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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Joseph M. Farley Nuclear Plant
Technical Specification 4.8.1.1.2.e
Electrical Power (AC Sources)

Ladies and Gentlemen:

Recent differing opinions have arisen concerning application of Technical Specification 4.8.1.1.2.e, Electrical Power (AC Sources). The purpose of this letter is to request NRC review and concurrence of the Farley Nuclear Plant interpretation and basis for this technical specification. Our position is attached.

If you have any questions, please advise.

Respectfully submitted,

DB Morey

Dave Morey

REM/clt:dgreject.doc

Attachment
1. Interpretation of Technical Specification 4.8.1.1.2.e

cc: Mr. L. A. Reyes, Region II Administrator
Mr. J. I. Zimmerman, NRR Project Manager
Mr. T. M. Ross, Plant Sr. Resident Inspector

A001

ATTACHMENT

Interpretation of Technical Specification 4.8.1.1.2.e,

Electrical Power (AC Sources),

Requirements

Attachment -Interpretation of Technical Specification 4.8.1.1.2.e

Technical Specification:

Technical Specification 4.8.1.1.2.e, Electrical Power (AC Sources), states:

> Each emergency diesel generator set shall be demonstrated OPERABLE:
>
> At least once per 5 years, on a staggered basis, by verifying that the emergency diesel generator can reject a load of 1200-2400 kw without tripping. The emergency diesel generator output breaker(s) must remain closed such that the emergency diesel generator is connected to at least one emergency bus. Verify that all fuses and breakers on the energized emergency bus(es) are not tripped. The generator voltage shall remain within 3330 and 4990 volts during and following the load rejection.

This requirement exists in both the Farley Unit 1 and Unit 2 Technical Specifications.

OPERABILITY is defined in the technical specification definitions as:

> A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, a normal and an emergency electrical power sources, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component or device to perform its function(s) are also capable of performing their related support function(s).

Question:

SNC's understanding is that the FNP TS allow one shared EDG to be tested on Unit 1 and the other on Unit 2. Is this acceptable?

Farley Position:

The surveillance requirement is to conduct sufficient testing to demonstrate that each shared EDG, the EDG output breaker, and bus fuses and breakers can successfully withstand a 1200-2400 KW load rejection on each unit. This does not require, however, that each shared EDG be aligned to each unit and a load rejection be performed in a redundant fashion. This surveillance assures that EDG voltage regulators are performing correctly. TS 4.8.1.1.2.e is a test of the EDGs themselves, not the EDG loads. EDG loads are subjected to more severe testing as noted in the following technical discussion.

The testing of the shared EDGs as required by Technical Specification 4.8.1.1.2.e can be satisfied by testing the EDG on either Unit 1 or Unit 2. The load rejection of 1200-2400 kw is accomplished by opening a breaker other than the EDG output breaker. This keeps the diesel

generator connected to at least one emergency bus such that the effects of the load rejection are imposed. The voltage and frequency effects (monitored for each test) and the connected loads subjected to those effects are similar in all shared EDG tests. Therefore, assurance is given that each EDG is OPERABLE, and that the effect of load rejection on each EDG does not cause adverse impacts to the emergency buses and the connected loads of each unit. Testing each unit with both the 1-2A and 1C EDGs would represent redundant and excessive testing of the diesel generators and is not required. Testing in this fashion would require the A-Train EDGs to be tested twice as often as the B-Train EDGs.

Basis for Farley Interpretation:

During the licensing of Farley Unit 2, discussions were held with the NRC Staff concerning the testing of the EDGs. The culmination of these discussions was the issuance of the Unit 2 Technical Specifications and amendment 26 to the Farley Unit 1 Technical Specifications. Included in the safety evaluation for amendment 26 are several discussion of the EDGs. The opening discussion states:

> There are five diesel generators at the two unit Joseph M. Farley Nuclear Plant. Each unit has a large (4075 kw) dedicated diesel generator. In addition there are three diesel generators (one large 4075 kw and two small 2850 kw) capable of serving either unit.
>
> The Technical Specifications regarding testing and surveillance of the diesel generators are different for the two units. This is because Unit 1 was licensed with an earlier version of the Standard Technical Specifications and Unit 2 was licensed with the NRC's more recent Standard Technical Specifications. Alabama Power has requested that the Technical Specifications regarding diesel generators be revised so that both of the units would be identical. The proposed Technical Specifications are similar to the NRC's Standard Technical Specifications with modifications made to reflect the uniqueness of the Farley design. In addition, reductions in the amount of diesel generator testing have been made to reflect the manufacturer's concerns about over-testing.
>
> The NRC's Standard Technical Specifications are intended for a single unit facility with two diesel generators. When one diesel generator becomes inoperable, it implies that one of the two redundant safety related trains necessary for shutdown and LOCA loads becomes unavailable. Under these conditions, constant verification of the remaining diesel's operability is desirable. However, the five diesel generators at the Farley plant presents much greater flexibility than that assumed in the NRC's Standard Technical Specifications. At Farley, each of the five diesel generators has either an automatic or manual capability to load one of the safety related shutdown or LOCA trains. Therefore credit, in terms of reduced surveillance and testing requirements, can be given to the Farley Technical Specifications due to the increased flexibility provided by this design.

Concerning load rejection tests, the SER states:

> The licensee agreed that in view of this experience a load rejection test to confirm that downstream safety equipment is not lost is worthwhile. It was agreed that such an occurrence is not as likely as loss of a single load; a five-year frequency was agreed upon. This frequency is comparable to the battery total-discharge tests and is appropriate for electrical equipment and for rather infrequent service conditions. As the Technical Specifications are presently written, the full-load rejection test is performed by tripping the diesel generator output breaker. Conducting the test in this manner confirms that the diesel does not trip on overspeed but inherently isolates plant safety equipment from the generator's voltage surge. The licensee has devised a test that, by manually tripping two circuit breakers (leaving the diesel generator output breaker closed), a load approaching 50% of rating is rejected and most of the safety-related Motor Operated Valves (MOVs) and inverters are subjected to the generator's voltage surge. The load rejected in this test is the largest practical value. The MOVs and inverters may be the equipment most sensitive to voltage surges. The licensee's analysis indicates that no loss (tripped breaker or blown fuse) should occur; the test will be confirmatory in this sense. We believe that testing of this type is a technical improvement needed to accommodate operating experience and the licensee agrees with the desirability of such testing with regard to overall plant safety.
>
> The licensee's request to delete the requirement of a full-load rejection test is acceptable. Such a confirmatory test has been completed during the plant pre-operational tests. The confidence gained from testing of loss of the single largest load every 18 months and testing of loss of half the rated load every five years is sufficient to provide reasonable assurance on a continuing basis that the diesel generator will not be lost due to a load rejection situation....

From the introductory discussion taken from the NRC's safety evaluation, several facts can be understood. First, the Farley design is flexible allowing some EDGs to supply either unit. Second, reductions in the amount of testing were made due to manufacturer's concerns with over-testing. Based on these facts, the NRC decided that "...credit, in terms of reduced surveillance and testing requirements, can be given to the Farley Technical Specifications..."

Based on the load rejection discussion taken from the NRC's safety evaluation, several points can be made. First, the NRC and Alabama Power agreed on a 5 year test frequency. Second, the testing proposed by Alabama Power and agreed to by the NRC was an improvement over that in the Standard Technical Specifications. The testing was an improvement because not only was it ensured that the EDG did not trip on overspeed, but it was also ensured that loads on the buses were not tripped as a result of the voltage surge. However, no specific breaker or loads were required for the load rejection test and no specific emergency buses were identified. Furthermore, no specific unit test was required.

Lastly, the safety evaluation explicitly states that the load rejection test will "provide reasonable assurance on a continuing basis that the diesel generator will not be lost due to a load rejection situation." This statement clearly indicates that the load rejection test is a test of the EDG; not a test of loads associated with a bus; and certainly not a test of loads associated with a specific unit. If the test was considered a test of specific loads, those loads would be listed in the technical specification requirements. However, the technical specifications lists no specific loads; only requirements to verify the proper operation of the voltage regulator for the EDG. As stated in the safety evaluation, the test of the loads is confirmatory. By being a confirmatory test, it is clearly not intended that each shared EDG be tested twice in a five year period. By testing the 1-2A EDG aligned to a Unit 1 emergency bus and the 1C EDG aligned to a Unit 2 emergency bus, at least one A train emergency bus of each unit is tested in the five year period. This satisfies the confirmatory test. To argue that the same load rejection test must be run on both units would imply that all combinations of loads should be included in the load rejection test in order to have an adequate test. In addition, it would result in A train EDGs being tested at twice the frequency of the B train EDGs. Clearly this was not the original intent of the amendment submitted by Alabama Power and approved by the NRC. Testing of each EDG on a EDG by EDG basis, and not on a unit by unit basis, demonstrates the operability of the EDG as was intended in the original license amendment.

Technical Discussion:

The current testing satisfies both the Unit 1 and 2 Technical Specifications (TS). The testing validates that the EDGs function as required and do not subject plant loads to unacceptable transient, dynamic, and steady state effects due to generator output voltage and frequency. This position is supported by the similarity in design between Units 1 and 2 distribution systems and by the following assessment of each requirement in step 4.8.1.1.2.e of each Units TS. (Note: The B train EDGs have no shared components and are not addressed in this Technical Position.)

Unit 1 TS:

(Demonstrate the EDG is operable) "At least once per 5 years, on a staggered basis, by verifying:

Requirement 1: "that the emergency diesel generator can reject a load of 1200 - 2400 kW without tripping."

Response: The purpose of this requirement is to test each EDG that aligns to Unit 1. Testing each unit with both the 1-2A and 1C diesel generators every five years would represent redundant and excessive testing of the diesel generators (twice B train) and is not required. EDG 1-2A has been tested at least once every 5 years by rejecting a load of 1200-2400 kW without tripping. EDG 1C has been tested at least once every 5 years by rejecting a load of 1200-2400 KW without tripping. Therefore, each EDG that aligns to Unit 1 meets this requirement.

Requirement 2: "The emergency diesel generator breaker(s) must remain closed such that the emergency diesel generator is connected to at least one emergency bus."

Response: The purpose of this requirement is to insure that the load rejection test is not accomplished by tripping the respective EDG output breaker. Rather, the EDG output breaker is to remain closed such that after the load rejection, at least one emergency bus with representative loads is connected and subjected to the transient, dynamic, and steady state impacts that occur due to the EDG voltage regulator and governor response to the load rejection. The TS do not identify the specific bus and loads to be subjected to these effects, only the KW amount of load per the first sentence. Based on current testing, at least one emergency bus of Unit 1 has been connected and subjected to an EDG load rejection and corresponding dynamic transient(s). EDG 1-2A has been connected to a Unit 1 emergency bus each time it has been tested per requirement 1 above. EDG 1C has been connected to a Unit 2 emergency bus each time it has been tested per requirement 1 above.

Although EDG 1C has not been tested each time by connecting to a Unit 1 bus, it has been tested per requirement 1 above and its Unit 2 output breaker has remained closed such that its connected loads (which are similar to Unit 1 loads) have been subjected to the various dynamics mentioned above. This is acceptable because the purpose of the testing is to periodically check the ability of the EDG voltage regulator and governor to respond such that voltage and frequency transients continue to remain within acceptable limits during a load rejection. Each EDG dynamic transient (voltage and speed) is recorded and checked to insure that it is within the acceptance criteria. The acceptance criteria for dynamic response is based upon industry standards that define acceptable limits and provide assurance that output breakers, connected loads, and protective devices will not be adversely impacted.

The purpose of the load rejection test is not to test each EDG output breaker. The breaker itself (on each unit) is tested by other surveillance testing at least once every 18 months.

Requirement 3: Verify that all fuses and breakers on the energized emergency bus(es) are not tripped."

Response: The purpose of this requirement, along with Requirement 4 below, is to verify that the EDG voltage regulator and governor responses to the load rejection remain within acceptable limits. In addition to the recordings of the frequency and voltage transients mentioned above, verification that the fuses and breakers do not trip provides validation that the regulator and governor are continuing to function properly. [illegible]ing that the dynamic response characteristics of each EDG are within acceptab[illegible]s also provides assurance that each of the EDG dynamic response characteristics are similar.

Current testing monitors each EDG voltage and frequency response to the specified load rejection and insures that at least one Unit 1 emergency bus and representative loads are subjected to the resulting (transient, dynamic, and steady state) effects of a load rejection. This continues to demonstrate that these effects do not cause the loads to be disconnected. The TS do not identify the specific bus and loads to be subjected to these effects. The specific loads may vary from one test to the next on any given EDG. For example, in one case, a charging pump may be operating,

in the next case a CCW pump may be running. Typical low voltage loads will generally be in operation during the test, such as MCC loads, battery chargers and inverter AC bypass circuits.

In addition, the connection of specific loads (to verify the impact to these loads of an EDG load rejection) is not necessary for the following reasons. First, the loads and associated fuses and breakers are very similar between Unit 1 and Unit 2. Next, the protective device settings provide sufficient setpoint margin such that they should not trip for normally expected variations in supply voltage and frequency. This would include those generated by the EDGs during load rejections. (The acceptance criteria for EDG dynamic response is based upon industry standards that are written to provide guidance on the allowable dynamic tolerances such that adverse impacts to operating loads and protective devices do not occur.) Therefore, verification that the tested voltage and frequency variations continue to remain within the EDG Load Rejection STP acceptance criteria, and that representative loads do not trip, is sufficient to meet the stated requirement. Furthermore, the LOSP tests and SI/LOSP tests subject a larger number of loads, including MOVs, to comparable, and usually more severe, transient and dynamic effects than the load rejection tests. For example, based on test data, the peak 4160V bus voltage that occurred in step 1 of a recent SI/LOSP test for the 1-2A DG was 112% of 4160V vs. only 108% for the last 1-2A DG load rejection test (Voltage time responses were comparable for both tests).

Requirement 4: The generator voltage shall remain within 3330 and 4990 volts during and following the load rejection."

Response: As mentioned under Requirement 3 above, the purpose of this requirement is to verify that the EDG voltage regulator continues to function properly so that it does not expose the equipment loads to unacceptable voltages and resultant currents in the event of a load rejection. The voltage transient from the load rejection is recorded during each load rejection test. The recordings are checked to insure that the voltage transient remains within the acceptance criteria.

A problem in the voltage regulator would be evident for a 1200-2400 KW step change in load, regardless of the plant or unit specific loads connected. (Note: A representative mix of resistive and reactive loads is desired, but the exact proportions of each is not critical. However, testing assures that at least 712 KVARs are present.) Again, the connection of specific buses and loads is not necessary to verify the impact to these loads of the EDG response to a load rejection. (EDG 1-2A has been tested at least once every 5 years by rejecting a load of 1200-2400 KW without exceeding the voltage limits specified. EDG 1C has been tested at least once every 5 years by rejecting a load of 1200-2400 KW without exceeding the voltage limits specified.) Therefore, each Unit 1 EDG meets this requirement.

Unit 2 TS:

(Demonstrate the DG is operable) "At least once per 5 years, on a staggered basis, by verifying:

Requirement 1: "that the emergency diesel generator can reject a load of 1200 - 2400 kW without tripping."

Response: The purpose of this requirement is to test each EDG that aligns to Unit 2. Testing each unit with both the 1-2A and 1C diesel generators every five years would represent redundant and excessive testing of the diesel generators (twice B train) and is not required. EDG 1-2A has been tested at least once every 5 years by rejecting a load of 1200-2400 kW without tripping. EDG 1C has been tested at least once every 5 years by rejecting a load of 1200-2400 KW without tripping. Therefore, each EDG that aligns to Unit 2 meets this requirement.

Requirement 2: "The emergency diesel generator breaker(s) must remain closed such that the emergency diesel generator is connected to at least one emergency bus."

Response: The purpose of this requirement is to insure that the load rejection test is not accomplished by tripping the respective EDG output breaker. Rather, the EDG output breaker is to remain closed such that after the load rejection, at least one emergency bus with representative loads is connected and subjected to the transient, dynamic, and steady state impacts that occur due to the EDG voltage regulator and governor response to the load rejection. The TS do not identify the specific bus and loads to be subjected to these effects, only the KW amount of load per the first sentence. Based on current testing, at least one emergency bus of Unit 2 has been connected and subjected to an EDG load rejection and corresponding dynamic transient(s). EDG 1-2A has been connected to a Unit 1 emergency bus each time it has been tested per requirement 1 above. EDG 1C has been connected to a Unit 2 emergency bus each time it has been tested per requirement 1 above.

Although EDG 1-2A has not been tested each time by connecting to a Unit 2 bus, it has been tested per requirement 1 above and its Unit 1 output breaker has remained closed such that its connected loads (which are similar to Unit 2 loads) have been subjected to the various dynamics mentioned above. This is acceptable because the purpose of the testing is to periodically check the ability of the EDG voltage regulator and governor to respond such that voltage and frequency transients continue to remain within acceptable limits during a load rejection. Each EDG dynamic transient (voltage and speed) is recorded and checked to insure that it is within the acceptance criteria. The acceptance criteria for dynamic response is based upon industry standards that define acceptable limits and provide assurance that output breakers, connected loads, and protective devices will not be adversely impacted.

The purpose of the load rejection test is not to test each EDG output breaker. The breaker itself (on each unit) is tested by other surveillance testing at least once every 18 months.

Requirement 3: "Verify that all fuses and breakers on the energized emergency bus(es) are not tripped."

Response: The purpose of this requirement, along with Requirement 4 below, is to verify that the EDG voltage regulator and governor responses to the load rejection remain within acceptable limits. In addition to the recording of the frequency and voltage transients mentioned above,

verification that the fuses and breakers do not trip provides validation that the regulator and governor are continuing to function properly. Validating that the dynamic response characteristics of each EDG are within industry acceptable limits also provides assurance that each of the EDG dynamic response characteristics are similar.

Current testing monitors each EDG voltage and frequency response to the specified load rejection and insures that at least one Unit 2 emergency bus and representative loads are subjected to the resulting (transient, dynamic, and steady state) effects of a load rejection. This continues to demonstrate that these effects do not cause the loads to be disconnected. The TS do not identify the specific bus and loads to be subjected to these effects. The specific loads may vary from one test to the next on any given EDG. For example, in one case, a charging pump may be operating, in the next case a CCW pump may be running. Typical low voltage loads will generally be in operation during the test, such as MCC loads, battery chargers and inverter AC bypass circuits.

In addition, the connection of specific loads (to verify the impact to these loads of an EDG load rejection) is not necessary for the following reasons. First, the loads and associated fuses and breakers are very similar between Unit 1 and Unit 2. Next, the protective device settings provide sufficient setpoint margin such that they should not trip for normally expected variations in supply voltage and frequency. This would include those generated by the EDGs during load rejections. This would include those generated by the EDGs during load rejections. (The acceptance criteria for EDG dynamic response is based upon industry standards that are written to provide guidance on the allowable dynamic tolerances such that adverse impacts to operating loads and protective devices do not occur.) Therefore, verification that the tested voltage and frequency variations continue to remain within the EDG Load Rejection STP acceptance criteria, and that representative loads do not trip, is sufficient to meet the stated requirement. Furthermore, the LOSP tests and SI/LOSP tests subject a larger number of loads, including MOVs, to comparable, and usually more severe, transient and dynamic effects than the load rejection tests. For example, based on test data, the peak 4160V bus voltage that occurred in step 1 of a recent SI/LOSP test for the 1-2A DG was 112% of 4160V vs. only 108% for the last 1-2A DG load rejection test (Voltage time responses were comparable for both tests).

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Response: As mentioned under Requirement 3 above, the purpose of this requirement is to verify that the EDG voltage regulator continues to function properly so that it does not expose the equipment loads to unacceptable voltages and resultant currents in the event of a load rejection. The voltage transient from the load rejection is recorded during each load rejection test. The recordings are checked to insure that the voltage transient remains within the acceptance criteria.

A problem in the voltage regulator would be evident for a 1200-2400 KW step change in load, regardless of the plant or unit specific loads connected. (Note: A representative mix of resistive and reactive loads is desired, but the exact proportions of each is not critical. However, testing assures that at least 712 KVARs are present.) Again, the connection of specific buses and loads is not necessary to verify the impact to these loads of the EDG response to a load rejection. (EDG

1-2A has been tested at least once every 5 years by rejecting a load of 1200-2400 KW without exceeding the voltage limits specified. EDG 1C has been tested at least once every 5 years by rejecting a load of 1200-2400 KW without exceeding the voltage limits specified.) Therefore, each Unit 2 EDG meets this requirement.