should be sufficient to verify successful performance of the EDG – meeting DBE loading can be satisfactorily verified during part of the endurance run performed every 18-24 months. This is a significant equipment issue that has not been recommended by IEEE.	
C.2.2.6	2		"Combined Safety Injection Actuation System (SIAS) and Loss-of-Offsite Power Test" It is our understanding that the NRC is in conversation with the BWR Owners Group regarding the separation of the LOOP and LOCA design basis events. If this is indeed the case, this test may no longer be necessary.	It is suggested that the NRC review their current position on separation of LOOP and LOCA design basis events and ensure that the testing required in this document (i.e. the Combined SIAS / LOOP Test) is consistent with the NRC position.
C.2.2.7	1		"This test involves demonstrating the emergency diesel generator's capability to reject a load equal to loss of the largest single load while	Eliminate "…while operating at largest load power factor…"

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			operating at largest load power factor and verify that the frequency and voltage requirements are met and the unit will not trip on overspeed." Testing "while operating at the largest load power factor" is a potentially destructive test. When paralleled to the grid, the voltage is artificially offset high to allow rated kvar loading. Upon load rejection, the accompanying voltage spike can potentially exceed max vendor recommended voltage (based on the how large the load is). Recommend performing this test at 1.0 power factor and placing limits on maximum voltage seen (overshoot no greater than 15% and/or within 10 % in 2 seconds).	
C.2.2.8	1		"This test involves demonstrating the emergency diesel generator's capability to reject a load equal to 90–100 percent of the continuous rating while operating at a worst case	Eliminate "...while operating at worst case design load power factor..."

Section	Priority (Hi, Med, Low)	Regulatory Basis	Description of the Issue	Proposed Alternate
			design load power factor and verify that the voltage requirements are met and that the unit will not trip on overspeed." Testing "while operating at the worst case design load power factor" is a potentially destructive test. When paralleled to the grid, the voltage is artificially offset high to allow rated kvar loading. Upon load rejection, the accompanying voltage spike will typically exceed max vendor recommended voltage. Recommend performing this test at 1.0 power factor and placing limits on maximum voltage seen (overshoot no greater than 15% and/or within 10 % in 2 seconds).	
C.2.2.9	1	Contrary to changes in IEEE 387-1995	"This test involves demonstrating the full load-carrying capability at a worst case design load power factor for an interval of not less than 24 hours."	Change clause to reflect an 8 hour endurance run.

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			The 24 hour endurance run is contrary to the IEEE-387 (1995) recommendation (Section 7.5.9) that the endurance run be completed in eight hours – two hours at load equivalent to the short term rating (110% of continuous), and six hours equivalent to 90-100% of the continuous rating. On the pre-op test the endurance run is still recommended to be a 24 hour run, but it recommends that the 18-24 month periodic endurance run be performed for only a total of eight hours. Accordingly, there is no regulatory basis for a 24 hour run. Some plants have recently had their Technical Specification approved to operate in this manner (8 hour endurance run).	
C.2.2.9	1		"Of this period, 2 hours are at a load equal to 105–110 percent of the continuous rating or design-basis load with a margin of 5–10 percent (whichever is higher) of the emergency diesel	Change clause to "Of this period, 2 hours are at a load equal to 105 percent of the continuous rating…"

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			generator, and 22 hours are at a load equal to 90–100 percent of the generator's continuous rating." If a 5% margin already exists between the design basis load and the continuous load rating of the machine, there is no basis to go to 105-110% of the continuous load. It is recommended that the EDG be tested to no more than 5% of design basis load (not 5-10%). This is a significant equipment issue that has not been recommended by IEEE.	
C.2.2.9	1	No regulatory basis. Not in Reg Guide 1.9 Rev 3 nor IEEE 387-1995	"Of this period, 2 hours are at a load equal to 105–110 percent of the continuous rating or design-basis load with a margin of 5–10 percent (whichever is higher) of the emergency diesel generator…" DBE loads in excess of continuous ratings are effectively not permitted by C.1.3 due to margin requirements – as such this	Replace clause with "Of this period, 2 hours are at a load equal to 105 percent of the continuous rating or design-basis load (whichever is higher) of the emergency diesel generator…"

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			should not apply to any plant receiving design certification after 2007. If the site somehow does have maximum design basis loads greater than the continuous rating (typically only for a short period of time) it is recommended that the EDG not be tested with a margin of 5-10 percent above that load. This is a potentially destructive testing that could have an impact on EDG reliability over time. Testing for these two hours at level of up to 105% of the continuous rating or at a level equal to the design-basis load (whichever is higher) should be sufficient to verify successful performance of the EDG. This is a significant equipment issue that has not been recommended by IEEE.	
C.2.2.10	1	No regulatory basis. Not in Reg Guide 1.9 Rev 3 nor IEEE 387-1995	"This test involves demonstrating the hot restart functional capability at full load-temperature conditions (after the emergency diesel generator has operated for 2 hours at continuous or design-	Eliminate the clause "...or design-basis event loads whichever is higher".

Section	Priority (Hi, Med, Low)	Regulatory Basis	Description of the Issue	Proposed Alternate
			basis event loads whichever is higher)..." This test should not be contingent on operating the EDG for two hours at "design basis loads (whichever is higher). As noted previously, EDG loads for new plants should not exceed the continuous rating, and if they did, the EDG should not be routinely testing at loads exceeding the continuous rating. Performing this test after two hours of operation at the EDG's continuous rating is sufficient enough to meet the objective of this test.	
C.2.2.11	1	No regulatory basis. Not in Reg Guide 1.9 Rev 3 nor IEEE 387-1995	"...This test should also verify that the critical protective trips that are not automatically bypassed perform their intended function..." It is not recommended that the critical protective trips that are not bypassed are tested to perform their intended function during this test. The function of	Delete last sentence under 2.2.11 (A similar comment appears below)

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			these trips can be verified in pre-start tests, relay tests, or with simulation per the site's existing maintenance program. The intent of the test is to verify that the bypassed trips do not trip the EDG during a design basis accident. This is not recommended in IEEE-387 and has no regulatory basis.	
General	1		There currently exist several different protocols and regulations regarding EDG performance including maintenance rule, mitigating system performance indicators (MSPI), and INPO requirements. Has the NRC performed a review to ensure this guidance is consistent with other documents, specifically MSPI and Improved Technical Specifications?	It is recommended the NRC review this document against MSPI guidance and Improved Technical Specifications to ensure this guidance is consistent.
Page 2 Part B 1st paragraph	2		How does a utility determine the period associated with "if an extended loss of offsite power occurs"? What defines this period? A clarification needs to be provided in DG-1172.	None. DG-1172 needs clarification.

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B. Page 3 2nd paragraph	2		How will we know if we meet "in about 1 second"? A clarification needs to be provided in DG-1172.	None. DG-1172 needs clarification.
C 1.4 Page 5	2		Page 5 section 1.4: "will not decrease to less than 75 percent of nominal". This does not align with the "20-30 percent" stated on page 3 second paragraph. If we are allowed 20-30 percent, then the minimum should be 70 percent, not 75 percent.	
C. 1.4 Bottom page 5	2		"speed of the diesel generator should not exceed the nominal speed plus 75 percent of the difference between nominal speed and the overspeed trip set point, or 115 percent of nominal (whichever is lower)." What value for overspeed trip set point do we use for this calculation? We have a specified band of 1035 - 1053 RPM? What if we test the overspeed trip and find it trips at 1020 RPM, do we have to change the maximum allowable EDG speed on largest single load reject based on an as-found	

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			trip set point? What if we decide to continue with the 1020 rpm set point for several months until the next planned outage?	
C.1.9 Page 6	2		Recommend specifying what reaction the operator is expected to take when the abnormal condition (associated with the bypassed trip) occurs. Is the action to trip the engine to protect it? A typical example is that low jacket coolant level is bypassed. If a flex hose or flex pipe coupling blew out, would an operator have time to address this before engine damage occurred? The design function of the EDGs is to operate (not shutdown). We are designed to have single failures. Therefore, recommend that item 2 be deleted.	Delete item #2 under C 1.9
C 2.1 Page 7	2		Definitions of demands and failures is not very thorough. Recommend stating that failures identified during post maintenance testing (provided that the failure was caused during the maintenance period)	

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			should not count as a demand or a failure. Failures identified during PMT, but not attributed to the maintenance performed should be counted as a demand and a failure. Is this guidance consistent with the Maintenance Rule guidance for demands and failures?	
C 2.1 Page 9 last paragraph	2		Past inoperability should apply to this also. If during a maintenance outage (EDG already inoperable) we find something that would have caused the EDG to not perform its required design function (past inoperability), this also should be counted as a demand and failure.	
C – Table 1 Page 10	2		Change "System operation tests: shutdown/refueling" to "System operation tests: once per operating cycle". If the plant design and operation conditions force these tests into a refueling outage, then that is when they will be performed. If they can be done with the plant on-line, this must be allowed.	Change "System operation tests: shutdown/refueling" to "System operation tests: once per operating cycle".
Section C,	2		The "Start" test referenced to	To make it consistent with Regulatory

Section	Priority (Hi, Med, Low)	Regulatory Basis	Description of the Issue	Proposed Alternate
page 10, Table 1			IEEE 387 Clause 7.5.1 should be required during monthly availability tests	Position C.2.3.2.1 and existing Standard Technical Specifications and during preoperational tests.
Section C, page 10, Table 1	2		The "Load Run" test referenced to IEEE 387 Clause 7.5.2 should be required during monthly availability tests	To make it consistent with Regulatory Position C.2.3.2.1 and existing Standard Technical Specifications)
Section C, page 10, Table 1	2		The "Fast Start" test referenced to IEEE 387 Clause 7.5.3 should be required during the 6 month availability tests	To make it consistent with Regulatory Position C.2.3.2.2 and existing Standard Technical Specifications
C – Table 1 Page 10	3		Have all monthly and 6 month tests gone away? Why are these columns blank?	
C.2.2.6	2		While this regulatory position is consistent with Regulatory Position C.2.2.6 of Regulatory Guide 1.9, Revision 3, the first sentence (which indicates that this test demonstrates that the emergency diesel generators can satisfactorily respond to a LOOP in conjunction with SIAS in whatever sequence they might occur), it is not consistent with the second sentence (which implies that	Given the amount of regulatory interaction that has occurred with respect to delayed LOOP/LOCA at several of the existing U.S. nuclear power plants, it is recommended that this regulatory position be clarified.

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			this regulatory position is satisfied by a simultaneous LOOP/LOCA event test)	
C 2.2.7 Page 11	2		"while operating at largest load power factor" is unclear. What if you are not shedding the largest load, but rather doing a full load reject? How close do you need to be to the power factor of this load?	
C 2.2.9 Page 12	2		Load tables are naturally very conservative, loading to above them is unnecessary and may be harmful to the EDG. If we have a < 10 minute load value and a > 10 minute load value, which would we use as the load value for the first 2 hours? We assume that meter tolerances do not need to be factored into these values.	
C 2.2.11 Page 12	1	Regulatory Guide 1.9 Rev 3	Recommend deleting last sentence. EDG safety function is to run, not trip. We should not be mandated to test that essential trips work.	Delete last sentence under 2.2.11
C 1.9	2		Clause 1.9 requires that it be ensured accident loading remains below continuous rating plus 10 to 15% margin	None. DG-1172 needs clarification.

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			during design stage. This clause seems to ignore the 2000 hour rating concept of diesel generators. A clarification should be added to this clause concerning a diesel generator's 2000 hour rating.	
C 1.4	1	Regulatory Guide 1.9 Rev 3	Clause 1.4 contains a response requirement for disconnection of the single largest load of recovery of the frequency to within 2 percent of nominal within less than 80% of sequencer interval. What is the basis of this requirement?	
C 1.8	2		Clause 1.8 identifies additional engine status indication requirements in terms of a surveillance system in the Control Room. The form of acceptability of this remote indication should be clarified in this clause. For example, a combination of indicator lights, computer screen indication, annunciation, etc.	None. DG-1172 needs clarification.
C 1.9	1	Regulatory Guide 1.9 Rev 3	Clause 1.9 identifies two or more measurements for each protective trip. Protective relay logic, protective relaying other	

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			than generator differential, at existing nuclear power station may not have two or more measurements. Protective relay trips should be identified as an exception in this clause.	
C 2.2.3	1	Regulatory Guide 1.9 Rev 3	See Comment #1.	
C 1.4	2		Clause 1.4 states in part "During recovery from transients caused by a disconnection of the largest single load, the speed of the diesel generator should not exceed the nominal speed plus 75 percent of the difference between nominal speed and the overspeed trip set point, or 115 percent of nominal (whichever is lower). Comment Initially Fairbanks Morse Engine, the vendor of the Opposed Piston and Pielstick engines within the Fairbanks Morse Owners' Group, recommended the overspeed trip setpoint of these engines be set in the range of 112% to 115% of nominal speed.	

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			Fairbanks Morse later revised their position concerning the overspeed setpoint to 115% to 117% of the engine's nominal speed. The nominal speed of Opposed Piston engines is 900 rpm and the nominal speed of Pielstick engines is 514 rpm. 75 percent of the difference between nominal speed and the overspeed trip set point will always be lower than 115 percent of nominal.	
C Table 1	2		Table 1 identifies a number of system operation tests: shutdown/refueling. It should be clarified that not all these tests are required to be performed with the unit in shutdown/refueling mode. There are a number of these tests which can be performed with the unit at 100% power without presenting a challenge to the operating unit. For example; (i) largest load rejection, (ii) design load rejection, (iii) endurance and load margin, and (iv) hot restart. Flexibility should be provided	

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			to the licensee to perform these test with the unit at 100% power. It is recommended a clarification be provided to allow licensees to perform tests on a refuel cycle periodicity versus with the unit in shutdown or refuel mode.	
C 1.9	2		Trips associated with electrical protective relaying should be excluded from this clause. Protective relay trips may be implemented with a single measurement and may not provide the operator with sufficient time to react to an abnormal condition. For example, a generator ground.	
C 2.1	2		The definition of "load run demands" should be deleted from DG-1172 and replaced with a reference to the proper regulatory document which contains these requirements.	
C 2.2.3	1	Regulatory Guide 1.9 Rev 3	See Comment #2.	
C.2.3.2.4	3		This would require the US EPR to start all four engines.	Ten-Year Testing Questionable value of a 10 year test to start ALL DGs simultaneously.

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C 2.2.9	1	Regulatory Guide 1.9 Rev 3	See Comment #3.	

Attached Comment 1 – DG-1172

Clause 2.2.3 of DG-1172 states *This test involves demonstrating 90-100 percent of the continuous rating or worst case design-basis event loads (whichever is higher) of the emergency diesel generator for an interval of not less than 1 hour and until attainment of temperature equilibrium. This test may be accomplished by synchronizing the generator with offsite power. The loading and unloading of an emergency diesel generator during this test should be gradual and based on a prescribed schedule that is selected to minimize stress and wear on the diesel generator.* The words *or worst case design-basis event loads (whichever is higher)* should be removed from this clause.

The NRC recommended that the emergency diesel generator be loaded in accordance with vendor's recommendations "...for all test purposes other than the refueling outage LOOP tests." in NUREG 1366, "Improvements to Technical Specification Requirements" published in December, 1992. Fairbanks Morse Engine's recommendations for the monthly test were provided in their 1985-1986 letters which recommend that the emergency diesel generator be loaded to between 60% and 100% of their continuous ratings. Further, the Commission approved Technical Specification changes on the North Anna docket in 1985 [Docket No. 50-339, Amendment 48] in response to GL 84-15 to address routine emergency diesel generator overloading by stating in their Safety Evaluation report (pg 16): "*We* [USNRC] *believe that the monthly test should exercise the EDG, confirm its operability, and detect degradation before a second failure* [sic] *is likely to occur. During the 18-month testing, the test loads envelope the calculated accident loads. It is our* [USNRC] *position that it is not necessary to envelope the design basis accident loads, which might occur once in 10,000 years, by a test that is repeated 12 times each year....*" [Emphasis added].

The industry and the Commission's collective efforts over the last 20 years has resulted in dramatic improvements in EDG performance and reliability. One of the key components of this effort has been the reduction in overly harsh testing regimens that were prevalent in the 1970's and 1980's, while still maintaining an appropriate balance to nuclear safety. The Commission should not foster regression of these gains through the re-imposition of unnecessary testing requirements.

Attached Comment #2 – DG-1172

Comment on Clause 2.2.3 of DG-1172

In the section associated with test descriptions, clause 2.2.3, "Load Run (Load Acceptance) Test", identifies the following:

This test involves demonstrating 90-100 percent of the continuous rating or worst case design-basis event loads (whichever is higher) of the emergency diesel generator for an interval of not less than 1 hour and until attainment of temperature equilibrium. This test may be accomplished by synchronizing the generator with offsite power. The loading and unloading of an emergency diesel generator during this test should be gradual and based on a prescribed schedule that is selected to minimize stress and wear on the diesel generator.

Comment

The load run is currently performed on approximately a monthly basis on existing emergency diesel generators at existing domestic nuclear power stations. Generally the emergency diesel generators are loaded to a kW value equal to or less than the continuous rating of the machine. This is done to minimize stress and wear on the emergency diesel generator. However, draft revision 4 of Regulatory Guide 1.9 would require the emergency diesel generator to load the machine to *90-100 percent of the continuous rating or worst case design-basis event loads (whichever is higher)*. In some existing domestic nuclear power stations the worse case design-basis event loads may be higher than the continuous ratings of the emergency diesel generators. To account for this possibility, manufacturers have provided standby diesel generators with short term ratings such as recommended in Safety Guide 9, issued in 1971. For example, ratings such as continuous, 2000 hour, 7 day and 30 minute can be found on a number of emergency diesel generators. Others may have different short term ratings. With engines built by Fairbanks Morse Engine there is a general rule of thumb concerning operation of emergency diesel generators within these ratings and de-energizing these machines for overhaul and inspection when operating at the short term ratings between normally scheduled overhauls. This rule of thumb can be characterizing as follows:

> When the following equation is equal to or greater than 1.0, the diesel generator should be shutdown to undergo a major inspection and overhaul:
>
> $$\frac{N_1}{R_1}+\frac{N_2}{R_2}+\frac{N_3}{R_3}+\frac{N_4}{R_4}=$$
>
> Where N equals the number of hours of operation of the emergency diesel generator at R rating. For an emergency diesel generator with the following ratings, the equation would be as noted below:

2600 kW continuous (8760 hours)
3000 kW 2000 hours
3100 kW 168 hours
3250 kW 30 minutes

$$\frac{N_1}{8760}+\frac{N_2}{2000}+\frac{N_3}{168}+\frac{N_4}{0.5}=$$

As can be seen by the above equation, if the worst case design basis event loads on an emergency diesel generator were above the machines 7 day rating and below the machine's 30 day rating, the licensee would load the emergency diesel generator to within its 30 minute rating each month and be required to perform a major inspection and overhaul each month if following the guidance as currently depicted in clause 2.2.3 of DG-1172.

It is not prudent to operate the emergency diesel generators above their continuous ratings during the monthly load run test. The machine may experience unnecessary and excessive wear and stress if operated above its continuous ratings will on a monthly basis. The purpose of the monthly load test is to verify operability of the emergency diesel generator to start and load, not to demonstrate its ability to meet worst case design basis event loads each month. This is the purpose of the LOOP and SIAS tests performed during unit outages. The Staff has previously demonstrated an understanding of the affects of excessive wear and stress on emergency diesel generators. Previous industry operating experience has demonstrated advanced wear on emergency diesel generators when performing monthly fast starts and loads. To avoid excessive wear on these machines, the NRC gave relief to the industry to perform fast start tests every six months versus monthly.

It is recommended the requirement for load run testing of emergency diesel generators at the worst case design basis event load be removed from this clause of DG-1172 and clause 2.2.3 be revised to read as follows:

This test involves demonstrating 90-100 percent of the continuous rating ~~or worst case design basis event loads (whichever is higher)~~ of the emergency diesel generator for an interval of not less than 1 hour and until attainment of temperature equilibrium. This test may be accomplished by synchronizing the generator with offsite power. The loading and unloading of an emergency diesel generator during this test should be gradual and based on a prescribed schedule that is selected to minimize stress and wear on the diesel generator.

Attached Comment #3 – DG-1172

Comment on Clause 2.2.9 of DG-1172

In the section associated with test descriptions, clause 2.2.9, "Endurance and Load Margin Test", identifies the following:

This test involves demonstrating the full load-carrying capability at a worst case design load power factor for an interval of not less than 24 hours. Of this period, 2 hours are at a load equal to 105-110 percent of the continuous rating or design-basis load with a margin of 5-10 percent (whichever is higher) of the emergency diesel generator, and 22 hours are at a load equal to 90-100 percent of the generator's continuous rating. The test process should verify that frequency and voltage requirements are maintained.

Comment

The endurance test is generally performed on a refuel cycle periodicity at domestic nuclear power stations that perform this test. It is not necessary to perform this test on a unit outage and there is no reason why the endurance test cannot be performed when the unit is at 100% power. This clause of DG-1172 requires the test to be performed for a period of *2 hours are at a load equal to 105-110 percent of the continuous rating or design-basis load with a margin of 5-10 percent (whichever is higher) of the emergency diesel generator, and 22 hours are at a load equal to 90-100 percent of the generator's continuous rating.* Existing domestic nuclear power stations have mature emergency diesel generator load profiles with little expected load growth on these machines. It is not necessary nor is it prudent to load the emergency diesel generator for 2 hours at the design basis load with an additional margin of 5-10 percent if this equivalent load level is greater than 105-110 percent of the machine's continuous rating. This will only burden the machine with unnecessary additional wear and stress. Rather, to ensure the emergency diesel generator will not experience unnecessary wear and stress during the endurance run, the load level of machines at existing domestic nuclear power stations with mature load profiles should be equal to "105-110 percent of the continuous rating or the worst case steady state design-basis load, whichever is lower" 2 hours and at their continuous rating for 22 hours.

Further, it is not necessary for the emergency diesel generator to run at the worst case load power factor for a period of 24 hours. The power factor of the generator load should be allowed to vary between 80-90 percent during the period of the test with the generator load power factor approaching expected design-basis load power factor where feasible.

It is recommended the requirement for endurance testing of emergency diesel generators, clause the DG-1172 and clause 2.2.9, be revised to read as follows:

This test involves demonstrating the full load-carrying capability at a ~~worst case design load~~ power factor **between 80-90 percent during the period of the test** *for an interval of not less than 24 hours. Of this period, 2 hours are at a load equal to 105-110 percent of the continuous rating or* ***worst case steady state*** *design-basis load ~~with a margin of 5-10 percent~~ (whichever is ~~higher~~* **lower***) of the emergency diesel generator, and 22 hours are at a load equal to 90-100 percent of the generator's continuous rating. The test process should verify that frequency and voltage requirements are maintained.*