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January 5, 1984

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

Subject: Byron Generating Station Units 1 and 2
Postaccident Sampling Capability
NRC Docket Nos. 50-454/455

References (a): December 11, 1983 letter from T. R. Tramm to H. R. Denton

Dear Mr. Denton:

This letter provides additional information regarding the accuracy and sensitivity of analytical procedures and online instrumentation to be used for postaccident analysis of reactor coolant at Byron Station. This information is provided to support the generic review of such procedures and instrumentation which is describedin Section 9.3.2 of the Byron SER. NRC review of this information should make unnecessary the License Condition contemplated on page 9-21 of the SER.

Reference (a) provided the initial setup standardization data sheets for the high radiation sampling system measurements of dissolved oxygen, conductivity and pH. Data sheets for the remaining measurements (chloride, disssolved hydrogen, and boron) are enclosed with this letter.

Please direct questions regarding these data sheets to this office.

One (1) signed original and fifteen (15) copies of this letter and the enclosures are provided for NRC review.

Very truly yours,

T. R. Tramm

T. R. Tramm
Nuclear Licensing Administrator

Enclosures

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Post Accident Boron Analysis
Using the Fluoroborate Probe

Procedure BCP 300-4, "Post Accident Boron Analysis using the Fluoroborate Selective Ion Electrode and Sulfuric Acid" was used for calibration of the instrument and boron determination.

A calibration curve was generated (see attached) from the following data:

ppm Boron Standards	Millivoit MV Reading
0.0	362.7
0.5	359.0
1.0	351.2
2.0	338.1
3.0	227.0
5.0	304.1

The standards were prepared and run using the floroborate probe:

ppm Boron Standards	Millivolt MV Reading	ppm Boron	% error
1.0	349.0	1.1	10.0
1.5	343.1	1.6	6.7
2.0	336.4	2.18	9.0
2.0	336.0	2.19	9.5
2.5	332.3	2.5	0.0

NUS Corp. has determined that the error for this analysis is as follows:

At a 95 percent confidence level: +13 percent/-3.3 at 2 ppm boron and +34 percent/-24 percent at 0.5 ppm boron.

This meets the FSAR post accident boron requirements.

Additional Methods

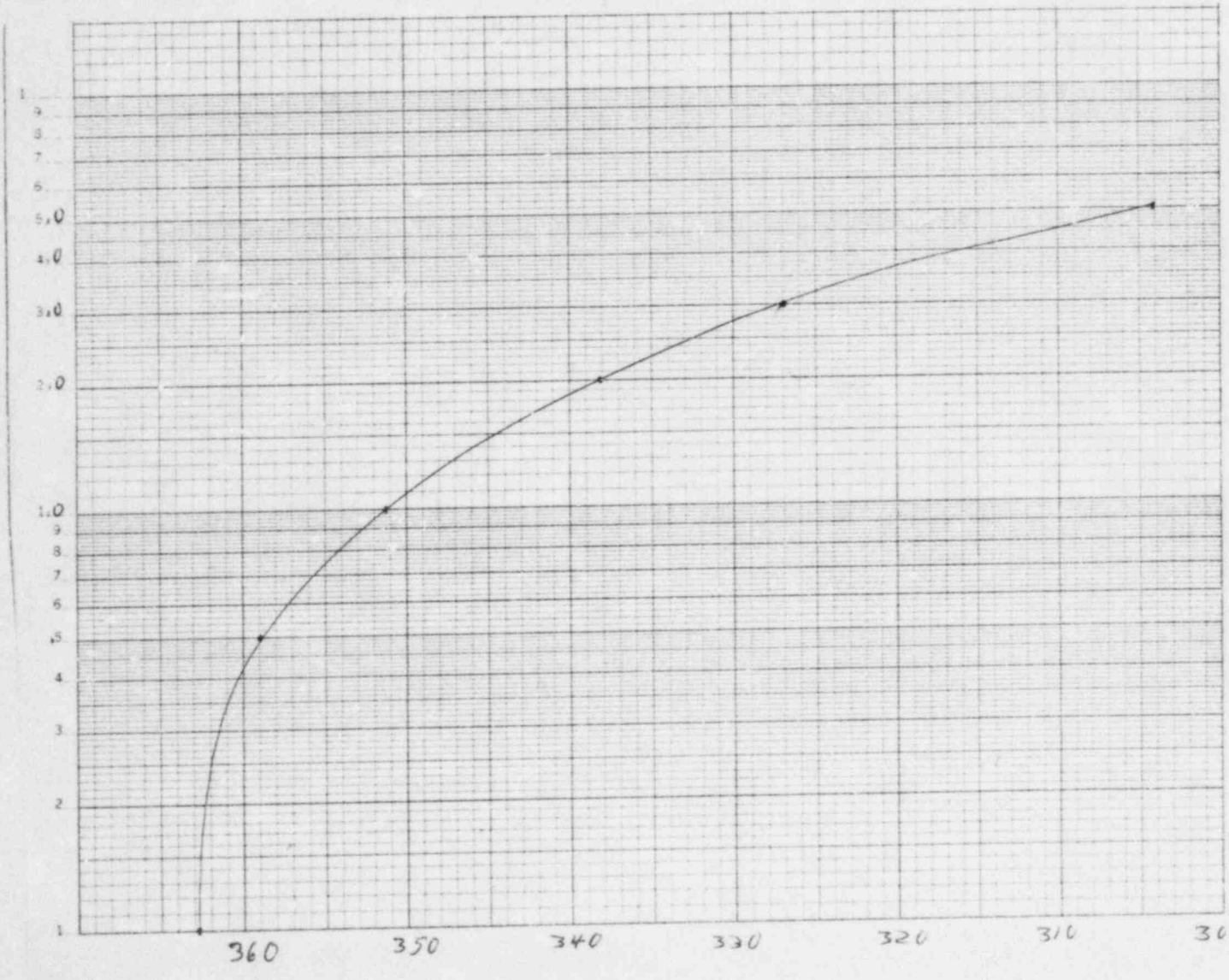
The backup method to the Fluoroborate method is the Curcumin mehtod, Byron Procedure BCP 800-5.

At this time Commonwealth Edison is examinating an additional method with greater accuracy using the Ion Chromatograph to determine boron in a post accident condition.

POST ACCIDENT BORON ANALYSIS FLUOROBORATE WORKSHEET

ANALYST: DH
DATE/TIME: 11-9-93 1100

PPM BORON (Log Axis)	MV READING (Beaker Stirring)	MV READING (Microdish--Static)
0.0	362.7	—
0.5	359.0	—
1.0	351.2	—
2.0	338.1	—
3.0	327.0	—
4.0	—	—
5.0	304.1	—



Unit 1 HRSS Ion Chromatograph
Chloride Analysis Initial Setup Data Sheet

This performance verification data is intended to fulfill the objectives for chloride analysis by the HRSS panel as stated in the following documents:

a. Attachment No. 1 to Post Accident Sampling System NUREG 0737, II.B.3, Evaluation Criteria Guidelines, Criteria No. 5 and No. 10.

b. Letter dated October 26, 1982, from T. Tramm to H. R. Denton

c. Byron FSAR, Question and Answer 281.7.

d. Reg. Guide 1.97, Table 2.

Instrument:

Dionex Ion Chromatograph, Model 10

Criteria for Chloride Analysis:

Imposed Criteria	Document Requiring
Analysis to be completed in 4 days	NUREG 0737, II.B.3, Criterion 5
For 0.5 to 20 ppm Chloride, +/- 10% accuracy; for below 0.5 ppm Chloride, +/-0.05 ppm accuracy.	NUREG 0737, II.B.3, Criterion 10
Analysis range of 0 to 20 ppm	Reg. Guide 1.97, Table 2

Tests Performed:

a. Time to complete analyses:

Repeated timings of analyses indicate that performance of the chloride analysis by the inline ion chromatograph at the HRSS Sample Panel can easily be accomplished in less than 4 hours.

b. Analysis Range and Accuracy:

Test #1: The first series of analyses were performed to test the overall range and accuracy of the instrument. A 1.0 ppm chloride standard (Byron QC #83-447) and a 1000 ppm chloride standard (#83-522) were prepared from which several other standards were prepared by dilution of the

original 2 solutions. The various standards were analyzed at the Sample Panel with the Dionex Ion Chromatograph. Three series of the analyses were performed, each using a different range on the ion chromatograph conductivity meter. Then, the same standards were analyzed in the laboratory by a Dionex Model 2020i Ion Chromatograph and a Graphic Controls Company model PHI-91100 Ultra Sensitive Chloride Electrode. The laboratory analyses were performed primarily to verify that the standards were accurate and to demonstrate the capability of the Sample Panel instrument as compared to other available methods. The instrument readings were as follows:

Chloride Concentration	Sample Panel Ion Chromat. Series A	Series B	Series C	Laboratory Ion Chrom.	Laboratory Probe
0.10 ppm	0.16 ppm	0.21 ppm	N/A	0.22 ppm	0.14 ppm
0.20 ppm	0.19 ppm	0.21 ppm	N/A	0.38 ppm	0.12 ppm
0.50 ppm	0.50 ppm	0.50 ppm	N/A	0.71 ppm	0.47 ppm
1.0 ppm	N/A	1.0 ppm	1.0 ppm	0.97 ppm	0.98 ppm
2.0 ppm	N/A	2.0 ppm	2.0 ppm	2.8 ppm	1.9 ppm
5.0 ppm	N/A	5.2 ppm	5.0 ppm	5.8 ppm	5.0 ppm
10.0 ppm	N/A	N/A	9.8 ppm	15 ppm	9.8 ppm
20.0 ppm	N/A	N/A	18 ppm	N/A	N/A

Conclusion: The results of the analyses performed at the Sample Panel utilizing the ion chromatograph were within the specified criteria for range and accuracy.

Unit 1 - HRSS Baseline Gas Chromatograph
Hydrogen Analysis Initial Setup Data Sheet

INTENT: This performance verification data is intended to fulfill the requirements for hydrogen analysis at the HRSS sample panel as stated in:

1) Reg. Guide 1.97
2) Criteria #10 of Attachment No. 1 to Post Accident Sampl. Sys., NUREG 0737, II.B.3 Evaluation Criteria Guidelines

INSTRUMENT: Baseline Model 1030A Gas Chromatograph with Leeds and Northrup Speedomax M Mark 111 Recorder.

CRITERIA FOR HYDROGEN ANALYSIS:

An accuracy of ±20% shall be demonstrated in the range of 50 to 2000 cc/kg and ±5% in the range below 50 cc/kg hydrogen for the reactor coolant stripped gas analysis.

TEST PERFORMED: Calibration curves were generated for Hydrogen Concentration verses Peak Height as described in Sentry Equipment Manual, Volume I, Section N. High and Low standards were analyzed and plotted for attenuation factors of 100 and 500. Intermediate concentrations were then analyzed and plotted for their respective attenuation settings. Actual analyses and resultant percentage of error are as follows:

ATTENTUATION 100

99.9% H2	ACTUAL cc/ks	PEAK HEIGHT	CALCULATED cc/ks	% of ERROR
1.0 cc	31.0	7.0	31.0	0.0
1.5 cc	46.5	13.5	45.5	-2.1
4.0 cc	124.2	52.0	142.0	12.5
5.0 cc	155.3	58.0	155.3	0.0

ATTENTUATION 500

99.9% H2	ACTUAL cc/ks	PEAK HEIGHT	CALCULATED cc/ks	% of ERROR
30.0 cc	931.7	160	931.7	0.0
40.0 cc	1242.0	165	1437.5	13.6
50.0 cc	1553.0	170	1662.5	1.0
60.0 cc	1863.0	172	1863.0	0.0

NOTE: Calculated cc/kg values are determined from Sentry Manual by the following:

$$\frac{(\text{cc of } H_2) \times \frac{273}{273+20}}{0.030} = \text{cc/kg}$$

NOTE: 0.030 = RCS (reactor coolant system) volume that is depressurized.

CONCLUSION: This instrument is operational for accuracy within the criteria listed above.

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