TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

May 21, 1980

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Denton:

In the Matter of the	)	Docket Nos. 50-259
Tennessee Valley Authority	)	50-260
		50-296

As requested by T. A. Ippolito of your staff in a May 12, 1980, telephone conversation, enclosed is additional information concerning the calibration requirements of the containment atmosphere monitoring system hydrogen sensors. This additional information provides further clarification to the reportable occurrence (BFRO-50-259/8039) previously submitted to the NRC on May 8, 1980.

Accordingly, TVA rescinds the request for proposed changes to the Browns Ferry technical specifications (BFNP TS 138) submitted to you on May 9, 1980.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills by RHL

L. M. Mills, Manager
Nuclear Regulation and Safety

Enclosure

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ADDITIONAL INFORMATION REGARDING

CALIBRATION OF HYDROGEN SENSORS

BROWNS FERRY NUCLEAR PLANT

The Containment Atmosphere Monitoring System (CAM) at Browns Ferry Nuclear Plant consists of hydrogen monitors located inside the containment. Four sensors are located in the drywell and two are in the torus. Only two sensors in the drywell and one in the torus are in active service at any time with the remaining sensors acting as backup. The purpose of the sensors is to monitor hydrogen concentration in the containment post-LOCA to provide guidance for use of the Containment Atmosphere Dilution System (CAD). TVA has previously prepared a design change to move the sensors outside the containment to improve the maintainability during unit operation (access considerations). This modification will be done during the fall 1980 refueling on units 2 and 3 and during spring 1981 on unit 1. The installation work is significant since sample lines must be brought outside the containment. We estimate about four weeks critical path time is involved.

Original sensor procurement specifications indicated that the hydrogen sensors manufactured by the General Electric Company (Valley Forge) were to have an accuracy of ± 2 percent of scale with a range of 0-20 percent hydrogen concentration. GE, during a recent reevaluation of the environmental qualification of instrumentation, has identified certain areas where the CAM sensor accuracy has not been fully qualified within the original accuracy specification. The deviations were identified in TVA's report to NRC (I&E Atlanta) on May 8, 1980. Detailed discussion on each point follows.

Operation Above 200°F

The hydrogen sensors have been integrity qualified up to 340°F. GE has informed us that the instrument accuracy cannot be guaranteed to be within specifications above 200°F. This does not appear to be a significant shortcoming since LOCA analyses indicate that drywell temperatures will return to 175°F within 15 minutes of the LOCA (when containment cooling is initiated) and decline steadily thereafter. Torus temperatures are expected to be no greater than 130°F. Also, as informed by GE, the accuracy of the sensors, after experiencing a temperature transient above 200°F, is qualified to be within ± 7.5 percent of full scale (20 percent) for temperatures below 200°F. This accuracy is based on a GE analysis of hydrogen sensor test data acquired in sensor qualification testing to determine maximum expected error assuming post-LOCA operation of the CAM system hydrogen sensors without the recommended initial post-LOCA recalibration.

Sulfuric Acid Concentration

In May 1979, GE incorporated a product improvement which reduced the sulfuric acid concentration from 60 to 25 percent. This improvement was made for two reasons.

1. The reduced acid concentration was safer to work with in the manufacturing process.

2. Manufacturing data indicated the high acid concentration was responsible for an increased corrosion and leakage problem resulting in reduced sensor life. The reduced acid concentration was expected to increase sensor life and reliability.

Based on GE's evaluation of the manufacturer's data, total requalification of the sensors should not be necessary due to the acid concentration change. GE, however, is reevaluating these data to determine if further testing is recommended..

Radiation Field Performance

The CAM hydrogen sensors were originally qualified by subjecting the sensor to a radiation dose of approximately 3.2×10^7 RAD. The primary intent was to demonstrate that the sensor's performance was not degraded by radiation effects on sensor material. Based on the results of this test, GE concluded that the sensor's performance was unaltered by the radiation exposure. GE is, however, expanding the scope of the radiation tests and new tests are scheduled to be performed this summer.

Calibration After 27°F Change

Based on the results of extensive vendor testing, the manufacturer has indicated that the original accuracy specifications can be assured only if the CAM sensor ambient temperature is within 27°F of the calibration temperature. The hydrogen sensors are factory tested before shipment at 135°F and 185°F. The test acceptance criteria calls for a ±5 percent accuracy rather than the ±2 percent criteria in the instrument specifications. The torus sensors are calibrated at approximately 80°F and the drywell sensors at 130°F. DBA LOCA temperatures will raise the ambient temperature greater than 27°F from the calibration temperatures. GE has accordingly recommended that the sensors be recalibrated following a LOCA to maintain specified accuracy. This calibration may be performed entirely from the control room and will permit an accurate H_2 concentration measurement within 6-8 hours. At least one sensor will be held in service while the others are being calibrated.

To ensure that the hydrogen concentration is maintained below four percent, operating instructions will be altered to initiate the CAD system while allowing for the possible presence of the additional instrument error (7.5 percent). Present analyses (assuming the worst case) indicates that the CAD system would not be needed for at least two hours. Analysis also indicates that with the earlier operation of the CAD system, hydrogen concentration levels and offsite dose limits are not exceeded. Once the hydrogen monitors are recalibrated to specification accuracy, CAD system operation may be returned to an as-needed basis.

Applicable surveillance and operating instructions will be altered to reflect the considerations expressed above. We are also working with GE to resolve specifics of the stated concerns regarding additional testing. TVA realizes the overall advantages of removing these instruments outside the DBA environment as a long-term solution. We accordingly commit to relocating the sensors at the next refueling outage for each respective unit.