Attachment 1

Duke Power Company
Oconee Nuclear Station

Proposed Technical Specification Revision

Pages 3.16-1
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3.16 CONTAINMENT HYDROGEN CONTROL SYSTEMS

Applicability

Applies to the Containment Hydrogen Recombiner System (including portable hydrogen recombiner unit and the Hydrogen Recombiner System flow path) and the Reactor Building Hydrogen Purge System whenever any Oconee unit is above cold shutdown conditions.

Objective

To define the conditions necessary to assure the availability of adequate containment hydrogen control capability.

Specifications

3.16.1 The Containment Hydrogen Control Systems shall be operable as follows:

a. A portable hydrogen recombiner unit shall be operable and available for connection to the affected unit.

b. If no portable hydrogen recombiner unit is operable and available for connection to the affected unit, a portable hydrogen recombiner unit shall be restored to an operable status within 7 days.

c. If the conditions in 3.16.1.b can not be satisfied, the Reactor Building Hydrogen Purge System shall be verified operable within the next 48 hours.

d. With the Reactor Building Hydrogen Purge System operable, restore a hydrogen recombiner unit to operating status within 30 days or submit a report to the NRC within the next 30 days describing the circumstances resulting in inoperable equipment and plans for returning the equipment to service and for any interim surveillance testing of the purge system.

e. With a portable hydrogen recombiner unit operable, the Reactor Building Hydrogen Purge System is not required to be operable.

3.16.2 If the conditions under Technical Specification 3.16.1.c are not met, the Oconee Units shall be in hot shutdown within the next 12 hours and in cold shutdown in an additional 24 hours.

3.16.3 Components in the Containment Hydrogen Control Systems' flow path shall be operable on each Oconee unit with the following exceptions.

a. If the flow path is inoperable it shall be restored to operable status within 7 days.

b. If an inoperable flow path is not restored to operable status within 7 days, then the affected unit shall be at hot shutdown within the next 12 hours and at cold shutdown within an additional 24 hours.

Bases

The Containment Hydrogen Control Systems are required at approximately 460 hours (19.2 days) following a LOCA to limit hydrogen concentration to 4.1 percent by volume.

The Containment Hydrogen Recombiner System is utilized as the primary method to maintain the post-accident containment atmosphere hydrogen concentration below its lower flammability limit of 4.1 percent by volume. The Containment Hydrogen Recombiner System includes a portable hydrogen recombiner which will be moved to the affected unit following a LOCA, anchored to its foundation, and connected to piping penetrations. Also included is a portable control panel, which will be locally mounted near the recombiner, anchored to its foundation and connected to its motor control center and the recombiner.

The Reactor Building Hydrogen Purge System is composed of a portable purging station and a portion of the Penetration Room Ventilation System. The purge system is operated as necessary (if the Containment Hydrogen Recombiner System is inoperable) to maintain the hydrogen concentration below the control limit.

The Containment Hydrogen Recombiner System is the preferable method of post-accident hydrogen control since it produces no radioactive gaseous release to the atmosphere. Therefore, the Containment Hydrogen Recombiner System will be utilized as the primary method to control the containment hydrogen concentration below 4.1 percent by volume.

Reference

FSAR, Section 15.16

4.4.3 CONTAINMENT HYDROGEN CONTROL SYSTEMS

Applicability

Applies to the Containment Hydrogen Control Systems.

Objective

To verify that the Containment Hydrogen Control Systems are operable.

Specifications

4.4.3.1 Containment Hydrogen Recombiner System In-place Testing

During each refueling outage, an in-place system test shall be performed on a recombiner unit. This test shall consist of:

a. Visual inspection of the system.

b. Connection of the hydrogen recombiner unit to the Reactor Building.

c. Hydrogen recombiner unit operation in the post-LOCA configuration with flow greater than 50 SCFM. Operation at recombination temperature is not required by this test.

4.4.3.2 Containment Hydrogen Recombiner System Operational Performance Testing

a. The testing requirement of this section may be performed without connecting the system to one of the Reactor Buildings.

b. The isolation flanges on the Containment Hydrogen Recombiner System permanent piping shall be leak tested on each unit at refueling to ensure adequate isolation.

c. At a refueling outage frequency:

1. Calibrate all recombiner instrumentation and control circuits.

2. Operate a recombiner unit at design flow rate ±10% and allow unit to reach recombination temperature.

4.4.3.3 Reactor Building Hydrogen Purge System Testing

a. Prior to declaring this system operable, a system test shall be performed.

b. This test shall consist of:

1. Visual inspection of the system.

2. Installation of new carbon and HEPA filters and in-place filter leakage test per ANSI-N510-1975 (minimum DOP efficiency 99%, minimum halogenated hydrocarbon removal 99%).

3. Connection of the system to a Reactor Building.

4. Flow measurement using flow instruments in the portable purging station.

5. Verification that the pressure drop across the combined HEPA filters and charcoal absorber banks is less than six inches of water at the system design flow rate (±10%).

6. Verification of the operability of the heater at rated power when tested in accordance with ANSI N510-1975.

Bases

The control panel mounted near the recombiner enables the operator to control and monitor system parameters for all functions of the recombiner system except containment isolation valve operation. The control and monitor functions include: process temperature indications, temperature control, flow indication, start/stop switch, low temperature timer and various annunciators. Therefore, the operational performance testing ensures operability.

The penetrations to and from the hydrogen recombiner are shared with the gaseous radiation monitoring pump. Since this pump is normally in operation and since there is no system isolation valve on the supply branch to the recombiner, the blind flanges are the only means of system isolation. Therefore, these flange joints should be leak tested periodically to ensure adequate isolation.

The hydrogen recombiner unit performance test should be conducted with full flow and with the heaters energized. The capability of the recombiner to achieve the required recombination temperature and flow rate is considered an adequate test of recombination efficiency. Gas inlet and outlet sampling is not required.

The pre-operational testing requirements for the Reactor Building Hydrogen Purge System are applicable only when the system is required to be operable as required by Technical Specification 3.16.1.c. Requirements for interim surveillance testing of the Reactor Building Hydrogen Purge System during any period of its required operability will be reported to the NRC as described in Technical Specification 3.16.1.d.

New carbon and HEPA filters are installed during pre-operational testing. HEPA filters are installed before the charcoal adsorbers to prevent clogging of the iodine adsorbers. The charcoal adsorbers are installed to reduce the potential release of radioiodine. Bypass leakage for the charcoal adsorbers and particulate removal efficiency for HEPA filters are determined by halogenated hydrocarbon and DOP, respectively.

Attachment 2

Duke Power Company
Oconee Nuclear Station
Proposed Technical Specification Revision
No Significant Hazards Consideration Evaluation

No Significant Hazards Considerations Evaluation

Duke Power Company (Duke) has made the determination that this amendment request involves a No Significant Hazards Considerations by applying the standards established by the regulations in 10 CFR 50.92. This ensures that operation of the facility in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

The proposed technical specifications concern the use of hydrogen recombination as the method for controlling the post-accident Reactor Building hydrogen concentration. Specifically, the current Technical Specifications 3.16 and 4.4.3 provide requirements for operation and surveillance of the Reactor Building Hydrogen Purge System (RBHPS) as the method for post-accident hydrogen purging. The proposed technical specifications will permit the use of Containment Hydrogen Recombiner System (CHRS) as the primary method to control the post-accident Reactor Building hydrogen concentrations.

Section 15.16 of the Oconee Nuclear Station FSAR describes the post-accident hydrogen control. The FSAR provides detailed evaluation of hydrogen recombination acceptability as a method for controlling the Reactor Building hydrogen concentrations. The analyses conclude that recombination is the preferred technique for containment hydrogen control compared to purging since it does not result in offsite releases of radioactivity. Technical justification for this amendment request is provided in Attachment 3.

The proposed revision to the Oconee Technical Specifications to permit the use of CHRS as the method for post-accident hydrogen control involves no significant hazards considerations. Specific evaluations to the three criteria follow:

1) Involves a significant increase in the probability or consequences of an accident previously evaluated.

The FSAR evaluation of recombination to control hydrogen concentrations indicates that this method is a preferred means of post-accident hydrogen control. The CHRS has a greater capacity than the RBHPS. Furthermore, unlike the purge system, use of the recombiner will not increase offsite releases of radioactive materials. The use of hydrogen recombiner system provides additional protection and clearly an improvement in the margin of safety.

The proposed license amendment governs operability of the CHRS as the primary means for post-accident containment hydrogen control. The RBHPS will still be available when needed. The probability and consequences of accidents previously evaluated are not increased by this amendment request.

2) Create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed technical specification revision allows the use of CHRS with greater capacity to control hydrogen concentrations. Analysis performed in the FSAR does not indicate the possibility of a new or different kind of accident is created by this proposed license amendment.

3) Involve a significant reduction in a margin of safety.

The proposed license amendment provides requirements which govern the operation and maintenance of the CHRS as the main system for hydrogen concentration control and the RBHPS as a backup system if the CHRS is unavailable.

The proposed license amendment will improve the margin of safety in that the application of hydrogen recombination instead of purging as an alternate method for containment hydrogen control provides additional protection since it does not result in offsite releases of radioactivity.

In view of the preceding, the proposed license amendment is not considered to involve significant hazards considerations.

Attachment 3

Duke Power Company
Oconee Nuclear Station
Proposed Technical Specification Revision
Technical Justification

Technical Justification

The Oconee FSAR analyses show that hydrogen will be generated in the Reactor Building following a LOCA, but that the hydrogen concentration can be adequately controlled utilizing recombination or reactor building purging. A full description of these analyses is given in Section 15.16 of Oconee FSAR, Post-accident Hydrogen Control.

The current Oconee Technical Specifications 3.16 and 4.4.3 define the conditions necessary to assure the availability of the Reactor Building Hydrogen Purge System (RBHPS) as the means for the containment hydrogen control. The proposed Technical Specifications provide requirements which govern the operation and maintenance of the recently installed and operational Containment Hydrogen Recombiner System (CHRS). Although the CHRS will be utilized as the primary means for the post-accident hydrogen control, the RBHPS will be available if needed.

Recombination of hydrogen and oxygen in the reactor building atmosphere is an alternate and preferred means of post-accident hydrogen control. The CHRS has a greater capacity than the RBHPS. In addition, unlike the RBHPS, use of the recombiner will not increase offsite releases of radioactivity.

The Containment Hydrogen Recombiner System consists of 2 portable hydrogen recombiner, control panel for the recombiner, and a portion of the Penetration Room Ventilation System (PRVS). When needed, the recombiner will be moved to the affected unit, anchored to its foundation, and connected by flexible metal piping to PRVS piping which runs to and from containment penetrations. The control panel will be locally mounted near the recombiner.

The system functions by drawing air from the Reactor Building into a heater in the recombiner. As the air temperature increases, the hydrogen in the air combines with oxygen to form water vapor. The mixture is then returned to the reactor building. The design flowrate is 90 standard cfm, and the design recombination efficiency is 95% for hydrogen concentrations greater than 0.5 volume percent.

All piping and equipment necessary for the function of the CHRS are designed to withstand a Safe Shutdown Earthquake without a loss of function except CHRS power which, if interrupted, can be manually restored using alternate power sources.

Following an accident which results in hydrogen generation, the CHRS will be operated if the containment hydrogen concentration exceeds 3.5% by volume to maintain the hydrogen concentration below the lower flammability limit of 4.1% by volume. The conservative margin between the control limit and the lower flammability limit allows for measurement error, poor mixing, and permits interruption of hydrogen removal for significant periods of time.

As concluded in the Oconee FSAR, hydrogen recombination in an acceptable and reliable means of preventing excessive post-accident hydrogen concentrations in the Reactor Building at Oconee. Recombination is the preferred method, however, the proposed technical specifications also take advantage of purging

if the CHRS is unavailable more than 7 days. This time is much smaller than the time required for hydrogen concentrations to reach the control limit following an accident.