TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

September 20, 1983

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the Application of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-391

Enclosed are TVA's responses to the postaccident sampling system items identified as license condition 19 in the Watts Bar Safety Evaluation Report. As indicated in response to question 1, details of the interim methodology for estimating core damage will be provided by December 2, 1983 for NRC approval.

If you have any questions concerning this matter, please get in touch with D. B. Ellis at FTS 858-2681.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me
this 20th day of September 1983

Paulette N. White
Notary Public
My Commission Expires 9-5-84

Enclosure
cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

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ENCLOSURE

WATTS BAR NUCLEAR PLANT
RESPONSE TO NRC SAFETY EVALUATION REPORT (SER)
LICENSE CONDITION 19
SER SECTION 9.3.2
NUREG-0737 ITEM II.B.3 POSTACCIDENT SAMPLING CAPABILITY

Question 1

Provide a procedure for relating radionuclide gaseous and ionic species to estimated core damage.

Response

TVA is presently preparing an interim method for estimating core damage. Details of this interim methodology will be submitted by December 2, 1983 for NRC approval.

Also, the Westinghouse Owners Group (WOG) has recently decided to commission the preparation of a final generic methodology for estimation of core damage. As a member of the WOG, we expect to use this final methodology after its development.

Question 2

Verify that chloride analysis can be completed within 4 days following an accident which requires postaccident sampling.

Response

The required chloride analysis will be performed within 4 days of an accident which requires postaccident sampling. This analysis will be done inline, with undiluted samples, using the Sentry Equipment Corporation (SEC) chemical analysis panel (CAP) which uses a Dionex model 10 ion chromatograph.

Question 3

Demonstrate the capability of analyzing the grab samples and verify that equipment provided for backup sampling shall be capable of providing at least one sample per day for 7 days following onset of the accident and at least one sample per week until the accident condition no longer exists.

Response

Portions of the chemical analysis on the reactor coolant is done inline by the SEC CAP. These analyses are chloride, dissolved hydrogen, dissolved oxygen, and pH. Boron analysis will be performed by an offline method. See the response to the next question for the accuracy, range, and sensitivity of the CAP.

Sample acquisition is performed by the SEC liquid sampling panel (LSP), containment air sample panel (CASP), and their associated control panels. During accident conditions, the following samples can be obtained from the LSP:

a. Undiluted and diluted (1000:1) liquid grab samples of the reactor coolant.

b. An inline sample of reactor coolant which is depressurized and degassed in place, and the stripped gas and depressurized coolant is sent to the CAP.

c. Diluted (15000:1) stripped gas grab samples from the pressurized liquid sample.

The LSP uses shielded cart/casks for the removal of the reactor coolant. The cask is mounted on a cart which allows the samples obtained to be mobile. A shielded syringe is used to acquire a 5-ml aliquot of (1000:1) diluted reactor coolant from the cart/cask and handcarry it to the onsite radiochemical laboratory where offline boron and isotopic analysis will be performed. At the laboratory the 5-ml sample will be put in a beaker shielded by 2-inch-thick lead bricks in a fume hood. Also a 15,000:1 dilution of the reactor coolant stripped gas from the reactor coolant system will be transported to the laboratory in a shielded carrier. Further dilutions, if necessary, will be made using gas syringes in a shielded fume hood for isotopic analysis.

See the response to question 4 for a discussion of the boron analysis.

Also, CASP samples can be collected in shielded cart/casks. These cart/casks are similar to those described for the LSP. The Radiological and Chemical Technologies (RCT) containment air separations device is used, in the sample station, to separate particulates, iodines, and noble gases. Particulates and iodines are trapped on filters and the nobles gases are then collected in a sample vial. These devices provide samples that are easily handcarried and isotopically analyzed. Isotopic analysis of these containment air samples will be performed in the existing plant radiochemical laboratory.

After completion of the sampling and analysis operations, lines of the SEC LSP, CASP, and CAP can be flushed to reduce residual radioactivity. Lines in the LSP are flushed with demineralized water; argon can then be used to dry the lines after flushing operations have been completed. CASP lines are flushed with nitrogen. All internal liquid and gas lines of the CAP and those lines that are connected to the LSP and CASP can be flushed with demineralized water and/or nitrogen.

The SEC system provides both manual and inline features for sample acquisition and analysis. By having this flexibility and the features discussed above, the SEC system should be able to supply one sample per day for seven days and, as a minimum, one sample per week until the accident condition no longer exists.

Question 4

Describe the procedures for onsite radiological and chemical analyses and provide the accuracy, range, and sensitivity of these analyses in an accident chemistry and radiation environment (that is, the presence of large amounts of fission products and a high radiation field in the samples).

Response

As stated in TVA's response to question 3, portions of the chemical analyses will be performed by the SEC CAP. The range and accuracy of this equipment is stated below:

Analysis	Range	Accuracy
Chloride Concentration	100-1000 ppb	± 15%
	1-20 ppm	± 20%
Dissolved Hydrogen	10-2000 cc/Kg	± 15%
Dissolved Oxygen	0-20 ppb	± 10%
	0-200 ppb	
	0-20 ppm	
Dissolved Oxygen	0.1-5 ppm	± 10%
	1-10 ppm	
	1-20 ppm	
pH Determination	pH 1-13	± 0.5%

Instrumentation in the CAP that performs inline analysis was tested in a radiation environment. The following is an example of the chemical composition of the solution:

Constituent	Concentration (ppm)	Chemical Prepared from
I^-	39	Potassium Iodide
Cs^+	246	Cesium Nitrate
Ba^{+2}	8.1	Barium Nitrate
La^{+3}	2.3	Lanthanum Chloride
Ce^{+4}	5.3	Ammonium Cerium Nitrate
Cl^-	1.8	
B	2000	Boric Acid
Li^+	1.98	Lithium Hydroxide
NO^-	136	
NH^+	1.4	
K^+	12	

The above information was taken from a document, R-27-4-1-1, prepared by Nuclear Utilities Services (NUS) titled "Development of Procedures and Analysis Methods for Postaccident Reactor Coolant for Sentry Equipment Corporation, April 1981."

The CAP inline analysis equipment that performs portions of the required analysis is as follows:

a. Baseline Gas Chromatograph - Model 1030A

b. Beckman pH Monitor - Model 960B

c. Dionex Ion Chromatograph - Model 10

d. Rexnord Dissolved Oxygen Analyzer - Model 3400-5

e. YSI Dissolved Oxygen Analyzer - Model 56

The boron analysis will be performed using a Dionex ion chromatograph using 2-ml of the 1000:1 diluted sample. The analysis has a range of 0.5 ppm to 20 ppm and has an uncertainty less than 6-percent (2-sigma percent error). This analysis will be performed by a laboratory analyst. The remainder of the 1000:1 diluted reactor coolant will be further diluted, as required, to perform an isotopic analysis on the reactor coolant if the original activity is as high as 10 Ci/g. The sensitivity of the isotopic analysis measurement is better than 1 μCi/g.

The anticipated postaccident radiation levels are not expected to have any measurable effect on the accuracy of measurement and negligible effect on the operating lifetime of components exposed to radiation. These conclusions are based upon information provided by the equipment supplier, limited testing results, literature reviews, and contacts with experienced personnel engaged in similar analyses under high radiation levels.

Portions of the SEC inline analysis will be backed up by the shipment of undiluted reactor coolant to an offsite laboratory for analysis. Arrangements have been made for a DOT-approved shipping cask and TVA will contract with an offsite laboratory for analysis. The analyses to be performed, by the offsite laboratory, are pH, chloride, boron, and gamma-ray spectroscopy.

TVA procedures for postaccident sampling and analysis will be prepared from those provided by SEC in their High Radiation Sampling System Operating and Maintenance Manual, except for the boron and gamma-ray spectroscopy analyses. All procedures will be issued before unit 1 fuel loading.

Question 5

Verify that provisions are available to restrict background radiation levels such that the sample analyses will provide results with a range of accuracy within a factor of 2.

Response

The isotopic analysis will be performed in a 4-inch lead shield or equivalent to reduce the background and produce results with a range of accuracy within a factor of 2. Also see the response to question 4.

Question 6

Verify that the sensitivity of onsite liquid sample analysis capability is such as to permit measurement of nuclide concentration in the range from approximately 1 μCi/g to 10 Ci/g.

Response

The liquid samples will be analyzed in the range of 1 μCi/g to 10 Ci/g by a multi-channel analyzer (MCA).

Question 7

Verify that the ventilation exhaust from the sample station will be filtered with charcoal adsorbers and high-efficiency particulate air filters.

Response

The exhaust air from the postaccident sampling facility is routed through an air cleanup unit during sampling operations. The air cleanup unit consists of a prefilter, electric heating coil, charcoal filter, and HEPA filters.

Question 8

Verify that the residues of sample collection will be returned to containment or to a closed system.

Response

During accident conditions, both liquid and gases sampling residues will be returned to the disabled reactor unit or a closed system.

Question 9

Provide information on testing frequency and type of testing to ensure long-term operability of the postaccident sampling system and on operator training requirements for postaccident sampling.

Response

Approximately 20 operators at Watts Bar will be trained initially. This initial training will be completed before unit 1 fuel loading. These operators will be retrained as testing indicates the need. The postaccident sampling capability will be tested annually.