Docket Nos. 50-317
and 50-318

August 26, 1985

MEMORANDUM FOR: Edward J. Butcher, Acting Chief
Operating Reactors Branch No. 3
Division of Licensing

FROM: David H. Jaffe, Project Manager
Operating Reactors Branch No. 3
Division of Licensing

SUBJECT: SUMMARY OF AUGUST 8, 1985 MEETING WITH BALTIMORE GAS AND ELECTRIC COMPANY (BG&E) CONCERNING POST-ACCIDENT SAMPLING (PASS) AT CALVERT CLIFFS

On August 8, 1985, representatives of BG&E and the NRC staff met in Room P-422 of the Phillips Building in Bethesda, Maryland. The purpose of the meeting was to discuss the PASS system for Calvert Cliffs Units 1 and 2. A list of attendees is shown in Enclosure 1.

BG&E indicated their desire to abandon the inline, PASS analysis capability. The modified PASS capability would consist of obtaining a diluted sample and using the on-site laboratory facilities to perform the necessary analysis. No undiluted samp ing capability was proposed by BG&E.

The licensee made a presentation to describe the way in which BG&E's revised PASS capability would conform to the NRC's criteria present in its letter to BG&E dated June 30, 1982. A summary of this presentation is shown in Enclosure 2.

At the conclusion of the meeting, it was agreed that the licensee would make a formal PASS submittal including an application for license amendment. The NRC staff agreed to inform BG&E regarding the need for PASS via an undiluted sample.

David H. Jaffe, Project Manager
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Baltimore Gas & Electric Company

Calvert Cliffs Nuclear Power Plant

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ENCLOSURE 1
Attendance List
For meeting with Baltimore Gas and Electric Company
August 8, 1985
Post-Accident Sampling at Calvert Cliffs

Name	Organization
D. Jaffe	NRR/DL/ORB#3
F. Witt	NRR/DE/CHEB
J. Wing	NRR/DE/CHEB
J. White	NRR/Region I
V. Benaroya	NRR/DE/CHEB
BG&E	
P. Crinigan	
G. Wolf	
L. Salyards	

ENCLOSURE 2

NUREG-0737 CRITERIA

CRITERIA	RESPONSE
(1) The licensee shall have the capability to promptly obtain reactor coolant samples and containment atmosphere samples. The combined time allotted for sampling and analysis should be three hours or less from the time a decision is made to take a sample.	(1) The time required for sampling and analysis of reactor coolant and containment atmosphere samples will be: RCS PASS: Technician briefing/dress 40 min. PASS preparation 30 min. Purge time 20 min. Analysis 30 min. TOTAL: 120 min. Containment Atmosphere: Technician briefing/dress 40 min. Preparation 10 min. Purge time 10 min. Analysis 20 min. TOTAL: 80 min.
(2) The licensee shall establish an onsite radiological and chemical analysis capability to provide, within 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.	(2) a. An aliquot of the diluted sample shall be diluted further if necessary, and a gamma spectrum shall be conducted on this by use of the chemical laboratory's gamma analysis equipment. The radionuclide analysis of the containment atmosphere shall be conducted by obtaining a syringe sample of the containment atmosphere and analyzing an aliquot of this mixture on the chemical laboratory's gamma analysis equipment. b. Hydrogen levels in the containment atmosphere shall be determined by the use of an on-line hydrogen analyzer. c. Dissolved gases can be obtained from the RCS PASS. The dissolved gases are stripped from the liquid and a sample of this can be obtained by means of a syringe. This sample can then be injected into the gas partioner and gas chromatograph

CRITERIA	RESPONSE
d. Alternatively, have inline monitoring capabilities to perform all or part of the above analyses.	for hydrogen and oxygen analysis. The concentration of these gases in the liquid can then be obtained via established calculational methods. The chloride analysis can be obtained by means of a Dionex ion chromatograph. Since minimum sensitivity of this is 2 - 5 ppb, an analysis of this can be done with a minimum dilution of 30:1 to meet 150 ppb criteria. Since the minimum boron shutdown margin is 350 ppm, a 30:1 dilution of the sample can also be performed. Established procedures can meet this sensitivity.
(3) Reactor coolant and containment atmosphere sampling during post accident conditions shall not require an isolated auxiliary system (e.g., the letdown system, reactor water cleanup system (RWCUS) to be placed in operation in order to use sampling system.	(3) The PASS skid will not require the use of an isolated auxiliary system as described in our earlier submittal.
(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.	(4) This Criterion is satisfied by the explanation given in 2(C).
(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 coditions the licensee shall provide for a chloride analysis within	(5) Although we do not have to analyze for chloride for ninety-six hours, the analysis can be performed within the initial sampling time frame stated in criterion (1).

CRITERIA	RESPONSE
24 hours of the sample being taken. For all other cases, the licensee shall provide for the analysis to be completed within four days. The chloride analysis does not have to be done onsite.	
(6) The design basis for plant equipment for reactor coolant and containment atmosphere sampling and analysis must assume that it is possible to obtain and analyze a sample without radiation exposures to any indiviual exceeding the criteria of GDC 19 (Appendix A, 10 CFR Part 50) (i.e., 5 rem whole body, 75 rem extremities). (Note that the design and operational review criterion was changed from the operational limits of 10 CFR Part 20 (NUREG-0578) to the GDC 19 criterion (October 30, 1979 letter from H. R. Denton to all licensees)).	(6) The radiation exposures to an individual for the sampling and analysis of the reactor coolant and containment atmosphere samples will be: RCS PASS Whole Body 2.5 rem Extremities 3.8 rem CONTAINMENT ATMOSPHERE Whole Body 0.5 rem Extremities 1.6 rem
(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).	(7) The analysis will be performed as outlined in 2(c).
(8) If inline 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 offsite facilities is acceptable. Equipment provided for backup sampling shall be capable of providing at least one sample per day for seven days following onset of the accident, and at least one sample per week until the accident condition no longer exists.	(8) In line monitoring will only be used for the containment hydrogen analysis consistent with NRC "guidance" Technical Specifications provided in Generic Letter 83-37.

CRITERIA	RESPONSE
(9) The licensee's radiological and chemical sample analysis capability shall include provisions to:	(9)
a. Identify and quantify the isotopes of the nuclide categories discussed above the 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 onsite liquid sample analysis capability should be such as to permit measurement of radionuclide concentration in the range from approximately 1u Ci/g to 10 Ci/g.	a. Liquid: Since the initial sample will be a 30:1 dilution, a 0.1 ml from the sample syringe can then be injected to a one liter ~~volumetric~~ volumetric flask, obtaining a 10,000:1 dilution. Additional similar dilutions can be performed. Containment Atmosphere: The grab sample from the containment atmosphere can be diluted by injecting a 0.1 ml sample into an four liter marinelli providing a 40,000:1 dilution. If further dilutions are needed, additional similar dilutions can be performed.
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 of 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.	b. For low levels of background interferences, a background subtract routine can be performed. If the radiation background levels are excessive the samples can be counted in our mobile laboratory which has complete gamma counting facilities.
(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 ractor coolant systems.	(10) Gamma Spectrum - The chemical laboratory's germanum detectors are calibrated periodically with NBS traceable radionuclides. These detectors have participated in the NRC Intercomparison Mobile Laboratory Tests. Boron, Hydrogen, and Chloride accuracies will be submitted after in-house testing is completed.

CRITERIA

(11) In the design of the post accident sampling and analysis capability, consideration should be given to the following items:

a. Provisions for purging sample lines, for reducing plateout in sample lines, for minimizing sample loss or distortion, for preventing blockage of sample lines by loose material in the RCS or containment, for appropriate disposal of the samples, and for flow restrictions to limit reactor coolant loss from a rupture of the sample line. The post accident reactor coolant and containment atmosphere samples should be representative of the reactor coolant in the core area and the containment atmosphere following a transient or accident. The sample lines should be as short as possible tominimize the volume of fluid to be taken from containment. The residues of sample collection should be returned to containment or to a closed system.

b. The ventilation exhaust from the sampling station should be filtered with charcoal absorbers and high-efficiency particulate air (HEPA) filters.

RESPONSE

pH - The pH shall be determined by the determination of the boron and phosphate concentrations which shall be determined by the Dionex ion chromatograph.

(11) Since the PASS will be utilized, these considerations have already been submitted, reviewed and approved by the NRC.

MEETING SUMMARY DISTRIBUTION

Licensee: Baltimore Gas and Electric Company

*Copies also sent to those people on service (cc) list for subject plant(s).

Docket File
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