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December 11, 1983

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 and 50-455.

Dear Mr. Denton:

This letter provides 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 described in 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.

Enclosed are the initial setup standardization data sheets for the high radiation sampling system measurements of dissolved oxygen, conductivity and pH. Data sheets will be submitted by January 15, 1984 for the remaining measurements: chloride, dissolved hydrogen, and boron.

Please direct questions regarding there data sheets to this office.

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

Very truly yours,

T. R. Tramm

T. R. Tramm

Enclosures
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UNIT-1 HRSS DISSOLVED OXYGEN PROBES INITIAL SETUP STANDARDIZATION DATA SHEET

Intent: This performance verification data is intended to fulfill the requirements for dissolved oxygen (d.o.) analysis by the HRSS Sample Panel as stated in the following:

Reg. Guide 1.97, Appendix II.B.3, criterion 4, clarification in letter from F. G. Lentine (NRC) to R. E. Querio dated February 7, 1983;

Reg. Guide 1.97, Table 2;
NUREG 0737 (clarification of Reg. Guide 1.97);
Byron FSAR, Question and Answer 281.7;
letter dated October 7, 1982 from R. E. Querio to T. Tramm (Byron 82-710).

Instruments:

a. YSI Model 56 Dissolved Oxygen Monitor

b. Rexnord Model 3400-5 Dissolved Oxygen Analyzer and Model 60 Probe

Criteria for Dissolved Oxygen Analysis:

Imposed Criteria	Document Requiring
Detect dissolved oxygen 0.10 ppm when chloride is 0.15 ppm in reactor coolant.	F. G. Lentine letter to R. E. Querio and NUREG 0737
Range of 0 to 20 ppm	Reg. Guide 1.97, Table 2
Accuracy of +/- 10 percent, and detectability at 0.10 ppm	Byron FSAR, Q. & A. 281.7; and R. E. Querio letter to T. Tramm

Tests Performed:

a. The first series of analyses was performed to test both instruments' capability of detecting dissolved oxygen in the presence of chloride. Two standard solutions were made up and analyzed by the instruments. Both solutions were made dissolved oxygen free by stirring 60 grams per liter of sodium sulfite into the closed solution containers containing deionized water. Chloride standard was added to both solutions so that the first solution was dissolved oxygen free and 0.2 ppm chloride (Byron Q. C. 83-487) and the second solution was dissolved oxygen free and 2.0 ppm chloride (Byron Q. C. 83-488). Both instruments were withdrawn from their respective sample wells and inserted into air-tight sample wells, each containing one of the test solutions. The instrument readings were as follows:

Instrument	0.2 ppm Cl-	2.0 ppm Cl-	Time in Each Solution
Rexnord	32 ppb d.o.	14 ppb d.o.	after 120 minutes
YSI	0.13 ppm d.o.	0.15 ppm d.o.	after 5 minutes
	$<$0.10 ppm d.o.	$<$0.10 ppm d.o.	after 10 minutes

Dissolved Oxygen (continued)

Sodium sulfite is known to cause inaccuracies in probe analysis of dissolved oxygen which may account for the instruments not responding more quickly, and also account for neither indicating closer to 0.0 ppm dissolved oxygen concentration. However, both were able to detect d.o. close to their respective lower limits of detectability in the presence of chloride.

b. The second series of analyses was performed to verify each instruments' range and accuracy and lower limit of detectability. Each instrument was tested against three solutions: solution #1 was made dissolved oxygen free by adding 60 mg. sodium sulfite per liter of deionized water; solution #2 was made air saturated by utilizing the spray apparatus installed at the HRSS Sample Panel; solution #3 was the Primary Water Makeup Pump effluent that is available at the panel as flush water. The d.o. concentration for the air-saturated solution (#2) was determined from the table provided by Sentry Equipment Corp. The d.o. concentration for the P.W. Makeup water was verified by a calibrated probe maintained in the Chemistry Lab. The probes were tested against solution #1 by withdrawal from their installed wells and emersion into the sample solution. Analyses against solution #2 and #3 were made in the normal manner with the probes left in their respective installed sample wells.
The Rexnord meter readings were allowed 2 hours to stabilize; the YSI meter readings were allowed 5 minutes to stabilize. The instrument readings were as follows:

Instrument	Solution #1	Solution #2	Solution #3
Rexnord	$\leq$ 0.2 ppb d.o. ##	8.0 ppm d.o.	1.8 ppm d.o.
YSI	$\leq$ 0.5 ppm d.o. ##	8.7 ppm d.o.	2.1 ppm d.o.
Sentry Table	N/A	8.2 ppm d.o.	N/A
Lab d.o. probe	N/A	N/A	2.7 ppm d.o. **

Smallest increments on the respective meter faces.

** This sample had to be grabbed and transported to the lab which could have introduced air to the sample and probably account for the higher reading.

For the YSI analyzer, the manufacturer states that the dissolved oxygen accuracy will be within +/-3% over all ranges from 0 ppm to 20 ppm dissolved oxygen. For the Rexnord analyzer, the manufactures makes no accuracy claim but states that the range is 0 to 20 ppm dissolved oxygen. Given the difficulty of making up dissolved oxygen standards and maintaining the standards in an air-tight environment, the analyses performed tend to verify the requirements of +/-10% accuracy over a 0 to 20 ppm range and the requirement for detectability below 0.1 ppm dissolved oxygen.

Conclusion: This instrument is within the criteria listed above.

Note: Additional information concerning electronic calibration of these instruments is available from the Instrument Maintenance Department.

UNIT-1 HRSS CONDUCTIVITY PROBE INITIAL SETUP STANDARDIZATION DATA SHEET

Intent: This performance verification data is intended to fulfill the requirement stated in the Byron FSAR Question and Response 281.7 (Amendment 40) and reiterated in a letter from R. E. Querio to T. Tramm dated Oct. 7, 1982 (Byron 82-710).

Instrument: Leeds and Northrup Model 7073-17 Industrial Conductivity Monitor

Criteria for Conductivity Analysis: No specific performance criteria is applied to this instrument. The instrument is only required to be installed and operational.

Tests Performed: It is extremely difficult to make up low level conductivity standards. For this test, three essentially "unknown" conductivity solutions were made up and analyzed in this order by the following instruments:

Analysis #1 - by certified conductivity cell in laboratory
Analysis #2 - by portable instrument (non-certified) in the field at the HRSS panel
Analysis #3 - by installed HRSS conductivity cell
Analysis #4 - by certified conductivity cell in laboratory (same instrument as analysis #1)

For this test, the installed HRSS conductivity cell was withdrawn from its well and dipped in the test solution. Also, no attempt was made to predict or factor out the effect of exposure to air on the conductivity of the test solution but this effect is demonstrated by comparing the results of analyses #1 and #4 (approximately 10% to 15% increase over the time of the test).

Results:	Solution #1	Solution #2	Solution #3	PWST grab
Analysis #1	64	7.1	1.3	N/A
Analysis #2	82	9.3	1.58	1.21
Analysis #3 (HRSS)	75	7.5	1.32	1.10
Analysis #4	73	8.1	1.54	N/A

Data Analysis:	Solution #1	Solution #2	Solution #3
Average reading (non-HRSS)	73	8.17	1.47
HRSS reading	75	7.5	1.32
HRSS instrument deviation from average	+ 2.7%	- 8.9%	- 11.4%

Conclusion: Given the limitation of the test, the range of deviation of the HRSS instrument readings compared to the other instruments' readings is within the acceptable accuracy for conductivity instruments. If analysis #2 (which was performed with the least accurate of the non-HRSS instruments) is omitted from the data analysis, the HRSS conductivity instrument compares even more favorably with the certified cell readings.

Note: Additional information concerning the electronic calibration of this instrument loop (1CE-PS264) and 1CIT-PS264) is available from the Instrument Maintenance Department.

UNIT-1 HRSS pH PROBE INITIAL SETUP STANDARIZATION DATA SHEET

Intent: This performance verification data is intended to fulfill the requirements of Criteria #10 of Attachment #1 to Post Accident Sampling System NUREG-0737, II,B.3 Evaluation Guidelines; and, Reg. Guide 1.97, page 1.97-15.

Probe: Beckman Model 960B

Criteria for pH analysis:

	Range:	Required Accuracy:
NUREG 0737:	5 to 9 pH units	+ or - 0.3 pH units
	all other ranges	+ or - 0.5 pH units
Reg. Guide 1.97:	1 to 13 pH units	None

Tests Performed:

Two analyses were performed on the pH probe. For the first test, the probe was withdrawn from the cell well and inserted directly into the buffer solutions. The cell was allowed to stabilize and readings recorded. For the second test, the probe was placed into the cell well as it will be during normal usage. The buffer solutions were injected into the inserted probe well exactly as specified in the Sentry instrument manual. Temperature corrections were disregarded because (a) the probe is temperature compensated and (b) it was calculated that at the temperature of the buffers (22 to 24 degrees C.), the pH error would not exceed 0.02 pH units (see CRC Handbook of Chemistry and Physics, p. D-187).

	Standard Buffer	Meter Reading	Error (pH units)
Test #1, 10-20-83:	4.0	4.1	0.1
	7.0	7.0	0
	10.0	9.8	0.2
Test #2, 10-27-83:	7.0	7.1	0.1
	10.0	9.6	0.4

Instrument Range:

The range of this instrument is stated by the manufacturer to be 0 to 14 pH units as per Beckman Instructions 015-556323 for Beckman Model 960B pH Monitor, page 36, Beckman Instruments Inc., 1980.

Note: Additional information concerning electronic calibration of this instrument loop (1AE-PS267, 1AI-PS267, and 1AT-PS267) is available from the Instrument Maintenance Department.

Conclusion: This instrument is within the NUREG-0737 and Reg. Guide 1.97 criteria.