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October 26, 1982

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

Subject: Byron Station Units 1 and 2
Braidwood Station Units 1 and 2
Post-Accident Samlping Systems
NRC Docket Nos. 50-454, 50-455,
50-456, and 50-457

Reference (a): August 26, 1982 letter from T. R. Tramm to H. R. Denton.

Dear Mr. Denton:

This is to provide advance FSAR information regarding the Byron/Braidwood post-accident sampling system. NRC review of this information should make is unnecessary to impose License Condition 11 contemplated in the Byron SER.

Attachment A to this letter contains additions to items 1 and 9 of the response to FSAR question 281.7. Attachment B to this letter contains information explaining how this post-accident sampling system will be used to periodically check the calibration of the containment hydrogen monitor. This information will be incorporated into the Byron/Braidwood FSAR at the earliest opportunity.

One signed original and fifteen copies of this letter and the attachments are provided for your review. Please address further questions to this office.

Very truly yours,

T. R. Tramm

T. R. Tramm
Nuclear Licensing Administrator

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Attachments



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ATTACHMENT A

ADDITIONAL INFORMATION

BYRON/BRAIDWOOD POST ACCIDENT SAMPLING

Q281.7

Item 9: "Provide information on (a) testing frequency and type of testing to ensure long term operability of the Post Accident Sampling System and (b) operator training requirements for Post Accident Sampling."

Revised Response:

The Byron Station Post Accident Sampling System is the same system that will be used for routine sampling during normal operations of the plant by the Radiation Chemistry Department. The specific procedures for obtaining a diluted sample, transporting it to the high level laboratory or auxiliary counting room and analyzing it are the only activities which will not be routinely performed during normal operation. However, emergency planning exercises (drills), testing and a training program will address these specific procedures and maintain radiation chemistry personnel capable of operating the system in accident conditions. Based on this, minimal periodic training and testing will be required to maintain personnel competence and operability of the system. The following testing and training frequencies will be maintained:

A. Testing frequency of the Post Accident Sampling System will be at a minimum of yearly. All analysis functions for chloride, dissolved hydrogen, dissolved oxygen, pH, conductivity and boron will be verified.

B. Formal initial training will be given to all personnel responsible for operation of the Post-Accident Sampling System. Retraining will be given as necessary to maintain competence (minimum yearly).

Item 1: "Demonstrate compliance will all requirements of NUREG 0737, II.B.3, for sampling, chemical and radionuclide analysis capability under accident conditions."

II.B.3, Item 2: The licensee shall establish an onsite radiological and chemical analysis capability to provide, within the 3-hour time frame established above, quantification of the following:

(b) Hydrogen levels in the containment atmosphere

(c) Dissolved gases (e.g., H), chloride (time alloted for analysis subject to Item 5), and Boron concentration of liquids.

Additional responses:

(b) The ability to have a continuous indication of containment hydrogen concentration available in the control room is met with redundant Delphi* K-III hydrogen monitoring units. Their capability covers the range of 0% to 10% hydrogen concentration by volume over a pressure range of minus 5 psig (9.7 psia) to plus 60 psig at a temperature above saturation up to 300°F and relative humidity from 0% to 100%.

The analysis is accomplished by using the well established principle of thermal conductivity measurement. The measurement of hydrogen in the presence of nitrogen, oxygen, and water vapor is possible because the thermal conductivity of hydrogen is approximately seven times higher than nitrogen, oxygen, and water vapor, which have nearly the same thermal conductivities at the filament operational temperature of approximately 500°F. The measurement is accomplished by using a thermal conductivity cell and a catalytic reactor. The sample first passes through the reference section of the cell, then passes through the sample section of the measuring cell that includes the catalyst. The change in sample composition, due to the catalytic reaction is indicated by the difference measured in the sample and reference sides of the cell.

The operation of these monitors is such that several hours of warmup time for stabilization of the hot-box which houses the sample chamber is required. The hydrogen monitors will be maintained so that a hydrogen analysis can be performed within 3 hours. Actuation and control of the hydrogen monitors will be from the main control room or at the local panel.

(c) The high radiation sample system (HRSS) allows for in-line analysis of the reactor coolant system through the use of a chemical analysis panel (CAP) for chloride, dissolved hydrogen, dissolved oxygen, pH, and conductivity. Readout of the in-line analysis is contained on the chemical monitoring panel (CMP). In addition grab sampling capability are supplied to receive a 1 to 1000 diluted reactor coolant sample for transportation to the on-site lab for boron and isotopic analysis.

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Footnote: * The specific instrument listed is presently designed and installed in the High Radiation Sample System (HRSS). It should be noted that an equivalent instrument that meets the requirements of NUREG 0737 II.B.3 may be substituted as a result of testing, operational experience, changes in instrument technology or as deemed necessary by Byron Station.

For dissolved hydrogen analysis the HRSS captures pressurized reactor coolant in an in-line 30 ml sample flask and degasses it into a 300 cc evacuated expansion flask. Pressurized argon is introduced through the bottom of the 30 ml flask to: (1) strip residual gases from the coolant, and (2) increase pressure to approximately 10 psig. The pressurized stripped gas is routed to an evacuation line. This line connects the module with an evacuated chamber in the gas chromatograph for hydrogen analysis. The gas chromatograph utilized is a Baseline model 1030A* employing a dual column, thermal conductivity detector system to separate and measure hydrogen. The gas chromatograph system is capable of measuring dissolved hydrogen in the reactor coolant in the range of 10 to 2000 cc $H_2$/kg with an accuracy of $\pm$15%.

For dissolved oxygen analysis the HRSS supplies a depressurized reactor coolant sample to the CAP. The dissolved oxygen analysis is then performed using an in-line dissolved oxygen meter and temperature probe manufactured by the Yellow Springs Instrument (YSI) Company*. The minimum level of detection for the YSI meter is approximately 0.1 ppm. The accuracy of the instrument is $\pm$10% for the ranges 0.1-5, 1-10, and 1-20 ppm. The YSI has a recorder for both dissolved oxygen and temperature readings with the temperature range being -5$^{o}$ to 45$^{o}$C with an accuracy of $\pm$0.4$^{o}$C.

Chloride analysis is accompanied through the use of a modified model 10 ion chromatography (IC) unit manufactured by Dionex Corporation*. The IC unit removes a 0.20 ml sample from the depressurized reactor coolant supplied by the HRSS and transfers it into the chromatography section. The signal from the ion chromatograph recorder is transmitted to the CMP and recorded on the Speedomax* chromatograph recorder. The accuracy of the ion chromatograph for chlorides is $\pm$15% in the range of 100-1000 ppb and $\pm$10% in the range of 1-20 ppm.

Boron analysis is accomplished through the use of the 1 to 1000 diluted reactor coolant grab sample obtained by the HRSS. The diluted sample is removed from the HRSS and transported to the on-site lab into a mobile cask on a cart. In the laboratory the sample will be analyzed for boron using the fluoroborate selective ion electrode probe method which has a range of 0.5-2.0 ppm boron based upon the 1:1000 sample dilution) at an accuracy of +13% to -3.3% at 2.0 ppm boron and +34% to -24% at 0.5 ppm boron. The back-up method for boron analysis will be the curcumin spectrophotometric method which has a range of 0.5-2.0 ppm boron (corresponding to a reactor coolant range of 500 - 2000 ppm boron based upon the 1:1000 sample dilution) at an accuracy of $\pm$13%.

The HRSS has been designed to provide most analysis results within one hour after sampling is initiated. The exception is the Curcumin back-up boron analysis which requires 2 hours for the results after sampling.

II.B.3, Item 9: The licensee's radiological and chemical sample analysis capability shall include provisions to:

(a) Identify and quantify the isotopes of the nuclude categories discussed above to levels corresponding to the source terms given in Regulatory Guide 1.3 or 1.4 and 1.7. Where necessary and practicable, the ability to dilute samples to provide capability for measurement and reduction to personnel exposure should be provided. Sensitivity of onsite liquid sample analysis capability should be such as to permit measurement of nuclide concentration in the range from approximately 1 uci/g to 10 uci/g.

Additional response:

Byron Station's radiological and chemical sample analysis capability will identify and quantify the isotopes of nuclide categories in Reg. Guide 1.3, 1.4 and 1.7. The sensitivity of the onsite liquid sample analysis capability will measure nuclide concentrations in the range from 1 uci/g to 10 uci/g.

ATTACHMENT B

Additional Information

Byron/Braidwood Containment Hydrogen Monitor

NUREG-0737 Item II.F.1, Attachment 6

Calibration

The hydrogen concentration in the containment (Unit 1 and Unit 2) will be measured at a minimum of two times a year and in a minimum time period of at least two months apart to verify operability of the $H_2$ monitors, subsequent to core load.

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