ENCLOSURE 1

PROPOSED CHANGES TO TECHNICAL SPECIFICATIONS
BROWNS FERRY NUCLEAR PLANT UNIT 3
DOCKET NO. 50-296

8009120 249

TABLE 3.2.F

Surveillance Instrumentation

Minimum # of Operable Instrument Channels	Instrument #	Instrument	Type Indication and Range	Notes
2	H_2M - 76 - 94 H_2M - 76 - 104	Drywell and To Hydrogen Concentration	0.1 - 20%	(1)
2	PdI-64-137 PdI-64-138	Drywell to Suppression Chamber Differential pressure	Indicator 0 to 2 psid	(1) (2) (5)

3.7 CONTAINMENT SYSTEMS

H. Containment Atmosphere Monitoring (CAM) System - H_2 Analyzer

1. Whenever the reactor is not in cold shutdown, two independent gas analyzer systems shall be operable for monitoring the drywell and the torus.

2. With one hydrogen analyzer inoperable, restore at least two hydrogen analyzers to OPERABLE status within 30 days or be in at least HOT SHUTDOWN within the next 24 hours.

3. With no hydrogen analyzer OPERABLE the reactor shall be in HOT SHUTDOWN within 24 hours.

4.7 CONTAINMENT SYSTEMS

H. Containment Atmosphere Monitoring (CAM) System - H_2 Analyzer

1. Each hydrogen analyzer system shall be demonstrated OPERABLE at least once per quarter by performing a CHANNEL CALIBRATION using standard gas samples containing a nominal eight volume percent hydrogen balance nitrogen.

2. Each hydrogen analyzer system shall be demonstrated OPERABLE by performing a CHANNEL FUNCTIONAL TEST monthly.

Inerting

The relatively small containment volume inherent in the GE-BWR pressure suppression containment and the large amount of zirconium in the core are such that the occurrence of a very limited (a percent or so) reaction of the zirconium and steam during a loss-of-coolant accident could lead to the liberation of hydrogen combined with an air atmosphere to result in a flammable concentration in the containment. If a sufficient amount of hydrogen is generated and oxygen is available in stoichiometric quantities, the subsequent ignition of the hydrogen in rapid recombination rate could lead to failure of the containment to maintain low leakage integrity. The <4% hydrogen concentration minimizes the possibility of hydrogen combustion following a loss-of-coolant accident.

The occurrence of primary system leakage following a major refueling outage or other scheduled shutdown is much more probable than the occurrence of the loss-of-coolant accident upon which the specified oxygen concentration limit is based. Permitting access to the drywell for leak inspections during a startup is judged prudent in terms of the added plant safety offered without significantly reducing the margin of safety. Thus, to preclude the possibility of starting the reactor and operating for extended periods of time with significant leaks in the primary system, leak inspections are scheduled during startup periods, when the primary system is at or near rated operating temperature and pressure. The 24-hour period to provide inerting is judged sufficient to perform the leak inspection and establish the required oxygen concentration.

To ensure that the hydrogen concentration is maintained less than 4% following an accident, liquid nitrogen is maintained on-site for containment atmosphere dilution. About 2260 gallons would be sufficient as a 7-day supply, and replenishment facilities can deliver liquid nitrogen to the site within one day; therefore, a requirement of 2500 gallons is conservative.

Following a loss-of-coolant accident the Containment Air Monitoring (CAM) System continuously monitors the hydrogen concentration of the containment volume. Two independent systems (a system consists of one hydrogen sensing circuit) are installed in the drywell and the torus. Each sensor and associated circuit is periodically checked by a calibration gas to verify operation.

Failure of one system does not reduce the ability to monitor system atmosphere as a second independent and redundant system will still be operable.

In terms of separability, redundancy for a failure of the torus system is based upon at least one operable drywell system. The drywell hydrogen concentration can be used to limit the torus hydrogen concentration during post LOCA conditions. Post LOCA calculations show that the CAD system within two hours at a flow rate of 100 scfm will limit the peak drywell

Inerting (Cont'd)

and wetwell hydrogen concentration to 3.9% (at 3 hours) and 3.9% (at 32 hours), respectively. This is based upon purge initiation after 20 hours at a flow rate of 100 scfm to maintain containment pressure below 30 psig. Thus, peak torus hydrogen concentration can be controlled below 4.0 percent using either the direct torus hydrogen monitoring system or the drywell hydrogen monitoring system with appropriate conservatism ($\leq$ 3.9%), as a guide for CAD/Purge operations.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT

PRIMARY CONTAINMENT HYDROGEN MONITORING SYSTEM

Each reactor is equipped with two totally independent systems for monitoring hydrogen concentrations in the drywell and the torus. Each system includes a Hays Republic Division, Milton Roy Company, Model 643D Condutherm thermal conductivity type gas analyzer, sample pumps, sample moisture removal equipment, and associated valves and controls, all mounted in a cabinet external to the primary containment. Gas samples are withdrawn from either the drywell or the torus for analysis.

The hydrogen analyzers use the principle of thermal conductivity to analyze the concentration of hydrogen in a gas mixture containing primarily nitrogen. The thermal conductivity of the sample changes linearly with the change in hydrogen concentration. The analyzer assembly consists of two identical electrically self-heated, glass-covered, temperature-sensitive resistors which are mounted in separate chambers in the analyzer cell block. These resistors form two legs of a Wheatstone bridge. A reference gas with known thermal conductivity diffuses into one of the cell chambers (the reference cell), and the drywell or torus sample diffuses into the other chamber (the measuring cell). The reference gas absorbs heat from the reference resistor in direct ratio to its thermal conductivity. The amount of heat absorbed remains constant since the reference gas has a constant thermal conductivity, maintaining the temperature and the resistance of the reference resistors constant. The sample gas absorbs heat from the measuring resistor in direct ratio to its thermal conductivity. As the composition of the sample gas changes, its thermal conductivity changes. This causes the amount of heat absorbed by the measuring resistor to change, changing the resistance of the measuring resistor. The Wheatstone bridge is calibrated so that 0 percent hydrogen balances the bridge, producing no electrical output. As the resistance of the measuring resistor changes, the bridge becomes unbalanced, producing an electrical output that is proportional to the hydrogen concentration in the gas sample. This signal is transmitted to a recorder in the control room.

Monitoring is continuous with an accuracy of 2 percent. No special operating procedures are required.

Each system is qualified for samples at 340° F, 45 psig, 100 percent RH, and post-LOCA fission product activity. All piping, cabling, the equipment cabinets, valves, readouts, and recorders are seismic Class I. Each system is powered from separate electrical fuses. All sample lines which penetrate the primary containment are equipped with one inboard and one outboard isolation valve per line.

Each system is designed to fully comply with the requirements of NUREG 0578 and Regulatory Guide 1.7 for primary containment hydrogen monitoring.