



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 45 TO FACILITY OPERATING LICENSE NO. NPF-2  
AND AMENDMENT NO. 36 TO FACILITY OPERATING LICENSE NO. NPF-8

ALABAMA POWER COMPANY

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT NOS. 1 AND 2

DOCKET NOS. 50-348 AND 50-364

INTRODUCTION

The present Technical Specifications at the Farley Nuclear Plant require that the 24-hour diesel generator load test be performed at overload conditions. These tests are performed at 18 month intervals. The NRC staff previously approved technical specification changes proposed by the licensee to conduct the entire 24-hour load test for all diesel generators at the 2000-hour load rating as opposed to the continuous rating. This was because the automatic loads on two of the five diesel generators were estimated to exceed the continuous rating under accident conditions to the extent that the automatic loading approximately equaled the 2000-hour rating. However, the diesel generator manufacturer has since stated that performance of the 24-hour load test at the 2000-hour load rating exposes the diesel generator to a high loading that does not promote reliability or longevity of the diesel generators. Therefore, the licensee wishes to reduce the automatically sequenced diesel generator loading in order to provide a basis to reduce the 24-hour diesel generator load tests to a value at or near their continuous rating.

In a letter dated December 30, 1982, Alabama Power Company requested permanent Technical Specification changes to alleviate the above situation. They proposed that: (1) the river water pumps be deleted from both the list of safety-related equipment and the Technical Specifications, and (2) the 24-hour diesel generator load test be conducted at essentially the continuous rating as opposed to the 2000-hour load rating. The basic argument in support of these changes is that: (1) the river water system is, in reality, a redundant ultimate heat sink to the pond and dam, and therefore is not required, and (2) by eliminating the river water pumps, the diesel generator automatic loading sequence will be reduced to approximately the continuous rating, as opposed to the 2000-hour load rating.

DISCUSSION

The proposed diesel generator Technical Specification changes and the proposed deletion of the river water system from the plant Technical Specifications are related. The deletion of the river water system from the plant Technical Specifications will result in reduced automatic loading requirements for the diesel generators that power the river water pumps. With the deletion of the

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river water pumps all diesel generators will receive automatically sequenced loads below or slightly above (diesel generator 1C) their continuous ratings. As discussed in the Evaluation section of this report, the automatic loading of 1C is very close to the continuous rating and falls within the uncertainties of being able to calculate the actual loading that will exist.

#### River Water System Technical Specification Deletion

During normal operation, the river water system provides make-up to the emergency storage pond (pond and dam). The service water system supplies water from the pond and dam to the plant safety-related equipment and ultimate discharge to the river.

In emergency conditions, the service water system does not discharge water to the river. The service water system recirculates water from the pond to the plant safety-related systems and then back to the pond. Recirculation during emergency conditions provides a 30-day supply of cooling water for the plant safety-related equipment which is sufficient to bring both Units 1 and 2 to a safe shutdown condition. No make-up or other use of the river water system is necessary to provide this 30-day supply.

The licensee's justification for deleting the river water system from the plant's Technical Specifications includes:

1. The emergency cooling pond is the safety-grade ultimate heat sink for all postulated accident conditions. The river water system is not needed to meet any NRC design criteria as an ultimate heat sink.
2. The emergency cooling pond dam was designed and constructed in accordance with all applicable seismic Category 1 standards to assure seismic integrity.
3. The pond and dam are tested and monitored to ensure continued compliance with the original design criteria.
4. The NRC has licensed other nuclear power plants with similar emergency cooling ponds without requiring a safety-grade backup system for the ultimate heat sink.
5. The Farley Nuclear Plant is in a low seismic activity region. Therefore, in the judgment of Alabama Power Company, a backup to the emergency cooling pond is no more important at Farley than at other licensed nuclear power plant sites that do not have a backup system.
6. The river water system will be maintained at a high level of availability in order to ensure reliable make-up of the pond (i.e., support normal plant operation).

7. Although the river water pumps are proposed to be deleted from the Technical Specifications, if an emergency condition should arise requiring operation of the river water pumps, they will be capable of being manually loaded onto the diesel generators in accordance with operating procedures.

#### Diesel Generator Technical Specification Change

The two units at Farley were licensed separately and originally had different technical specification requirements regarding diesel generator testing. Unit 1 originally had no requirements for a 24-hour load test. Every 18 months the diesel generators were required to be run for 60 minutes at a load that equaled or exceeded their continuous rating. However, Unit 2 was licensed with the requirement that all diesel generators shall perform a 24-hour load test every 18 months. The Unit 2 technical specifications required that the diesel generators operate at the 300-hour load rating for the first two hours followed by 22 hours at the continuous rating.

This inconsistency between the two units was further complicated because three of the five diesel generators are shared. Thus in the fall of 1981 the licensee proposed technical specification changes that would end these inconsistencies. Since the estimated automatic loads on diesel generators 1-2A and 1C exceeded the continuous duty rating and approached the 2000-hour load rating, the licensee proposed that the entire 24-hour load test for each diesel generator be performed at the 2000-hour load rating. The NRC staff approved of these proposed changes.

The diesel generator surveillance requirements were reviewed with the manufacturer who agreed with the need for a 24-hour load test but recommended that the test be conducted at 60-90% of the continuous load rating. The manufacturer emphasized that the diesel generator will operate for at least 2000 hours at the 2000-hour load rating but reiterated that load tests at loads greater than the 60-90% load range do not contribute to either the dependability or longevity of the diesel generators. Therefore, in the view of the manufacturer, the 24-hour load test at the 2000-hour load rating exposes the diesel generators to an unnecessarily high loading without concomitant benefits.

Based on deleting the river water pumps from the plant's Technical Specifications, the licensee has proposed the following changes for diesel generator testing:

1. With respect to the 24-hour load test, run the diesel generators at their maximum calculated accident load conditions or the continuous load rating, whichever is greater, for 2 hours followed by 22 hours at the continuous rating.

This change would allow all diesel generators (with the exception of 1C) to perform the entire 24-hour load test at the continuous rating. Since diesel

generator 1C loading is still predicted by calculation to exceed the continuous rating by about 2%, it would run the first two hours at the higher calculated rating.

Part of the licensee's basis for this change to eliminate overload testing is that all diesel generators have passed both factory and field overload testing at or above the 300-hour rating. In addition, the licensee's review of previous test failures during overload conditions indicate that the failure of auxiliary equipment affecting diesel generator testing would have been similarly detected by testing at any load rating and are not indicative of their load carrying capability.

2. Following the 24-hour test, reduce load, trip the diesel generator and demonstrate hot restart capability within ten minutes.

The present Farley Technical Specifications require that following the successful completion of the 24-hour load test, the diesel generators shall be tripped from the 2000-hour load condition and a hot restart test be performed within 10 minutes. The purpose of this test is to provide continuing assurance that the diesel generators could be immediately restarted and loaded if they tripped for any reason during accident conditions. This proposed change would allow plant operators to manually reduce the load before tripping and restarting the diesels.

#### EVALUATION

##### River Water System Technical Specification Deletion

The staff's Safety Evaluation Report for the original licensing of the Farley plants discusses how the ultimate heat sink needs can be met by either (1) the service water pond by itself; (2) the river water system by itself; or (3) a combination of both the pond and the river water system.

As pointed out by the licensee, NRC requirements does not include redundancy of the ultimate heat sink. The staff's position as set forth in the Standard Review Plan (NUREG 75-087) is that the source of water which serves as the ultimate heat sink be capable of supplying the worst case heat removal needs for 30 days post accident without the need for makeup. Recent licensing actions at Grand Gulf and WNP-2 support the change being requested for Farley. Both Grand Gulf and WNP-2 have man-made ultimate heat sinks (cooling tower basins and a spray pond respectively) that are designed to provide the 30 day post-accident heat removal needs. However, neither of the pump make-up systems from the rivers (Mississippi and Columbia respectively) are included in the technical specifications for these two plants.

Therefore, the staff has both a basis and a precedence for approving the proposed deletion of the river water pump system from the Farley technical specifications.

## Diesel Generator Technical Specification Changes

### Diesel Generator Loading

During the course of our review of the proposed changes, the staff discussed the automatically sequenced loading of the diesel generators with the licensee. Although this matter is covered by plant operating procedures, not Technical Specifications, we wanted confirmation that the maximum expected loads that may result from operators adding non-automatic loads to the previous automatic loads would not exceed the continuous duty rating. In their letter of March 2, 1984, the licensee stated that procedures exist at the Farley Nuclear Plant which preclude operators from manually loading the diesel generators above their continuous rating (except in the case of emergencies beyond those described in the FSAR or except as required by current surveillance test requirements).

With the deletion of the river water pumps, diesel generator 2C would be started automatically but not loaded. Since operating diesel generators at light loads or no loads is undesirable, the licensee, in their letter of March 27, 1984 clarified its intent to modify operation procedures to either have diesel 2C automatically loaded to equal or greater than 50% of its continuous rating or to transfer any loads to the other diesel generators.

Therefore, the maximum automatic load of the diesel generators are estimated to be:

<u>D.G.</u>	<u>Continuous Rating (KW)</u>	<u>2000-Hour Rating (KW)</u>	<u>With River Water Pumps (KW)</u>	<u>Without River Water Pumps (KW)</u>
1-2A	4075	4353	4348	3885
1B	4075	4353	3974	3974
2B	4075	4353	3897	3897
1C	2850	3100	3092	2896
2C	2850	3100	2523	*

### 24 Hour Load Tests

The current Farley Technical Specifications require that the entire 24-hour load test be performed at the 2000-hour load rating. Technical Specification changes now under consideration propose limiting the 24-hour load test to be at or near the continuous rating.

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\*Either no load or equal to or greater than 50% depending on accident conditions and loading on the other diesels.

The staff's Standard Technical Specifications require that once each 18 months the continuing capability of each EDG be demonstrated via a 24-hour load test run. The test is specified to be with the first 2 hours at the 2-hour load rating load followed by 22 hours at the continuous duty load. The primary purpose of this test is to demonstrate that the original capability of the EDG continues to be available. If loss of this capability were to occur, the degradation of the EDG performance could be detected before the degradation jeopardized the required performance of the EDG. A second purpose of the test is to demonstrate that margin in load capability is still available that could be utilized in an unanticipated emergency situation.

The Standard Technical Specifications endorse the recommendations of Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units used as Onsite Electric Power Systems at Nuclear Power Plants." They have been applied to a large number of nuclear plants for which the automatic loading of the EDG's was estimated to be well within (below) the continuous duty rating. The staff has been aware of the general comments offered by the EDG manufacturers regarding load testing at or above the continuous duty rating. The staff has considered these comments and concluded that the testing benefits to nuclear plant safety outweigh any potential long-term detrimental effects due to operating the machine near its full capability.

The licensee has not presented any plant-specific reason which might justify a plant-specific deviation from the STS. Non-anticipated emergency loads may increase the actual load to beyond the continuous duty rating. In addition, the licensee has stated that procedures \* exist to manually load the river water pumps onto the diesel generators if necessary. If this action is necessary two of the diesel generators would again be loaded to nearly the 2000-hour load rating thus providing further justification to require some amount of testing at the 2000-hour load rating.

With regard to diesel generator 1C, consideration was given to requiring testing at the 102% rating for the final 22 hours because it is uncertain whether our proposed test profile will envelope worst case conditions. It has been concluded that operation of 1C at 100% of the continuous load rating for the final 22 hours would be acceptable. This is because we believe the 102% value has been conservatively calculated, potential operation at this level is likely to be brief, and that uniform testing of all diesel generators is desirable (i.e., special treatment of one diesel generator may lead to confusion).

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\*The licensee has advised us that the emergency operating procedure is being modified to prohibit loading any EDG above the 2000-hour load rating. The standard operating procedure currently contains such restriction.

In view of the considerations discussed above (especially that the benefits of the testing required by the STS remain valid and worthwhile), we require that the 24-hour load test for each diesel generator be conducted with the first two hours at the 2000-hour load rating and the remaining 22 hours at the continuous load rating. This provides relief from the current Farley technical specifications. Also the licensee has advised us that it agrees that the first two hours at the 2000-hour rating is a very small part (0.1%) of the 2000-hour rating and is not considered a substantive change to its request.

#### Hot Restart Testing

The present Farley Technical Specifications require that following the successful completion of the 24-hour load test, the diesel generator be tripped from the 2000-hour load condition and a hot restart be performed within ten minutes. The licensee has proposed a technical specification change such that after completing the 24-hour test, they would reduce load, trip the diesel generator and demonstrate hot restart capability within ten minutes.

The staff's Standard Technical Specifications require that the diesel generator be restarted within five minutes after completion of the 24-hour load test. The primary purpose of this test is to demonstrate hot restart capability of the diesel generator at full load temperature conditions. The staff requires assurance that, if a diesel generator were to trip for any reason during accident conditions, the diesel could be manually restarted, while hot, in a timely manner.

It has been the staff's understanding that under the current Farley Technical Specifications the hot restart test would be performed within ten minutes after completion of the 24 hour load test. We previously approved ten minutes as opposed to the five minutes found in the NRC's Standard Technical Specifications. The ten minutes would permit plant operators to adjust control system settings following the 24-hour load test in order to avoid a potential overspeed trip during the restart test. We understand from the licensee that these control system settings are necessary only to accommodate test conditions and are not applicable to accident conditions.

However, the licensee now proposes to follow an extended load (and temperature) reduction procedure prior to performing the restart test. Following completion of the 24-hour load test, the licensee proposes to manually reduce the diesel generator load in incremental steps while holding power at certain levels. The entire process is anticipated to require 30 to 60 minutes. Following this cooldown process, the ten minute clock will begin to perform the hot restart test. This procedure has been recommended by the manufacturer in order to minimize wear and potential long term degradation of the diesel generator.

While such a load reducing program may be beneficial for long term diesel generator concerns, we believe that conducting a restart test as long as one hour after the 24-hour load test would not be representative of "hot restart" conditions.

Again, the Standard Technical Specifications have been applied to a large number of nuclear plants for which a hot restart test of the diesel generators is required within five minutes of the 24-hour load test. The Farley licensee has not presented any plant specific information which might justify a plant specific deviation. It should be noted that the 24-hour load and hot restart tests are only required to be performed once every 18 months. During a postulated 40-year life time, each diesel would be subjected to approximately 26 of these tests. In addition those tests would be interspersed by major maintenance outages for each diesel. We believe that the requirement to demonstrate hot restart capability is significant and that it should be performed under full-load temperature conditions.

Therefore, in view of the considerations discussed above, we will require that the hot restart test be performed within ten minutes after the 24 hour load test, and without an engine cooldown procedure. A Standard Technical Specification type of hot restart test will be required. This will delete the present requirements to trip the diesel generators from the 2000-hour load rating and permit the licensee to manually rampdown the load before tripping provided the load reduction and hot restart are completed within 10 minutes following completion of the 24 hour load test.

#### SAFETY SUMMARY

##### River Water System

The emergency cooling water storage pond can independently provide the 30 day post-accident ultimate heat sink needs for the Farley facility. Although the river water pumps will be deleted from the technical specifications, we understand from the licensee that (1) the river water pumps will be maintained in an operable condition to provide make-up to the pond during normal operation and (2) plant configuration and procedures exist to manually load the river water pumps onto the diesel generators if necessary. Therefore, considering that (1) the Farley dam is seismically qualified; (2) the storage pond, dam and dike at Farley were designed and constructed in accordance with NRC requirements as documented in the Farley Final Safety Analysis Report; (3) the river water system is primarily a make-up system to the pond and dam; (4) the removal of the river water system from the technical specification is in accordance with current NRC licensing practice; and (5) the pond and dam are tested and monitored to ensure continued compliance with original design criteria, we approve of the licensee's proposal to delete the river water system from the plant's technical specifications.



### Diesel Generator Testing

With the river water pumps as required automatic loads, two of the five diesel generators received automatically sequenced loads that approached the 2000-hour load rating. With the river water pumps removed from the automatic post accident loads, four of the five diesel generators will receive accident loads that fall below the continuous rating. The fifth diesel generator is conservatively calculated to exceed the continuous rating by less than 2% and this will be for a short duration.

We agree with the licensee that an appropriate basis has been presented to reduce the diesel generator loading for the 24-hour load test. However, as discussed in the Evaluation, we disagree with the licensee regarding 1) the total loads for the 24 hour load test and 2) the hot restart test procedures. Post-accident situations may arise that are similar to the testing conditions that we are requiring. For example: 1) the river water pumps or other non-anticipated loads may have to be added to the diesel generators that could increase the loads above the continuous ratings and 2) the diesel generators may trip and be required to restart under hot conditions.

We are aware that the licensee's proposals were made to accommodate the manufacturer's recommendations. These, in turn, were made to maximize the longevity and reliability of the diesel generators. However, the prime objective of the technical specification testing in question is to provide periodic verification that the diesel generators are continually capable of operating under worst case accident conditions. We emphasize that such testing verifies the present operability status as opposed to relying on overload tests performed during the plant's preoperational test program.

We conclude that changes to the diesel generator test program are appropriate. However, the licensee has not presented plant specific information that justifies significant deviations from the NRC Standard Technical Specifications. The technical specifications changes that are in question are only required to be performed every 18 months. Therefore, we believe that the benefits that they provide outweigh any concerns regarding their detrimental effects on long term diesel generator reliability. In summary the Technical Specifications that we are approving are the following:

1. Delete the River Water System;
2. Require some amount of overload testing as part of the 24-hour load test; and
3. Require a hot restart test within 10 minutes after the completion of the 24-hour diesel generator load test.

Environmental Consideration

We have determined that these amendments do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendments involve an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of these amendments.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: June 7, 1984

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