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the southern electric system

September 30, 1980

Docket No. 50-364

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

Attention: Mr. A. Schwencer

JOSEPH M. FARLEY NUCLEAR PLANT - UNIT 2
CONTAINMENT PURGE SYSTEM

Gentlemen:

Your letter of August 25, 1980, to Alabama Power Company transmitted Containment Systems Branch Question 020.1 concerning the containment purge system. The general approach to limit the operation of the containment purge system was discussed with the NRC staff in a meeting held on September 18, 1980. As a result of your questions and the discussions held, Alabama Power Company proposes the action contained in Enclosure 1.

On an interim basis the mini-purge system will be used during operation in Modes 1-4 for containment atmospheric and pressure control until the first Unit 2 refueling outage. Limiting the mini-purge valves to a maximum opening of 50° limits flow and reduces the system capability to control pressure and maintain noble gas concentrations to a minimum. Alabama Power Company has submitted the mini-purge valve qualification documentation which is still being reviewed by the Power Systems Branch. It is requested that the mini-purge qualification review be expedited and completed such that the mini-purge valves can be unblocked prior to exceeding 5% power.

It is requested that the proposed Technical Specification (Enclosure 2) be reviewed and approved for the period between issuance of the full power license and the first refueling outage.

Alabama Power Company supports limiting the use of the containment purge system and requests your cooperation in achieving this common goal without undeuly restricting the operation of the Farley Nuclear Plant.

Yours truly,

F. L. Clayton, Jr.

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Enclosure
cc: See Page 2

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cc: Mr. R. A. Thomas
Mr. G. F. Trowbridge
Mr. L. L. Kintner
Mr. W. H. Bradford

ENCLOSURE 1

CONTAINMENT SYSTEMS BRANCH

QUESTION 020.1:

Our review of the containment isolation system has also included review of the containment purge system. This system will be used to reduce airborne radioactivity in the containment to permit personnel entry. In order to complete our review of the purge system, we require the following information:

(1) A description of the containment purge system design that assures blockage of the purge valves by debris will not occur. The description should include quality and seismic classification of the blockage prevention measures.

(2) A description of the means for detecting high radioactivity conditions prior to opening the purge valves.

(3) An estimation of the time period that the purge valves will be open during the year with justification for the duration.

Response:

(1) The purge supply and exhaust duct openings inside containment are covered with a "bird screen" material to prevent debris from entering the ducts and blocking isolation valve closure. As the openings are located outside the primary shield, no significant debris should be generated in the vicinity of the bird screen during an accident. The bird screen material is a steel wire screen with 1/2" square openings and .049" diameter wire. It is a commercial grade wire screen, weighing less than 0.4 psf. The bird screen is attached to the duct openings by welding. We consider that the material and the installation is adequate for the very low seismic stresses that would be encountered.

(2) High radioactivity conditions inside containment would be detected prior to opening the purge valves by means of the containment atmosphere particulate radioactivity monitor (R-11) and the containment atmosphere gaseous radioactivity monitor (R-12). The output from each monitor detector is transmitted to the Radiation Monitoring System cabinets located in the control room where the radiation level is indicated by a meter and recorded. High radiation level alarms are indicated on the Radiation Monitoring System cabinets with annunciation at the main control board in the control room. A description of these monitors is provided in FSAR Section 11.4.

(3) The Farley Nuclear Plant Containment Purge System consists of two flow paths as described in FSAR Section 6.2.3. The larger path (main purge) is through 48-inch butterfly valves. The small path (mini-purge) utilizes 18-inch butterfly valves which acts as a bypass path around the 48-inch valves.

ENCLOSURE 1

With regard to the main purge system, Alabama Power Company has previously committed to maintain the main purge valves closed whenever the plant is in modes 1, 2, 3 or 4 until valve operability is demonstrated. These valves currently will be opened only in modes 5 and 6 (cold shutdown and refueling).

The mini-purge system is used at the Farley Nuclear Plant for purging in order to limit the build-up of radioactive gases and particulates for ALARA considerations and to prevent a pressure build-up in the containment. During reactor operation of Farley Unit 1, containment pressure was found to build up at a rate of about 1 psig per every 24-48 hours. This was based upon a volumetric flow rate of about 100 CFM. Farley Nuclear Plant Technical Specifications require that containment internal pressure be maintained between -1.5 and 3.0 psig. The Farley Nuclear Plant does not have a separate containment vent system acceptable for use during reactor operation. The 6-inch post accident hydrogen vent system uses manual valves that are not capable of automatic closure upon containment isolation signals and are, therefore, maintained locked closed during reactor operation.

Alabama Power Company has considered a number of alternative methods of preventing containment pressurization during normal operation. These alternatives fall into two classes. The first class of alternatives utilizes containment air as the source of air supply to air operated valves located inside containment. No significant increase in containment pressure would result due to the fact that the source of air supply does not originate outside the containment. The second class of alternatives are those which allow controlled venting of the containment. This approach would allow a build-up of containment pressure due to the fact that the source of air to air operated valves located inside containment originates outside containment.

Of the first class, several different types of systems were evaluated and are discussed below. These types of systems would include the following components: air compressors, air receiver tanks, and auxiliaries including air dryers, oil separators, aftercoolers, piping and valves associated with the cooling water system. Location of these types of systems inside containment or to compress the excess air leakage for periodic transfer outside containment is not feasible due to the size of the systems and their auxiliary equipment. In addition these systems are high maintenance items which, if located inside containment, would increase the necessity to enter the containment. This additional access would increase the time needed for purging above that already required. Their location would also involve increased exposure to plant personnel. Such systems could not be placed on the operating floor due to the lack of space available during refueling operations. These systems would also place a potential source of internally generated missles and high pressure piping and components in the vicinity of safety related piping, cable trays and instruments. Finally, it would not completely eliminate containment pressurization since outside air would still have to be routed into the containment for breathing air and the backup air supply for the reactor coolant system PORV's, so the potential for air inleakage would continue to exist.

Use of a compressor outside containment, taking suction from the containment atmosphere, either to supply air to the systems inside containment or to compress excess air from inside containment would require qualified air compressors and auxiliaries (dryers, oil separators, etc.), to maintain pressure boundary integrity equivalent to the containment boundary. No qualified compressors of the size required are currently available. Use of an unqualified compressor in this application would require prompt containment isolation capability and would thus be equivalent to a proposed venting design described below.

Evaluation of these systems has shown that none are acceptable from either a safety concern or a space availability concern; therefore, resolution of this problem must come from the second set of alternatives, that is, from a method of controlled venting of the containment.

The use of a modulating valve in the existing purge system has been evaluated as one type of vent system. Modulating valves such as these, with their associated controls, are high maintenance items. Location of such a valve inside containment would significantly increase operator exposure. Also, space near the containment penetration area is extremely limited inside and outside containment. Addition of a modulating valve and its associated controls would also involve major redesign and equipment relocation. This option is not feasible.

Alabama Power Company therefore proposes to install a 3-inch vent line in parallel with the 18-inch mini-purge system by the end of the first refueling outage. The 3-inch line size was selected based on Alabama Power Company's understanding of the modified NRC Branch Technical Position CSB 6-4, yet to be revised. The new 3-inch air operated containment isolation valves will be fully qualified to their intended use. They will be powered and controlled by the same sources and signals which are currently used for the 18-inch mini-purge valves. The lead time for these valves is at least 12 months. This proposed design is shown in the attached Figure (1). The 3-inch gate or globe type isolation valves will be automatic air operated valves set to close on any of the following signals:

(1) Containment Isolation
(2) Containment High Radiation
(3) Safety Injection

The valves will be periodically opened, allowing the containment to vent. This design will prevent containment pressurization while still allowing a more than adequate isolation capability. A small vent between the two outboard isolation valves will assure that any leakage past these containment isolation valves will be drawn into the containment penetration room filtration system. This alternative has been chosen for the Farley Nuclear Plant after consideration of such factors as valve operability and feasibility of piping design changes and other additions required.

ENCLOSURE 1

In the interim, until the 3-inch vent system is installed and limited use of the main purge is authorized above cold shutdown, it will be necessary to purge in order to:

(1) control containment pressure
(2) limit the buildup of noble gases and particulates to provide an acceptible working environment for safety related maintenance and inspection activities.

Alabama Power Company therefore proposes to use the existing 18-inch line to purge and vent the containment until the end of the first refueling outage on Unit 2.

The 18-inch mini purge valves have been demonstrated operable, per Alabama Power Company's letter of December 10, 1979, under the most severe design basis accident flow condition loading and can close within the time limit stated in the Farley Plant Technical Specifications. Additional information on this subject was submitted on June 30, 1980, July 25, 1980 and August 14, 1980. As previously stated, The Farley Nuclear Plant does not have any other containment vent system acceptable for use during reactor operation. The 6-inch post accident hydrogen vent system uses manual valves that are not capable of automatic closure upon containment isolation signals; and are, therefore, maintained locked closed during reactor operation.

For venting operations the mini-purge system is not designed to be placed in service with a positive back pressure in containment. If pressure is allowed to build in the containment and the purge system is then placed in operation, damage can occur to the purge system ductwork outside containment beyond the outboard isolation valve. Actual tests of the system in Farley Unit 1 in this mode of operation has shown this to be true. It is, therefore, necessary to periodically vent in order to prevent a pressure buildup and meet the Farley Nuclear Plant Technical Specifications for containment pressure.

For maintenance of a proper containment atmospheric environment for ALARA purposes, with the present restriction on the use of the main purge system, it is absolutely necessary to maintain the containment atmosphere essentially free of radioactive contaminants at all times. This requires periodic operation of the minipurge to accomplish this objective due to its small flow rate and corresponding long half time (approximately 24 hours) to reduce the airborne contamination to acceptible levels for containment entry. Failure to maintain the containment atmosphere in this condition by restricting minipurge operation would mean that the plant on certain occasions would have to be placed in cold shutdown in order to have an effective purge for radiological purposes. Being required to unnecessarily place the plant in cold shutdown places significant extra workload on the plant staff and contributes to unmerited unavailability.

Subsequent to the first refueling outage, Alabama Power Company proposes to utilize the 3-inch vent system as required for pressure control purposes. In addition, it is proposed to utilize the 48-inch purge valves (upon demonstration of operability) for periodic purging in modes 1 through 4 in order to perform safety related maintenance and inspection activities. It is estimated that the time required for such purging would be approximately 270 hours per year. This time is based upon the following data compiled from over three years of operation of Farley Unit 1:

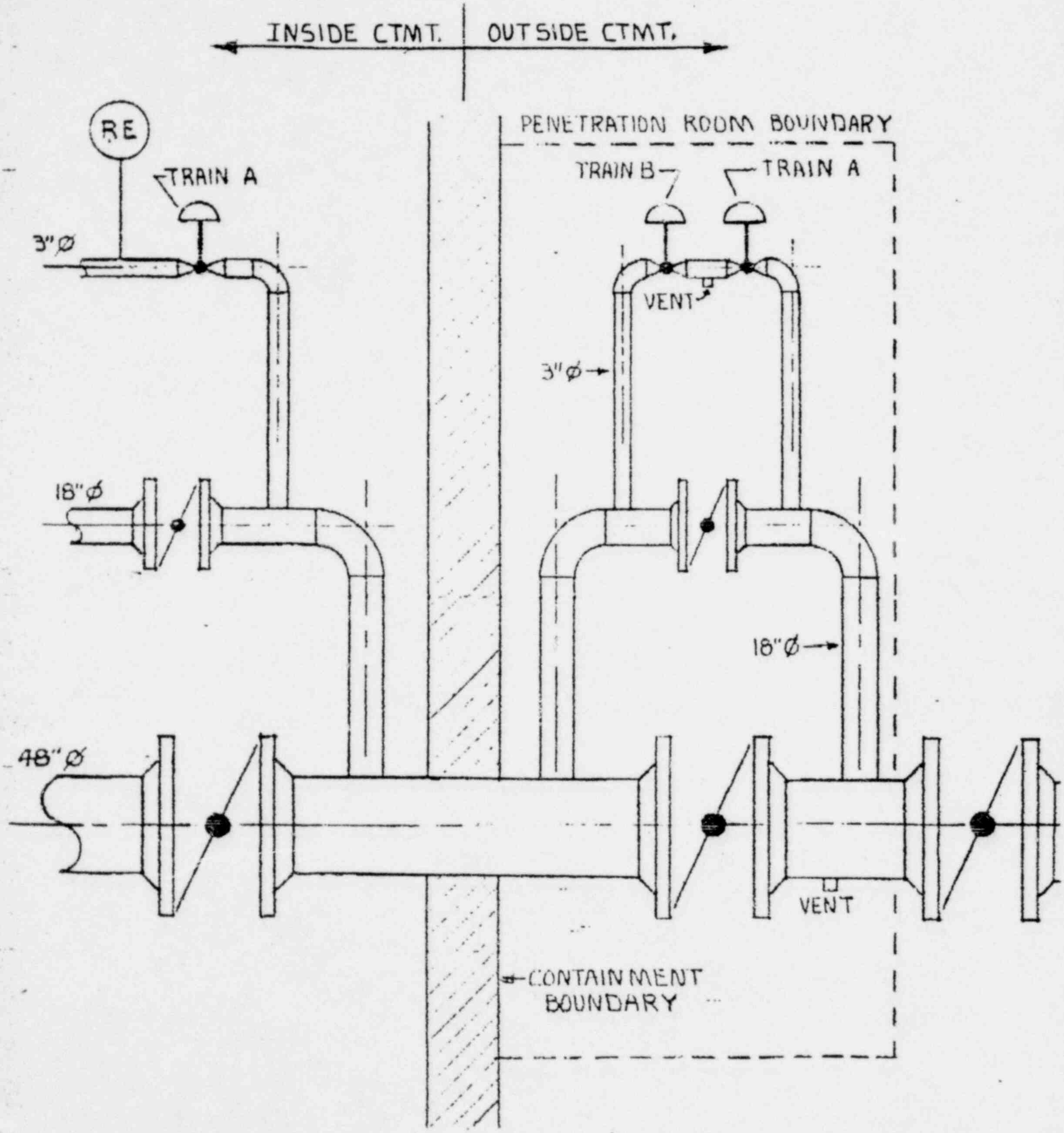
1. 24 entries for safety related maintenance and inspection activities into containment per year.

2. Two hours for sampling and purging required for containment accessibility per entry - 48 hours.

3. Average time per entry of nine hours - [illegible]6 hours.

4. Purge system is operational during all entries.

5. Total purge system operation required - 264.


INSIDE CTMT.
OUTSIDE CTMT.
RE
TRAIN A
3"Ø
PENETRATION ROOM BOUNDARY
TRAIN B
TRAIN A
VENT
3"Ø
18"Ø
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48"Ø
VENT
CONTAINMENT BOUNDARY

FIGURE 1

ENCLOSURE 2

CONTAINMENT SYSTEMS

CONTAINMENT VENTILATION SYSTEM

LIMITING CONDITION FOR OPERATION

3.6.1.7 The 48-inch containment purge supply and exhaust isolation valves (CBV-HV-3198A, 3198D, 3196, 3197) shall be closed. [redacted]

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With one 48-inch containment purge supply and/or one exhaust isolation valve open, close the open valve(s) within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.7 The 48-inch containment purge supply and exhaust isolation valves shall be determined closed at least once per 31 days.