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J. Phillip Bayne
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April 16, 1984
JPN-84-23

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. Domenic B. Vassallo, Chief
Operating Reactors Branch No. 2
Division of Licensing

Subject: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
NUREG-0737 Item II.B.3
Post-Accident Sampling System (PASS)

References:
1. NRC letter, D. B. Vassallo to L. W. Sinclair, dated July 27, 1982.
2. NYPA letter, J. P. Bayne to D. B. Vassallo, dated October 5, 1983 (JPN-83-85)
3. NEDC-30088 "Response to NRC Post - Implementation Review Criteria for Post-Accident Sampling Systems," dated April, 1983.

Dear Sir:

Reference 1 transmitted the criteria and guidelines for NUREG-0737 Item II.B.3. Reference 2 provided responses for criteria 1, 2d, 3, 6, 11a and 11b and committed to provide the remaining responses within six months. This letter provides responses for the remaining criteria and includes a revised Table of Integrated Dose Rates.

The following attachments are included:

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1. Attachment A lists NRC criteria 2a, 2b, 2c, 4, 5, 7, 8, 9, and 10, and provides the Authority's responses.

2. Attachment B is the "Core Damage Estimation Procedure" for the FitzPatrick Plant.

3. Attachment C is the "PASS Containment Radiation Monitoring Procedure" for the FitzPatrick Plant.

4. Attachment D is a letter from General Electric (GE) to the NRC on the "Accuracy of Dissolved Gas Measurement for GE Post-Accident Sampling Systems."

5. Attachment E provides a revised Table of Integrated Dose Rates to replace Table 2 of Reference 2.

If you have any questions, please contact Mr. J. A. Gray, Jr. of my staff.

Very truly yours,

J. P. Bayne
Executive Vice President
Nuclear Generation

cc: Office of the Resident Inspector
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NEW YORK POWER AUTHORITY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

JPN-84-23

ATTACHMENT A

ATTACHMENT A

Criterion: (2) The licensee shall establish an on-site radiological and chemical analysis capability to provide, within a three-hour time frame established above, quantification of the following:

a) certain radionuclides in the reactor coolant and containment atmosphere that may be indicators of the degree of core damage (e.g., noble gases, iodines and cesiums, and non-volatile isotopes);

b) hydrogen levels in the containment atmosphere;

c) dissolved gases (e.g., H_2), chloride (time allotted for analysis subject to discussion below), and boron concentration of liquids.

Response: (2a) The FitzPatrick Plant on-site radiological analysis of post accident samples is performed using a Ge(Li) detector/multi-channel analyzer (MCA) spectrophotometer system with a counting cave of sufficient shielding to remain operable in the worst case background radiation levels within 2 hours after an accident (based on projected Reg. Guide 1.3 and 1.4 source terms). Provisions have been made to handle samples in such a manner as to minimize personnel exposure through the use of transport casks and sample dilution caves. In addition remote handling tools will be available for handling highly radioactive samples. Reduction in exposure levels is also attained with an approximate 100:1 dilution (internal to the PASS sink) of reactor coolant. Further sample dilutions will be performed in the radiochemistry lab under a fume hood.

A Plant specific core damage estimate procedure (Attachment B) has been prepared based on the generic procedure submitted by the BWROG. The procedure estimates the core damage based on fission product concentrations and integrates other physical parameters for confirmation of these estimates. Attachment C, provides a Plant unique procedure for estimating the core damage based on the containment radiation monitors.

Response: (2b) A gas chromatograph located in a fume hood will be used for analysis of hydrogen gas from the primary coolant gas sample. In addition, the containment atmospheric monitoring system hydrogen analyzer provides in-line monitoring of hydrogen. Atmospheric samples are available from the torus, drywell and secondary containment. The gas sample is withdrawn from the sample vial through a small access port from the gas vial cask in the PASS sink.

Response: (2c) Chloride concentrations will be analyzed off-site by Babcock and Wilcox as mentioned in Response 5. An initial scoping for chlorides will be conducted on-site by the turbidimetric or spectrophotometric method. Boron will be analyzed by the carminic acid method. Liquid sample pH will be measured with a flat surface combination electrode.

Criterion: (4) Pressurized reactor coolant samples are not required if the licensee can quantify the amount of dissolved gases with unpressurized reactor coolant samples. The measurement of either total dissolved gases or H_2 gas in reactor coolant samples is considered adequate. Measuring the O_2 concentration is recommended, but is not mandatory.

Response: (4) As described in Attachment D, the plants with the GE PASS system are changing the method of measuring dissolved gas. The method, including range and accuracy, is all described in Attachment D. At the time of this letter, no written confirmation of approval from the NRC for this dissolved gas modification has been received by the Authority. Therefore the FitzPatrick Plant can not confirm the ranges and accuracies at this time. The Authority will confirm the entire dissolved gas portion of the PASS after resolution of this issue and receipt of an approved Technical Specification Amendment to allow sampling during power operation with a containment atmosphere monitor temporarily isolated.

Criterion: (5) The time for a chloride analysis to be performed is dependent upon two factors: (a) if the plant's coolant water is seawater or brackish water and (b) if there is only a single barrier between primary containment systems and the cooling water. Under both of the above

conditions the licensee shall provide for a chloride analysis within 24 hours of the sample being taken. For all other cases, the licensee shall provide for the analysis to be completed within 4 days. The chloride analysis does not have to be done on-site.

Response: (5) Since the FitzPatrick Plant does not use seawater or brackish water for plant cooling, the chloride analysis is required to be completed within four (4) days. An on-site scoping analysis using the turbidimetric method is available for an initial approximation.

Arrangements have been made with Babcock and Wilcox for accurate chloride measurements within 4 days, using an ion specific electrode with a liquid ion chromatograph as an alternate technique.

In addition, the FitzPatrick chemistry laboratory has purchased a liquid ion chromatograph and will investigate the use of this equipment to more accurately analyze for chlorides and to further reduce personnel exposure.

Criterion: (7) The analysis of primary coolant samples for boron is required for PWRs. (Note that Rev. 2 of Regulatory Guide 1.97 specifies the need for primary coolant boron analysis capability at BWR plants).

Response: (7) Boron analysis capability for liquid coolant samples will be performed by the carminic acid method in the on-site laboratory.

Criterion: (8) If in-line monitoring is used for any sampling and analytical capability specified herein, the licensee shall provide backup sampling through grab samples, and shall demonstrate the capability of analyzing the samples. Established planning for analysis at off-site facilities is acceptable. 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: (8) The FitzPatrick Plant will not utilize in-line monitoring for PASS sampling. The GE system employed at the FitzPatrick Plant utilizes a grab sample system which is transferred into a cask and analyzed in the chemistry lab on-site. For backup capability and primary chloride measurements, the undiluted sample will be inserted in a Post Accident Shipping Cask. Two casks have been purchased by the Pooled Inventory Management spare parts program (PIMS), of which the Authority is a member. These casks, being manufactured by Nuclear Packaging, Inc. are awaiting final NRC licensing approval and subsequent delivery to the Memphis, Tennessee warehouse. Emergency withdrawal procedures have been developed.

Additional arrangements have been made with Babcock and Wilcox for receipt of the cask for backup sampling capability which meet all of the Reg. Guide 1.97 ranges and accuracies.

Criterion: (9) The licensee's radiological and chemical sample analysis capability shall include provisions to:

a) Identify and quantify the isotopes of the nuclide 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 of personnel exposure should be provided. Sensitivity of on-site liquid sample analysis capability should be such as to permit measurement of nuclide concentration in the range from approximately 1μCi/g to 10 Ci/g.

b) Restrict background levels of radiation in the radiological and chemical analysis facility from sources such that the sample analysis will provide results with an acceptably small error (approximately a factor 2). This can be accomplished through the use of sufficient shielding around samples and outside sources, and by the use of a ventilation system design which will control the presence of airborne radioactivity.

Response: (9a) As discussed in Attachment B, the source terms for FitzPatrick Plant are based on Reg. Guide 1.3 and 1.4. The predicted activities from the various samples drawn were based on a reference BWR-6/238 Mark III containment (Reference 3). Correction factors were applied (coolant mass, containment and drywell volumes, thermal rating) to develop plant unique activities for the FitzPatrick Plant. These activities were incorporated into integrated whole body and extremity doses (Attachment E), for samples taken 1 hour after the accident.

As discussed in response 2A, internal dilution of approximately 100:1 is conducted for highly radioactive coolant samples to minimize personnel exposures. Also, transport casks are used for the same purpose.

Although the maximum expected primary coolant activity for the FitzPatrick Plant is estimated at 2.63 Ci/g, capability for measuring up to 10 Ci/g is available with a dilution of $1X10^7$.

(9b) The GeLi detector in the FitzPatrick chemistry laboratory is adequately shielded to insure that background radiation levels 2 hrs. after an accident (allowing 1 hr. for obtaining, transporting and preparing the sample) do not radically affect the sensitivity (factor of 2).

Criterion: (10) Accuracy, range, and sensitivity shall be adequate to provide pertinent data to the operator in order to describe radiological and chemical status of the reactor coolant systems.

Response: (10) The accuracy, range and sensitivity for post accident sampling and analysis at FitzPatrick are adequate to provide pertinent data to the operator for the radiological and chemical status of the reactor coolant systems, as shown below.

Analysis	Range	Accuracy
Gross Activity (Radionuclide)	1μCi/g-10 Ci/g	± 100%
Boron	100 - 1,000 ppm	± 50 ppm
Chloride (Off-site)	<0.5 ppm	± 50 ppb
	0.5 ppm - 20 ppm	± 10%
Total dissolved gas	To be addressed following resolution of the dissolved gas issue.	
pH*	1 - 13	±.03
*Assuming conductivity	>1 μmho/cm	

The procedures for the above, have been tested by GE with the effects of radiation and interference from other constituents being negligible. See Reference 3 for a explanation of these results.

Training for applicable personnel in the collection, transport, and on-site analysis of samples for the PASS will be conducted annually and documented in the Indoctrination Training Procedure ITP-7 for Radiological and Environmental Technicians (chemistry). Functional testing and calibration frequency will be addressed in the Authority's Technical Specification Amendments related to NUREG 0737.

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ATTACHMENT B