

NRC INSPECTION MANUAL

ORPB:DI

PART 9900: TECHNICAL GUIDANCE

STS48112.TG

STANDARD TECHNICAL SPECIFICATIONS SECTION 4.8.1.1.2

A. PURPOSE

To provide the NRC position concerning the surveillance testing of diesel generator lockout features as provided in an NRR memorandum dated March 7, 1986.

B. BACKGROUND

By memorandum from Richard W. Starostecki, Director, Division of Reactor Projects, Region I to Themis Speis, Director, Division of Safety Review and Oversight, NRR, a request was made that NRR develop a uniform position on surveillance requirements of the Technical Specifications concerning diesel generator lockout features. This request was prompted as a result of questions raised during a routine resident inspector review of surveillance procedures at Susquehanna. Susquehanna's Technical Specifications require verification that the following lockout features prevent diesel generator starting and/or operation only when required:

1. engine overspeed
2. generator differential
3. engine low lube oil pressure

It was noted that the licensee's surveillance procedures did not appear to meet the surveillance requirement of the Technical Specifications (TS). The testing methods are as follows:

1. During the 18 month diesel generator load reject test, the licensee verifies that the overspeed trip does not actuate on the speed peak following a 4000 kW load reject.
2. During the 18-month 4kV diesel generator differential relay calibration, the differential lockout relay is removed, bench calibrated, and reinstalled. The automatic lockout feature circuitry is not tested (i.e., repeater relays and contacts) during the surveillance.

3. During the 18-month calibration of the diesel generator lube oil low pressure switches, the pressure switch is calibrated, but the automatic circuitry is not functionally tested.

It also was noted that the licensee's staff believes that the current calibration procedures are sufficient to meet the intent of the surveillance requirement. Because the nuclear safety concern is that the diesel generator (D/G) does not receive a spurious trip in the emergency mode, the licensee believes the absence of a trip during testing and the completion of the calibrations noted above adequately proves that inadvertent emergency trip signals are not actuated and therefore satisfies the TS surveillance requirement. The overspeed governors are "periodically" replaced with vendor (Woodward) calibrated governors. The licensee also believes that verification that the trips will actuate when a valid malfunction occurs is important for equipment protection but is not necessary to ensure plant safety.

Region I stated its belief that the testing is not adequate to meet the surveillance requirement as written. The testing is not verifying that the lockout features prevent D/G operation only when required, but is verifying that the lockout features do not prevent operation when not required. The region noted that the basis for the surveillance requirement is indeterminable from the TS.

The region's review of the GE Standard Technical Specifications (STS) found that this surveillance requirement is left blank. A check by Region I of three other plants found that the intent of this requirement has been interpreted differently by other utilities. Some have listed emergency lockouts, while others have listed manual lockout features or all diesel generator trips (test/emergency mode). A comparison of the plants reviewed is presented in Attachment 1. This comparison by the region was limited to GE facilities; however, it was suspected that the problem also exists with the other standardized TS and warrants a more structured review than the region was able to perform.

C. DISCUSSION

The current STS for each vendor include examples of the types of lockout features intended for inclusion under Specification 4.8.1.1.2.e.13 (see Attachment 2); these examples are "turning gear engaged" and "emergency stop." The surveillance requirement is to verify that the lockout features prevent starting only when required. Because the lockout features are not normally actuated, i.e., in a state which prevents starting of a diesel generator, the intent of the surveillance requirement is to verify that the lockout features prevent starting of the diesel generator when, in the terms of the examples cited, the turning gear is engaged or the emergency stop lockout feature is actuated. The other 18-month surveillance requirements are performed to verify the starting and loading of the diesel generators would verify that the identified lockout features do not prevent starting of the diesel generators when they are not required, i.e., the lockout feature is not actuated.

With regard to the test method used to demonstrate conformance with this surveillance requirement, it should demonstrate the operability of those components which must function to prevent starting of the D/G that are associated with each lockout feature identified.

Obviously a test would not attempt to start a diesel generator with a turning gear engaged because damage to equipment could result if the lockout feature did not function as required. Instead, the test would probably be performed in two steps, e.g., first verify that the lockout relay is activated when the turning gear is engaged and then verify that the diesel generator will not start when the lockout relay is activated.

The lockout features identified in the Susquehanna Technical Specification under Section 4.8.1.1.2.c.13 are noted in Attachment 1 as a) engine overspeed, b) generator differential, and c) engine lube oil pressure low. With regard to what features should be included in this specification, the current guidance providing examples was added to the GE STS in Revision 3. It is clear that some licensees had proposed and the staff had issued the Technical Specifications with requirements that differ from the current guidance on the types of lockout features listed. The fact that these differences exist is not surprising because the earlier STS versions did not provide guidance on the type of lockout features intended. However, when the Technical Specifications are issued, the requirements exist and conformance to these requirements is required. Conformance to TS requirements is not subject to interpretations with regard to intent by subsequent change to the STS. Thus, in this case, the lockout features indicated in the Susquehanna TS are those which must be addressed and tested in conformance to the stated requirements.

Based on the description of the licensee's tests noted above, the NRR staff agrees with Region I that these tests do not satisfy the intent of the surveillance requirements because they do not fully demonstrate that these features prevent starting and/or operation when required. The description of the licensee's test procedure on the engine overspeed trip is not directly responsive to the specification in question since it is a requirement of Specification 4.8.1.1.2.d.3 (load rejection without overspeed trip). The fact that the overspeed governors are periodically replaced with vendor-calibrated governors would appear to be adequate to address their operability under the assumption that the frequency of such action is performed in accordance with the manufacturer's recommendation and in the absence of any other practical method to verify the operability of the overspeed trip. (Note: It is assumed that the overspeed trip function is an integral part of the overspeed governor and is not a separate component.) The licensee's test for "generator differential" and "engine low lube oil pressure" verifies that these components are operable. However, these tests are not sufficient to satisfy the surveillance requirements, which would require that the next step should be to simulate the actuation of these components and to verify that the balance of the circuits associated with these lockout features will in fact prevent starting the diesel generator. The omission of this step in the test procedures results in a failure to satisfy the surveillance requirement.

The licensee's position that verification that the trips will actuate when a valid malfunction occurs is important for equipment protection but not necessary to ensure plant safety, is an argument

which could be made for a change in the TS requirements. However it is not acceptable as a basis to disregard an existing TS which is explicit in its requirements. The tests should be performed as noted above.

With regard to the broader aspects of what types of tests should be included in the diesel generator surveillance requirements, it is clear that the current guidance in the STS does not address all lockout, trip or other features which are included in the design of the system. As a minimum, the objective of TS surveillance requirements should be that all features which are considered to be essential to ensure plant safety are included. As an example, the current STS guidance on lockout features addresses features which are not considered to be essential for satisfying the design basis of the diesel generators. These features are associated with equipment or personnel protection. The same is true for those trip features which are bypassed on emergency start signals. It is important that testing verifies that these features do not preclude the capability of the diesel generators to satisfy its safety function, however; this objective is met by the present start and loading surveillance requirements. It is not essential that the TS include testing of those features that are not essential to ensure plant safety. Good practice should be the basis for licensees to test these features in the absence of a TS requirement.

D. CONCLUSION

The resolution of the problem of different TS requirements such as those noted in Attachment 1 is a matter which will be addressed as a part of the ongoing NRC Technical Specifications Improvement Program to implement improvements to the STS and their basis. However, the differences in TS requirements that presently exist do not require additional action at this time because they do not involve tests of functions which are essential to ensure plant safety. For plants such as Susquehanna, the TS requirements should be met as they are stated or the requirements are changed by a license amendment.

F. REFERENCE

The guidance provided in this directive was extracted from a memorandum from William T. Russell, Director, Division of Human Factors Technology, NRR to Richard W. Starostecki, Director, Division of Reactor Projects, Region I, dated March 7, 1986, subject: Technical Specification Interpretation Concerning Surveillance Testing Methods For Diesel Generator Lock Out Features. The complete memorandum and enclosure have been placed in the Document Control System.

END

Attachments

ATTACHMENT 1

TECHNICAL SPECIFICATION COMPARISONS

NUREG-0123, Rev. 2
STS for GE BWR

TS 4.8.1.1.2.c.14

Verifying that the following diesel generator lockout features prevent diesel generator starting only when required:

- a) _____
- b) _____

Susquehanna Units 1 & 2
TS 4.8.1.1.2.d.13

Verifying that the following diesel generator lockout features prevent diesel generator starting and/or operations only when required:

- a) Engine overspeed
- b) Generator differential
- c) Engine low lube oil pressure

Limerick
TS 4.8.1.1.2.e.13

Verifying that the following diesel generator lockout features prevent diesel generator starting only when required:

- a) Control Room Switch In Pull-To-Lock (With Local/Remote Switch in Remote)
- b) Local/Remote Switch in Local
- c) Emergency Stop

LaSalle Unit 2
TS 4.8.1.1.2.d.13

Verifying that the following diesel generator lockout features prevent diesel generator operation only when required:

- a) Generator underfrequency
- b) Low lube oil pressure

- c) High jacket cooling temperature
- d) Generator reverse power
- e) Generator overcurrent
- f) Generator loss of field
- g) Engine cranking lockout

Hope Creek (Proof and Review)
TS 4.8.1.1.2.h.14

Verifying that the following diesel generator lockout features prevent diesel generator starting only when required:

- a) Engine Overspeed, generator differential, and low lube oil pressure (regular lockout relay, (1) 86R)
- b) Backup generator differential and generator overcurrent (Backup lockout relay, (1) 86B)
- c) Generator ground and lockout relays - regular, backup and test energized (breaker failure lockout relay, (1) 86F)

END

ATTACHMENT 2

(THIS IS A PAGE FROM A WESTINGHOUSE STANDARD TECHNICAL SPECIFICATION)

STANDARD TECHNICAL SPECIFICATIONS

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

frequency shall be maintained within these limits during this test. Within 5 minutes after completing this 24-hour test, perform specification 4.8.1.1.2e.6(b),*

- 8) Verifying that the auto-connected leads to each diesel generator do not exceed the 2000-hour rating of ___ kW;
- 9) Verifying the diesel generator's capability to:
 - a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power.
 - b) Transfer its loads to the offsite power source, and
 - c) Be restored to its standby status.
- 10) Verifying that with the diesel generator operating in a test mode connected to its bus, a simulated Safety Injection signal overrides the test mode by: (1) returning the diesel generator to standby operation' and (2) automatically energizing the emergency loads with offsite power;
- 11) Verifying that the fuel transfer pump transfers fuel from each fuel storage tank to the day and engine-mounted tank of each diesel via the installed cross-connection lines;
- 12) Verifying that the automatic load sequence timer is OPERABLE with the interval between each load block within $\pm 10\%$ of its design interval;
- 13) Verifying the following diesel generator lockout features prevent diesel generator starting only when required:
 - a) [Turning Gear engaged], or

* If Specification 4.8.1.1.2e.6(b) is not satisfactorily completed, it is not necessary to repeat the preceding 24-hour test. Instead, the diesel generator may be operated at [continuous rating] kW for 1 hour or until operating temperature has stabilized.

b) [Emergency stop].

- 14) Verifying that with all diesel generator air start receivers pressurized to less than or equal to ___ psig and the compressors secured, the diesel generator starts at least [5] times from ambient conditions and accelerates to at least [900] rpm in less than or equal to [10] seconds.

END