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AUTH.NAME AUTHOR AFFILIATION
HAMPTON,J.W. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
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SUBJECT: Forwards response to RAI re emergency power engineered safeguards functional test procedure.

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Duke Power Company
Oconee Nuclear Site
P.O. Box 1439
Seneca, SC 29679

J. W. HAMPTON
Vice President
(864)885-3499 Office
(864)885-3564 Fax

DUKE POWER

December 26, 1996

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Request For Additional Information Regarding
Oconee Emergency Power Engineered Safeguards
Functional Test Procedure

On December 6, 1996, Duke Power Company provided draft copies of the emergency power engineered safeguards functional test procedure to the NRC. During a public meeting between Duke Power and the NRC on December 12, 1996, Duke Power reviewed the emergency power system design and provided an overview of the planned test. The NRC asked numerous questions about the test procedure during the meeting.

In a letter dated December 18, 1996, the NRC requested additional information regarding the emergency power engineered safeguards functional test procedure. Attachment 1 provides Duke Power's response to the information requested by the staff.

Please address any questions to Michael Bailey at (864) 885-4390.

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Very truly yours,

J. W. Hampton, Site Vice President
Oconee Nuclear Station

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PDR ADOCK 05000269
P PDR

cc: S. D. Ebneter, Regional Administrator
Region II

M. A. Scott, Senior Resident Inspector
Oconee Nuclear Site

D. E. LaBarge, Project Manager
NRR

M. Batavia,
DHEC

ATTACHMENT 1

Additional Information Regarding The Oconee Emergency Power Engineered Safeguards Functional Test Procedure

The NRC identified seven areas where additional information is necessary to support the review of the emergency power engineered safeguards (ES) functional test draft procedure provided to the NRC by Duke Power Company on December 6, 1996. This attachment lists each NRC request followed by the Duke Power Company response.

Question 1: How has it been assured (or how will it be verified) that starting/operating safety related plant equipment from the Keowee generators under the test conditions will not result in damage or degradation of the equipment (i.e., if equipment ratings are exceeded during testing, how will operability be evaluated?)?

Response: Starting engineered safeguards motors and motor operated valves during these tests is expected to result in increased internal motor heating. The internal motor heating will not exceed the motor's design capabilities. Overcurrent protective relays and overloads associated with this equipment are set to take into account both the expected currents and thermal limitations of the equipment. Following each test, checks will be made to determine if any current protective devices have actuated. For cases where the current protective devices have actuated, an equipment damage and degradation analysis will be performed. Following the completion of all six tests, functional checks of the engineered safeguards equipment will be performed. For motors, the functional tests will include thermal, vibration, and electrical checks. For motor operated valves, the functional tests will include performance testing.

Overall, the tests are not expected to result in any significant qualified life degradation of the engineered safeguards equipment. Normal predictive and preventive maintenance programs are in place for ongoing monitoring of the health of this equipment.

Question 2: Provide the completed calculations which address the total electrical loading on the Keowee and/or Lee generators during the test.

Response: The calculations which evaluate the total electrical loading on the Keowee and Lee generators during the test conditions have not been approved. The draft procedures indicate that the test loading will bound the design bases for the emergency power system in parts 1, 2, 3, 4, and 6 of the emergency power ES functional test. For part 5 of the emergency power ES functional test, the inrush loading will bound the design basis of the emergency power system and the steady state loading will approximate the steady state loading. The calculations will be provided to the NRC resident inspectors as soon as the calculations are approved.

Question 3. Describe the effect of operating the Keowee oil lift pumps prior to initiating the Keowee start signal on the performance of the Keowee units relative to demonstrating their design basis.

Response: Operation of the Keowee oil pumps prior to the test will not impact the performance of the Keowee units during any part of the test. The Keowee units are designed such that the turbine guide bearings have a film of oil between them after a quarter of one turn. In addition, the turbine guide bearings are located in an oil bath during periods when the Keowee units are not operating. The Keowee oil lift pumps are placed in service prior to the test as a precaution and is similar to industry practices regarding diesel generator testing.

Question 4: The draft test procedure does not contain acceptance criteria for the voltage levels on the electrical busses. Please explain why such criteria are not necessary. Please address this issue for both Keowee and Lee test scenarios.

Response: This test is a functional test of the emergency power system and engineered safeguards systems. This test will demonstrate the ability of the emergency power system to supply power capable of starting the pumps and valves necessary to inject water into the core for the Oconee LOCA unit. Electrical data consisting of voltages, currents, kWs

and kVARS are being recorded at the sources (Keowee and Lee). In addition, the voltages, currents, kWs and kVARS are being recorded on the auxiliary power system down to the 208V level for post-test engineering reviews. The test acceptance criteria verify that the appropriate motors and valves operate as expected. Comparisons of recorded test data to calculated results (where available) will be performed during the post-test reviews in early to mid 1997. These additional engineering comparisons will provide further assurance that the design calculations reflect actual voltages available to the loads. If any modifications to the design models are required, such changes will be implemented and any previous analyses affected by the changes will be revised.

Question 5: Explain how the contingency procedures for the test were verified and validated. Describe how personnel who will perform the test will be trained on the test and contingencies. Will the crew(s) involved in the tests walk down each contingency section?

Response: The contingency plans were validated on the plant simulator during the procedure development. Additionally, activities performed outside the control room were verified by walking through the steps in the plant. The actions performed in the contingency plans are actually steps removed from existing abnormal procedures.

The operations crews involved with the performance of the test will be trained on the contingency plans in both the classroom and simulator. Test conditions will be established on the simulator with failures introduced so that the operators involved with the performance of the test may actually perform all the contingency actions on the simulator under test-like conditions. Training for licensed personnel involved with the performance of the test will be performed by subject matter experts and a certified nuclear instructor. The Operations Shift Manager for the applicable crew will provide training for the non-licensed operators involved with the performance of the test on contingency actions performed outside the control room. This training involves walking through the actions in the plant. The training plan is included as Attachment 2 for additional information.

Question 6: Confirm that the test and contingencies were reviewed to provide reasonable assurance that testing and/or contingency actions will meet current regulatory and license requirements at Oconee.

Response: In preparation of the license amendment request for the emergency power ES functional test, the Oconee technical specifications and UFSAR were reviewed to ensure that the test and contingency actions do not violate any regulatory requirements. The performance of the test or contingency actions does not violate any current regulatory requirements.

Question 7: Describe how Watts and Vars at the power sources (Keowee and Lee) will be measured during the test (or derived from test data).

Response: The data recorders which will monitor the voltage, current, and frequency of the Keowee unit and Lee gas turbine provide Watts and Vars indication. Data will be available after the test which indicates the amount of loading on the power sources during the test.

ATTACHMENT 2

Training Plan For The Emergency Power Engineered Safeguards Functional Test

Just In Time Training Plan for the Emergency Power and Engineered Safeguards Functional Test T/0/A/0610/025

ANALYSIS

The purpose of this analysis is to determine the training requirements for Just In Time Training for the performance of the Emergency Power and Engineered Safeguards Functional Test to be performed in December of 1996.

Discussions were held between the Overall Test Coordinator, Clark Curry, and the Oconee Training Center contact, Alan Whitener. It was determined that training needed to be presented in a classroom and simulator setting for the licensed operators, an in plant review for the NLOs, and a review of the expected responses from the Keowee Hydro and Lee Steam Station personnel. The Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025, will be covered in enough detail during the classroom training to ensure the operators were familiar with the anticipated actions to be performed and objectives to be achieved by the successful completion of the test. Incident free performance of the procedure as well as contingency actions to cover equipment failures will be covered. The Simulator will be used to give the operators actual hands on experience for performance of the procedure under simulated operating conditions. Training for NLOs will consist of on-shift review of specified tasks by their supervision. Training for the Keowee Hydro and Lee Steam Station personnel will consist of an overview of the test procedure.

All Licensed and nonlicensed operators involved in the test are current on all required Requalification training, including the following identified tasks:

NLO Tasks		**CFID**
OO1130401	Align a Reactor Building Spray pump for recirc by procedure	3.00
OO1131207	Adjust the BWST level	3.00
OO1133701	Cross connect vent header between units by procedure	2.00
OO1231901	Operate the CCW system	3.75
OO1241601	Cross connect the LPSW systems by procedure	4.25
OO1241602	Align HPSW to LPSW by procedure	4.25
OO1345302	Restore 600V load centers following a loss of power	3.25
OO1335303	Transfer MCC between Load Centers by Procedure	3.25
OO1335305	Align Main & Aux. Xformer for Backcharge by Procedure	3.75
OO1335306	Align a S/U Xformer to an Alternate Unit by Procedure	3.75
OO1335307	Supply Sfty Related Load Ctr w/ Alternate Power by Proc	3.75
OO1335308	Rack a Station 600V Breaker In/Out by Procedure	3.00
OO1335309	Rack a Station 4160/6900V Breaker In/Out by Procedure	3.00

CRO Tasks		**CFID**
OO2620403	Operate a Reactor Bldg Spray Pump in Recirculation	3.00
OO2625301	Test 100KV Power Supply from Lee Steam Station	3.75

CRO Tasks		CFID
OO2625401	Test the Oconee-Central Supv Control System	2.75
OO2625801	Test Keowee Hydro Operation	3.50
OO2631801	Operate the Unit 1&2 Recirculating Water System	3.75
OO2631802	Operate Unit 3 RCW System	3.75
OO2631803	Cross-connect Unit 1&2 RCW System With Unit 3	3.75
OO2631901	Startup the Condenser Cooling Water System	3.75
OO2633701	Operate the Gaseous Waste Disposal system	3.50
OO2635314	Backcharge Main & Auxiliary Transformer	3.75
OO2635401	Operate Switchyard Circuit Breakers from Control Room	3.00
OO2635801	Startup a Keowee Hydro Unit In Automatic	3.00
OO2635803	Startup a Keowee Hydro Unit in Manual	3.75
OO2635806	Shutdown a Keowee Hydro Unit in Manual	3.50
OO2640302	Perform Required Actions for Loss of LPI During DHR	4.75
OO2640902	Perform the Required Actions for a Loss of CC	3.75
OO2641601	Perform Required Actions for Loss of LPSW System	4.75
OO2645302	Perform Required Actions for Electrical Blackout	4.75
OO2645303	Perform Required Actions for Swy Isolation	4.75
OO2645304	Following a Keowee Emergency Start, Transfer MFB Power from CT-4 to CT Transformer	3.75
OO2545305	Following a Keowee Emergency Start, Transfer MFB Power from CT-4 to CT-5	3.75
OO2645306	Manually align CT Xformer to MFBs Following LOP	4.25
OO2645307	Emergency Start Keowee Hydros & Align CT-4 Transformer to MFBs Following Loss of Power	4.75
OO2645308	Manually Align CT-5 Transformer to MFB Following LOP	4.75
OO2645309	Perform a Unit Status Assessment Following LOP	4.75
OO2645310	Reset MFB Monitor Panel Load Shed Circuitry	4.25
OO2645312	Supply Emerg. Pwr to Unit Elec. Aux. From Lee Steam	4.75
OO2645313	Secure Emergency Power from Lee Steam Station	3.75
OO2655201	Manually Initiate ES If Required	4.25
OO2655202	Reset ES Following Initiation	3.25
OO2655203	Verify Proper ES Actuation Following Auto. Initiation	4.25
OO2655204	Take Manual Control of ES Comp. Folln'g Auto. Initiation	4.25

SRO Tasks		CFID
OO3610025	Evaluate Need to Deviate from Approved Procedures	4.50
OO3610032	Conduct On-Shift Training	3.25
OO3615301	Supervise Alignment of Electrical Systems	4.50
OO3640001	Evaluate Abnormal System Operating Parameters	4.50
OO3640005	Determine if Indications of Core Damage are Present	4.75
OO3640301	Determine Corr. Actions for Loss of LPI & Direct Recvry	4.75
OO3640901	Det. Cause & Superv Recovery from Loss of CC	3.25

SRO Tasks		CFID
OO3641601	Det. Cause & Direct Activities to Mitigate Consequences of Loss of LPSW	4.75
OO3645302	Evaluate Effects of Loss of Elec. Pwr and Direct Recvry	4.75

KHO Tasks		CFID
O-GOM-OPS-008	Respond to an Emerg. Start of the KHUs	5.25

DESIGN

The design component of the training plans includes development of objectives to be covered in the classroom and simulator. Objectives are written to ensure coverage of all applicable identified tasks. A formal lesson plan was not created. The procedure will be used as guidance for classroom and simulator presentation. Subject Matter Experts will be used as instructors for coverage of the procedure in both the classroom and simulator. A knowledgeable instructor will be present at all licensed operator presentations to ensure coverage of all identified objectives.

NLO Objectives:

Terminal

Perform out of control room portions of the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025.

Enabling

1. Given a copy of Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025, walk through enclosure 13.8A, Restoring Unit 3 Loads outside The Control Room, locating all equipment and controls.

2. Perform the actions, on all three units, required by JPM NLO-016, Restore load centers and IA compressors following a loss of power.

3. Perform the actions, on all three units, required by JPM NLO-009, Align the Main Steam Atmospheric Dump Valves.

4. Locate and discuss how to manually energize, for all three units, the sync check relays associated with the Auxiliary Transformer. ($25XB1_{1/2/3}$ and $25XB2_{1/2/3}$)

Licensed Operator Objectives

Terminal

Perform the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025.

Enabling

1. Describe the overall purpose of the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025.

2. Describe the purpose of the six (6) individual tests associated with the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025.

3. Discuss the alternate power sources available during performance of the six (6) tests associated with the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025.

4. Using guidance found in the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025:

    a. recover from Engineered Safeguards 1-8 Actuation.

    b. recover from Loss Of Offsite Power.
    - Keowee Hydro to the Underground
    - Keowee Hydro to the Overhead
    - Lee Steam Station

    c. parallel power from Keowee to Switchyard after a Switchyard Isolation

    d. align power from Lee Steam Station.

    e. perform contingency plan actions to regain power.
    - align power from the start up transformer
    - align power from the auxiliary transformer
    - align power from Lee Steam Station

    f. feed the steam generators following an extended loss of decay heat removal capability

5. Recall that the run out limits for the HPIPs is 475 GPM per pump, and the run out limits for the LPIPs is ≈ 3000 GPM per pump and must be throttled to this flow rate prior to the BWST reaching ≈ 30'.

6. Recall that forced CCW flow should be established on units 1 and 2 within 1.5 hours to ensure adequate LPSW suction.

Keowee Hydro/Lee Steam Station Objectives

Terminal

Perform Keowee Hydro/Lee Steam Station portions of the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025.

Enabling

1. Review the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025.

2. Review plant responses for supplying emergency power to the Oconee Nuclear Station.

DEVELOPMENT

The primary document used for development of training is the procedure. Based upon the purpose and objectives to be performed, tasks that the ROs/SROs/NLOs/KHOs were qualified on were identified. Objectives were written to cover specific aspects of the test that would be included in the Just In Time Training.

The list of tasks and objectives were reviewed by the OTC and Clark Curry, the overall test coordinator.

The complete list of objectives for licensed operators are covered in two settings: classroom and simulator.

The classroom portion will consist of a step by step review of the entire procedure, which will include all six (6) tests, with all licensed ROs and SROs who are to be involved with its performance. This review will be performed by Clark Curry and Dave Deatherage. These are the Subject Matter Experts engineers who developed the procedure. An instructor will be present to ensure all objectives are covered.

The set of objectives for the identified NLO tasks will be covered on shift by their supervision. This will consist of walk-downs in the plant of applicable procedure steps to ensure familiarity of the performance of the tasks and location of the equipment by the affected NLOs.

The simulator files (snaps) have been created to replicate as close as possible, the actual status of the plant in the pre-test state. Two snaps have been created, one for Unit 1&2 and one for Unit 3. OTC simulator models Unit 1, therefore, some of the actual control locations and equipment response will not be the same as for Unit 3. The biggest difference will be in the fact that the simulator is unable to replicate a shutdown unit with the reactor vessel head removed, as will be the pretest status of unit 3. These differences will be covered with the operators. Due to the operators familiarity with Units 1, 2, and 3, these differences should not present a problem during the training.

The set of objectives identified for the Keowee and Lee personnel will be reviewed with the affected personnel by their supervision. This will consist of an overview of the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025. This review will familiarize the operators with the expected/required actions for their plants during the different tests performed.

IMPLEMENTATION

This training plan will be presented on approximately December 29 and 30 to the licensed operators. All involved licensed operators will attend approximately 4 hours of classroom. Subject Matter Experts (Clark Curry and Dave Deatherage) will review the procedure and answer questions during this time. All enclosures for all six (6) tests will be reviewed with the operators at this time. Particular attention will be given to the enclosure for contingency plans. This enclosure covers all available methods regarding power in the event power is lost and does not return in the manner described in the specific test enclosure.

The operators will then receive approximately 6 hours on the simulator to receive hands on training for performance of the test. Unit specific enclosures will be utilized by the operator crews in the simulator. The simulator will be set up as close as possible to the pre-test status. Differences in the units and responses seen on the simulator will be emphasized.

The specific unit enclosures will be performed as many times as needed to ensure the operators are comfortable with performance of the tests and with use of the contingency plans.

A fully certified OTC Nuclear Instructor will be present during all classroom and simulator training.

Training for the NLOs and KH and Lee personnel will be performed by their supervision.

All training will be documented using a TSR-10, Training Content Summary.

EVALUATION:

During performance of the test by the licensed operators on the simulator, any problems noted will be corrected to ensure satisfactory completion of the test. The training will be considered acceptable if at the conclusion of the simulator training, all operators have successfully completed the performance of the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025.

At the conclusion of the simulator training, an evaluation form will be presented to all involved operators. Feedback will be solicited to enhance the Just In Time training process and to ensure the operators feel familiar enough with the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025, to safely and accurately perform the test.

Evaluation Form for Just In Time Training for the Emergency Power and Engineered Safeguards Functional Test procedure, TT/0/A/0610/025

On a scale of 1 - 5 with 1 being the worst and 5 being the best possible, how would you rate the training you have just received as relates to:

1. Amount of knowledge you have received in the classroom covering performance of this test:

   Comments:

2. Questions/concerns I had concerning the test being sufficiently addressed:

   Comments:

3. Skills I have reviewed/gained from simulator training for the safe performance of this test:

   Comments:

4. What could be done to enhance future Just In Time Training?