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June 1, 1981

Docket No. 50-364

Director, Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. B. J. Youngblood

Gentlemen:

JOSEPH M. FARLEY NUCLEAR PLANT - UNIT 2
Post TMI Requirements for
Additional Accident Monitoring Instrumentation

As required by the Joseph M. Farley Nuclear Plant Unit 2 Full Power License, NPF-8, a description of containment pressure instruments, containment water level measurement system and installed hydrogen indication monitors is to be submitted to the NRC by June 1, 1981. Previously, Alabama Power Company has submitted description responses associated with these components in letters to the NRC dated January 14, 1981, February 9, 1981 and February 13, 1981. Supplement No. 5 to the Unit 2 SER requested a comparison of these instruments to Appendix B, NUREG-0737. A description of the design and qualification of these instruments, per the criteria outlined in Appendix B, NUREG-0737, is therefore provided in Attachments 1, 2 and 3 to this letter.

If you have any questions, please advise.

Yours very truly,

F. L. Clayton, Jr.

FLCJr/JAR:nac

Enclosures

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ATTACHMENT 1

CONTAINMENT PRESSURE INSTRUMENTS

NPF-8 PARA 2.C.(21)(f)(4)

As a result of the NRC's recommended modifications, Alabama Power Company has installed two wide range containment pressure instruments with a range of -5 psig to four times the containment design pressure and four narrow range containment pressure instruments with a range of -5 psig - 65 psig. These instruments are provided in addition to four narrow range pressure instruments. The following is a description of the design and qualification criteria for the containment pressure instruments.

Criteria 1 Response:

The containment pressure instrumentation channels; four narrow range and two wide range measuring channels, are installed such that the pressure measuring devices, the bellows sensors, are located inside containment. An impulse line penetrating containment provides containment pressure signal to the pressure transmitters which are located outside containment and not exposed to a harsh environment. The bellows are qualified to IEEE-344, 1975. The wide range indication overlaps the narrow range indication in a manner that provides the range necessary for all modes of operation.

The four narrow range containment pressure transmitters have been qualified to IEEE-323, 1971 standard for environmental qualification and to IEEE-344, 1971 standard for seismic qualification. Alabama Power Company will make every effort to qualify these items by June 30, 1982, in accordance with the requirements of NUREG-0588. The related containment pressure monitoring system electronics for these four channels is designed and constructed as protection equipment utilizing qualified 7300 process equipment which meets IEEE-344, 1975 (Reg. Guide 1.100) for seismic qualification.

Criteria 4 Response:

The containment pressure channels are available prior to an accident as specified in the Farley Unit 2 Technical Specifications, Sections 3.3.2 and 3.3.3.8.

Criteria 5 Response:

The Alabama Power Company's containment pressure measuring system meets the Q.A. requirements in this criteria, as documented in APCo and Westinghouse Q.A. manuals which have been reviewed by the NRC.

The containment pressure monitoring system is classified as a Category A item within the Operations Quality Assurance Policy Manual. A detailed description of the procurement, installation, inspection, testing, storage and records activities associated with A items are documented in Operation Quality Assurance and Farley Nuclear Plant Procedures.

The containment pressure monitoring system complies with 10CFR50 Appendix B and is included under Westinghouse Quality Assurance Programs QCS-2 Rev. 1 and program directive 10458-001.

Criteria 6 Response:

Alabama Power Company has continuous display, recording and trend capability as described below:

Each of the four narrow range and each of the two wide range containment pressure monitoring channels is provided with a separate analog readout. In addition, a two pen recorder is provided; one pen records narrow range pressure and one pen records wide range pressure.

For the narrow range instrumentation, computer readout and trending is available for each of the four instruments.

These instruments provide containment pressure indication over the following range:

Narrow range instrument channels (- 5 psig to 65 psig)

Wide range instrument channels (- 5 psig to 225 psig)

Criteria 7 Response:

As described above in Criteria 6 Response, Alabama Power Company has the capability to record and trend containment pressure readout using both the strip chart recorder and the plant computer.

Criteria 8 Response:

Lines of demarcation have been installed around the indicators and recorder as a result of the control room review. They are located on the vertical section of the main control board near the control switches for the RHR and Containment Spray Systems. In addition, containment pressure is specifically identified as a post-accident instrument. The indicator and indicating recorder are labeled with unique tag numbers and labels.

Criteria 9 Response:

Alabama Power Company's containment pressure monitoring system meets this criteria as described below:

The transmission of signals from the containment pressure transmitters through the 7300 process racks, protection logic and safeguards actuation devices are isolated by devices which would preclude the impairment of the pressure sensing system under faulted conditions experienced in other devices.

Criteria 10 Response:

Alabama Power Company's system has the capability for checking the operational availability of each monitoring channel as described below:

Transmitter operational availability is assured through a scheduled, periodic calibration program. In addition a test point is provided for each monitoring channel to enable a functional check of the electrical processing and readout devices to assure their operability over the entire instrument range. This testing is part of a scheduled, periodic verification program.

Criteria 11 Response:

As described in Criteria 10 Response above, Alabama Power Company has provided capability for testing, servicing and calibration of these instrument channels. A monthly check and a channel calibration is performed during each refueling outage on these instrument loops as provided in Technical Specification Section 1.0 and Tables 4.3-7 and 4.3-2.

Criteria 12 Response:

The design of the containment pressure monitoring system provides dual redundant channels to facilitate removing one channel for service and testing while maintaining one channel for accident monitoring.

All maintenance on plant equipment is controlled by administrative procedures. A licensed operator determines any valve lineup changes and gives permission to the individuals who perform the maintenance, calibration, etc. The shift operators are made aware of maintenance on safety related equipment and/or the identification of such equipment that is out of service.

Criteria 13 Response:

The design for the containment pressure monitoring system provides access to setpoint adjustments, calibration adjustment and test points. Administrative control to such access points is provided by normally locked doors which are controlled by licensed shift operations personnel.

Criteria 14 Response:

Alabama Power Company's system is designed to minimize development of conditions which would cause anomalous, and potentially confusing information to the operator. Each of the four narrow range containment pressure channels are independently powered by one of the four instrument protection busses. Since these channels provide a protection function, (i.e. containment isolation and safety injection signal generation) and because the setpoint for this function is set as low as possible, channel-to-channel deviation during normal operation

would be highlighted. In addition, the four redundant channels plus the additional two wide range channels, which are also independent, provide the operator with the ability to cross-check instrument indications.

The design of these channels is such that direct containment pressure measurement could be made if necessary.

Criteria 15 Response:

Alabama Power Company's containment pressure monitoring system is designed and constructed so as to facilitate recognition, location, replacement, repair or adjustment of malfunctioning components or modules as described below:

The transmitters and process control circuitry for the containment pressure instrumentation is located outside containment in accessible areas. Only the mechanical pressure sensing bellows are located inside containment.

Periodic testing (criteria 11), anomalous reading (criteria 14) and ambiguous readings (criteria 2) would precipitate evaluation of these loops to determine the need for such activities.

Criteria 16 Response:

Alabama Power Company's system is designed to directly measure the desired variable as described below:

The containment pressure sensing bellows are located inside the containment in the containment atmosphere and directly transfer the containment pressure to the input side of the pressure transmitters via sealed impulse tubing.

Criteria 17 Response:

Alabama Power Company's four narrow range containment pressure instrumentation channels are those utilized during normal operation conditions. The two wide range containment pressure instrumentation channels are provided to extend pressure monitoring capability to four times the containment design pressure.

Criteria 18 Response:

Alabama Power Company has a program for periodically testing this system as outlined in criteria 11 response above.

ATTACHMENT 2

CONTAINMENT WATER LEVEL MEASUREMENT SYSTEM

NPF-8 PARA 2.C(21)(f)(5)

Alabama Power Company has installed wide range containment water level measurement instruments with a range of 10 feet and, as a result of the NRC's recommended modifications, narrow range containment water level instruments with a range of 3 feet. The following is a description of the design and qualification criteria for the Containment Water Level Measurement System.

Criteria 1 Response:

Wide Range

Then environmental qualification based on the DBA conditions of the Gems Delavel Model XN-36495 Containment Wide Range Sump Water Level Sensors is being addressed as a part of the NUREG-0588 response. The design of these systems meets the requirement for safety related equipment as defined by IEEE-279, 1971. Train separation that satifies Class 1E requirements is provided from the sensor to the receiver. Alabama Power Company will make every effort to qualify these items by June 30, 1982.

Due to the unavailability of design and material, the isolation devices are scheduled for implementation during the 1982 refueling outage. The planned location of these isolation devices is the main control room which will allow accessibility during an accident for maintenance and repair activities.

This instrumentation does not require an extended range or stepped overlapping ranges beyond its current design range of 10 feet. The receivers for the sensors are seismically qualified and have been mounted in the cable spreading room below the main control room. Redundant indication (one indicator is by indicating recorder) and a recorder for these measurements is located on the main control board.

Narrow Range

Alabama Power Company has recently installed the containment narrow range sump water level sensors as required by NUREG-0737. The environmental qualification based on the DBA condition of the Gems Delavel Model XM -54854 containment narrow range sump water level sensors located in the sump below the reactor vessel is currently in process by Wyle Laboratory (Qualification Plan 45102-01, November 7, 1980) and the test results are scheduled to be available in June, 1982. The design of these systems is being qualified to IEEE 323, 1974, 344, 1975, and 279, 1971. Train separation that satisfies Class IE requirements is provided from the sensor to the main control board indicator. Alabama Power Company will make every effort to qualify these items by June 30, 1982.

No isolation devices are required for these since they are only used for indicators in the main control room. Space is currently available in the main control room if isolation devices are required in the future.

This instrumentation does not require an extended range or stepped overlapping ranges beyond its current design range of three feet. Redundant indication is available on the balance-of-plant panels in the main control room. The seismically qualified receivers for the units are mounted in the train oriented penetration room associated with each unit.

Criteria 2 Response:

Wide Range

No single failure within either the accident-monitoring instrumentation, its auxiliary supporting features or its power sources concurrent with the failure that is a condition or result of a specific accident will prevent the operator from being presented the information necessary for him to determine the safety status of the plant and to bring the plant to a safe condition and

maintain it in a safe condition following that accident.

Where failure of one accident-monitoring channel results in an ambiguity (that is, the redundant displays disagree) which could lead the operator to defeat or fail to accomplish a required safety function, additional information is provided to allow the operator to deduce the actual conditions in the plant. This is accomplished by comparing refueling water storage tank level to the containment ECCS sump level. In addition to the above, the flows into containment (normal charging, ECCS injection and ECCS recirculation flows) can be compared to the flows out of containment (normal letdown, ECCS recirculation via RHR and containment spray flows).

Redundant or diverse channels are electrically independent, energized from station Class 1E power source and physically separated in accordance with Regulatory Guide 1.75 up to and including any isolation device. Redundant indication (one indication is by indicating recorder) and a recorder for these measurements is located on the main control board.

Narrow Range

The post-accident containment water level would, in most accidental conditions be beyond the design range of this instrument. This instrument is not used for primary identification of accident conditions. In any event, however, failure of one channel of level will not lead to any ambiguity of measurement that could lead an operator to defeat or fail to accomplish a required safety function based upon the fact that no post-accident operator action is required based on this instrumentation.

Criteria 3 Response:

Wide Range

The instrumentation is energized from station Class 1E power sources.

The two channels are powered from train oriented power supplies that are Class 1E and backed by the station 1E batteries. These power sources meet all separation, isolation, and redundancy requirements imposed on safety related equipment.

Narrow Range

The instrumentation is energized from station Class 1E power sources.

The two channels are powered from train oriented power supplies that are Class 1E and backed by the station 1E batteries.

Criteria 4 Response:

Wide Range and Narrow Range

This instrumentation is designed to be continuously powered and available at all times.

Criteria 5 Response:

Wide Range & Narrow Range

Alabama Power Company's water level measurement system meets the Q.A. requirements in this criteria as documented in APCo and Westinghouse Q.A. Manuals which have been reviewed by the NRC.

The containment water level monitoring system is classified as Category A item within the Operation Quality Assurance Program as documented in FSAR Section 17.2 and in the Operation Quality Assurance Policy Manual. A detailed description of the procurement, installation, inspection, testing, storage and records activities associated with A items are documented in Operations Quality Assurance and Farley Nuclear Plant Procedures.

The Containment Water Level Measurement system complies with 10CFR50 Appendix B and is included under Westinghouse Quality pressure programs QCS-2 Rev. 1 and program directive 10458-001.

Criteria 6 Response:

Wide Range

There are two continuous channels of indication and one channel of recording

for this measurement. There are no overlapping ranges for this measurement due to the fact that there are two sumps with separate instrument systems.

Narrow Range

There are two continuous channels of indication. There are no overlapped ranges due to the fact that there are two sumps with separate instrument systems

Criteria 7 Response:

Wide Range

The recorded channel is on an analog strip chart recorder.

Narrow Range

Narrow range water level instrumentation is not used for primary identification of accident conditions. Therefore, analog strip chart recording is not required.

Criteria 8 Response:

Wide Range

Lines of demarcation have been installed around the indicators and recorder as a result of the control room review. In addition, this instrument is specifically identified as a post-accident instrument. They are located on the vertical section of the main control board near the control switches for the RHR and Containment Spray systems. The indicator and indicating recorder are labeled with unique tag numbers and labels.

Narrow Range

These instruments are not specifically required for post-accident conditions; however, the indicators are located on balance-of-plant panels and identified with their unique tag numbers LI 3282 A & B. They are located on panels near the sump pump control switches.

Criteria 9 Response

Wide Range and Narrow Range

Alabama Power Company will address the installation of isolation devices

between 1E channels and non-1E equipment as a part of the R.G. 1.97 program.

Criteria 10 Response:

Wide Range & Narrow Range

Physical perturbation of the sensor mechanism requires containment entry and is not practical during power operation. Alabama Power Company has incorporated into the test and calibration program provisions for sensor calibration during each refueling outage.

Criteria 11 Response:

Wide Range and Narrow Range

Alabama Power Company performs a monthly channel check and a channel calibration each refueling outage on the wide and narrow range instrument loop as provided in Technical Specification Section 1.0 and Table 4.3-7.

Criteria 12 Response:

Wide Range & Narrow Range

The design of the containment water level system provides dual redundant channels to facilitate removing one channel for service and testing while maintaining one channel for accident monitoring.

All maintenance on plant equipment is controlled by administrative procedures. A licensed operator determines any valve lineup changes and gives permission to the individuals who perform the maintenance, calibration, etc. The shift operators are made aware of maintenance on safety related equipment and/or the identification of such equipment that is out of service.

Criteria 13 Response

Wide Range & Narrow Range:

The design for the wide range Containment Water Level System provides access to setpoint adjustments, calibration adjustment and test points. Administrative control to such access points is provided by normally locked doors which are controlled by licensed shift operations personnel.

Criteria 14 Response

Wide Range

The wide range containment water level instruments normally see no water in containment so there is no potential, under normal conditions, for anomalous indications or alarms. Under accident conditions, the Refueling Water Storage level indication can be used as a cross check to verify the amount of water that is introduced into the containment if analogous indications are provided by the wide range containment water level instruments (see response to criteria 2).

Narrow Range

The narrow range containment water level instruments are used in normal operation to measure liquid collected in the sump to be pumped to waste process tanks thereby providing no anomalous indications or alarms under normal conditions. Under accident conditions the containment water level would exceed the range of this instrument.

Criteria 15 Response:

Wide Range and Narrow Range

All portions of the instrument loop are accessible for repair, replacement or adjustment, except the sensor which is located inside containment. Periodic testing (criteria 11), anomalous reading (criteria 14) and ambiguous readings (criteria 2) would precipitate evaluation of these loops to determine the need for such activities.

The wide range containment water level system has a comprehensive service manual to diagnose malfunctions and facilitate repairs, replacement or adjustment to components.

Criteria 16 Response:

Wide Range and Narrow Range

The design for the containment water level instrumentation is specifically for direct measurement of sump level and not for measurement of a secondary variable.

Criteria 17 Response:

Wide Range

There should be no liquid level in containment under normal operating conditions; therefore, this instrumentation is specifically provided for accident monitoring. The operators use this instrument for determining containment water level as a part of their training and as directed by emergency operating procedures.

Narrow Range

Under all conditions other than normal conditions and small leaks, the contents of this sump are not removed. Due to this fact the indication of this monitor is not acted upon under accident conditions.

Criteria 18 Response:

Wide Range and Narrow Range

Alabama Power Company has a program for periodically testing this system as outlined in the response to criteria 11.

ATTACHMENT 3

INSTALLED HYDROGEN INDICATION MONITORS

NPF-8 PARA 2.C(21)(f)(6)

Alabama Power Company has installed hydrogen indication monitors with a range of 0-10% hydrogen concentration of concern. The following is a description of the design and qualification criteria for the Hydrogen Indication Monitors:

Criteria 1 Response:

The hydrogen analyzers are not required to be addressed in NUREG-0588 because they are not located in the harsh accident environment which they are analyzing. The units are located in the auxiliary building in separate rooms with a wall separating them rated as a minimum three hour fire barrier.

The Model K-IV Delphi Industries Hydrogen Monitor, Serial Number R-35, was seismically tested at Wyle Laboratories in Norco, California on August 16, 1976 (Test Report No. 58095). The test unit consisted of a panel housing the pumping unit, analyzer cell, control switches and readout modules. The unit was energized and monitored during and following the seismic test. The seismic tests performed enveloped those curves of concern for FNP. All panels for this system are the same model number as the test model. The analyzer electronics has been qualified for proper operation at radiation levels of 2E6 Rads. The design of these systems meets the requirements for safety related equipment as defined by IEEE-279, 1971. The instrumentation channel signal is not used for any computer-based analysis or logging; therefore, no isolation device is needed to isolate the unit from a computer. In the event that either or both units provide signals to a computer at some time in the future, a qualified isolation device could be located in an area that is environmentally accessible to isolate the signal of the 1E equipment from any non-1E equipment.

The range of the instruments is designed to cover the 0 to 10% hydrogen concentrations of concern; therefore, no extended range is required. The accuracy of the hydrogen monitor is ± 2% of span with a response time of 0.45 minutes which

is adequate for the function that the hydrogen monitor performs. The output signal of the analyzers are indicated at the analyzer panel location and are alarmed and recorded in the main control room. The emergency operating procedures, which have been reviewed and approved by the NRC, require the containment atmosphere be sampled within one hour of the accident and the hydrogen concentration determined.

Criteria 2 Response:

No single failure within either the accident-monitoring instrumentation, its auxiliary supporting features or its power sources concurrent with the failure that are a condition or result of a specific accident should prevent the operator from being presented the information necessary for him to determine the safety status of the plant and to bring the plant to a safe condition and maintain it in a safe condition following that accident.

This is accomplished by the two independent analyzers located in separate rooms. In the event the operator finds a disagreement between the readout recorders in the control room, he has controls at the control room panel to inject zero and span gases to determine which of the two units has malfunctioned.

Where failure of one accident-monitoring channel results in ambiguity (that is, the redundant displays disagree) which could lead the operator to defeat or fail to accomplish a required safety function, additional information should be provided to allow the operator to deduce the actual conditions in the plant.

Redundant or diverse channels are electrically independent, energized from station Class 1E power source and physically separated in accordance with Regulatory Guide 1.75. The output signal of the anlyzers are indicated at the analyzer panel and are alarmed and recorded in the main control room.

Criteria 3 Response:

Each independent analyzer is powered by Class 1E power sources with

train oriented Class 1E cables routed from separate penetration rooms via train oriented tray systems.

Criteria 4 Response:

The instrumentation channel is demonstrated operable every 92 days as required by Technical Specifications by performing a channel calibration using sample gases containing:

a. ten volume percent hydrogen, balance nitrogen, for zero check.

b. ten volume percent hydrogen, balance nitrogen, mixed with compressed air, for span check.

Criteria 5 Response:

Alabama Power Company's containment hydrogen monitor meets the Q.A. requirements in this criteria as documented in APCo and Westinghouse Q.A. Manuals which have been reviewed by the NRC.

The containment hydrogen monitor is classified as a category A item within the Operations Quality Assurance Program as documented in FSAR Section 17.2 and in the Operations Quality Assurance Policy Manual. A detailed description of the procurement, installation, inspection, testing, storage and records activities associated with A items are documented in Operations Quality Assurance and Farley Nuclear Plant procedures.

The containment hydrogen monitor complies with 10CFR50, Appendix B and is included under Westinghouse Quality pressure program QCS-2, Rev. 1 and program directive 10458-001.

Criteria 6 Response:

There is continuous indication at the meter module located in the analyzer panel when the unit is in a sample run mode. In addition, there is a continuous recording (with indication) at the control units in the main control room in this same run mode.

Criteria 7 Response:

There is an individual indicating analog strip chart recorder for each analyzer located in the control unit in the main control room.

Criteria 8 Response:

The instruments are housed in a control room cabinet that is used exclusively for post-accident hydrogen monitoring and are labeled as such; therefore, uniquely identified for the control room operators.

Criteria 9 Response:

The signal to these units are not used in the plant process computer; therefore, no isolation devices are required. In the event that these signals are transmitted to non-1E equipment at some future date, properly qualified isolation devices will be installed to process these signals.

Criteria 10 Response:

The units have the capability to be checked while operating by use of bottled zero and span gasses injected into the conductivity cell to ascertain that the unit is properly operating. This check is verified during performance of the surveillance test procedure every 92 days.

Criteria 11 Response:

Alabama Power Company demonstrates operability at least once per 92 days on a staggered test basis by performing a channel calibration using sample gasses containing ten percent by volume hydrogen, balance nitrogen, for zero check and ten percent by volume hydrogen, balance nitrogen, mixed with compressed air for span check as provided in Technical Specification Section 1.0 and Section 4.6.4.1.

Criteria 12 Response:

The design of the post-accident hydrogen analyzer system provides dual redundant channels to facilitate removing one channel for service and testing while maintaining one channel for accident monitoring.

All maintenance on plant equipment is controlled by administrative procedures. A licensed operator determines any valve lineup changes and gives permission to the individuals who perform the maintenance, calibration, etc. The shift operators are made aware of maintenance on safety related equipment and/or the identification of such equipment that is out of service.

Criteria 13 Response:

The design for the hydrogen monitor provides access to setpoint adjustments, calibration adjustment and test points. Administrative control to such access points is provided by normally locked doors which are controlled by licensed shift operations personnel.

Criteria 14 Response:

The containment hydrogen monitoring instrumentation system design minimizes the development of conditions that would cause meter, annunciators, recorders or alarms to give anomalous indications potentially confusing to the operator. In the event of a potential anomalous reading, other instrumentation/methods of verification of anomalous readings are available (e.g. grab samples, containment wide range pressure, core exit temperature, etc.).

Criteria 15 Response:

All portions of this instrument loop are accessible for repair, replacement or adjustment. In addition potential accessibility problems may be experienced with the analyzer panels which are located in the electrical penetration room under NUREG-0737 postulated accident conditions. To respond to these conditions, Alabama Power Company has committed to modifications to address accessibility under these conditions. Periodic testing (criteria 11), anomalous reading (criteria 14) and ambiguous reading (criteria 2) would precipitate evaluation of these loops to determine need for such activities.

These instrument loops have a comprehensive instruction manual that is designed to facilitate recognition of malfunctions and has aids for the instrument and control technicians in maintenance and repair of each component.

Criteria 16 Response:

The sensors for the containment hydrogen monitor instrumentation directly measure hydrogen concentration by conductivity cells designed specifically for analyzing hydrogen concentrations.

Criteria 17 Response:

There is no application for the operators to measure containment hydrogen concentrations under normal operating conditions; therefore this instrumentation is only used under accident conditions.

Criteria 18 Response:

Alabama Power Company has a program for periodically testing this system as outlined in the response to criteria 11.