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SUBJECT: Forwards addl info re NUREG-0737,Item II.B.3, "Post-Accident Sampling Sys," in response to NRC 820630 ltr.

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WISCONSIN PUBLIC SERVICE CORPORATION

P.O. Box 1200, Green Bay, Wisconsin 54305

September 14, 1982

Mr. Darrel G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant

NUREG 0737 Item II.B.3 Post Accident Sampling System

References: 1) Letter from S. A. Varga to E. R. Mathews, dated June 30, 1982.

2) Letter from C. W. Giesler to S. A. Varga, dated July 22, 1982.

By enclosure to this letter we are providing you with additional information on NUREG-0737 Item II.B.3 Post Accident Sampling System as requested by reference No. 1 above. This package includes a response to each criterion as delineated in reference No. 1 above. Additionally, a booklet containing KNPP procedures for Post Accident Sampling, procedures for Post Accident Sampling as supplied by the vendor, and plant drawings of the post accident sampling system is enclosed.

Due to difficulties in procuring the required information this package is being submitted past the date specified in reference No. 2 above. The Project Manager for Kewaunee Nuclear Power Plant has been notified of this situation.

Very truly yours,

Carl W. Giesler

A046

C. W. Giesler
Vice President - Nuclear Power

smv

Enc.

cc - Mr. Robert Nelson, NRC Sr Resident Inspector
RR #1, Box 999, Kewaunee, WI 54216

ATTACHMENT TO LETTER FROM C. W. GIESLER

TO D. G. EISENHUT

DATED SEPTEMBER 14, 1982

UPDATE INFORMATION

ON NUREG-0737 ITEM II.B.3

Criterion: (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 3 hours or less from the time a decision is made to take a sample.

Clarification: Provide information on sampling system(s) and analytical laboratories locations including a discussion of relative elevations, distances and methods for sample transport. Responses to this item should also include a discussion of sample recirculation, sample handling and analytical times to demonstrate that the three-hour time limit will be met (see (6) below relative to radiation exposure). Also describe provisions for sampling during loss of off-site power (i.e. designate an alternative backup power source, not necessarily the vital (Class IE) bus, that can be energized in sufficient time to meet the three-hour sampling and analysis time limit.

WPSC Response: WPSC has installed a sample acquisition panel that was designed by Sentry Equipment Company and NUS Corporation.

The panel consists of state of the art equipment which is capable of inline sampling and analysis of dissolved hydrogen and oxygen concentrations, conductivity, pH, and chloride concentration. WPSC procedures provide for obtaining a grab sample from the panel and analyzing for boron concentration and quantifying the radionuclides.

The WPSC procedure is formatted to enable chemistry personnel to analyze for each of the above parameters independently (i.e. Boron only, hydrogen, and gaseous activity only). This approach is justified

because the parameters which must be analyzed will vary with time throughout the accident.

WPSC Chemistry personnel have demonstrated through trial runs that Procedure EP-RET-3C, Appendix A, Section A-1 can be performed within 4 hours, but could be modified to be performed in 3 hours. We feel the current format of the procedures will be more useful in the event of an accident and that the 4-hour time frame is not unreasonable.

The High Radiation Sample Room is located on the 586' level of the Auxiliary Building at Kewaunee Nuclear Power Plant. The present procedure for isotopic analysis of a diluted sample of primary coolant requires transporting the sample to the MCA in the Hot Chemistry Laboratory.

A conservative estimate on time of transport is 5 minutes. In the future, inline isotopic analysis equipment will be installed in the HRSR making it unnecessary to remove liquid from the panel for isotopic analysis. Additionally, WPSC is evaluating the purchase of an inline boron analyzer.

The streams that can be sampled in the HRSR include: volume control tank gas space, mixed bed demineralizer inlet and outlet, residual heat removal loop, reactor coolant hot leg, pressurizer liquid and vapor spaces, and containment atmosphere.

Procedures have been developed at KNPP for obtaining:

a) A diluted liquid sample of primary coolant for boron analysis and isotopic analysis.

b) An inline primary coolant sample for pH, conductivity, oxygen, and chloride analysis.

c) An inline primary coolant sample for hydrogen analysis, and a dilute sample of gases contained in primary coolant for isotopic analysis.

d) An undiluted sample of primary coolant for off-site analysis.

e) Containment atmosphere hydrogen concentration (inline).

f) Containment atmosphere grab sample; heat traced to prevent plateout of iodine.

These procedures are located in Appendix A. Also in Appendix A (Section A.2) are the flowpaths and schematics as provided by the vendor. Section A.3 contains Plant Drawings of the flowpaths from the process streams to the sample panel and Plant Drawings of the spent fuel pool flush system.

Power is supplied to the High Radiation Sample Room by 480V Bus 1-46 which is energized by 4160V Bus 1-4 which in turn is powered from the Main Auxiliary Transformer. In case of loss of offsite power the Technical Support Center (TSC) Diesel Generator will energize Bus 1-46. The switch-over to the TSC Diesel is automatic.

iterion: (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:

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.

d) Alternatively, have inline monitoring capabilities to perform all or part of the above analyses.

Clarification: 2 (a) A discussion of the counting equipment capabilities is needed, including provisions to handle samples and reduce background radiation (ALARA). Also a procedure is required for relating radionuclide concentrations to core damage. The procedure should include:

1. Monitoring for short and long lived volatile and non-volatile radionuclides such as ^{133}Xe, ^{131}I, ^{133}I, ^{137}Cs, ^{134}Cs, ^{85}Kr, ^{140}Ba, and ^{188}Kr (See Vol. II, Part 2, pp. 524-527 of Rogovin Report for further information).
2. Provisions to estimate the extent of core damage based on radionuclide concentrations and taking into consideration other physical parameters such as core temperature data and sample location.

2 (b) Show a capability to obtain a grab sample, transport and analyze for hydrogen.

2 (c) Discuss the capabilities to sample and analyze for the species listed here and in Reg. Guide 1.97 Revision 2.

2 (d) Provide a discussion of the reliability and maintenance information to demonstrate that the selected on-line instrument is appropriate for this application. (See (8) and (10) below relative to back-up grab sample capability and instrument range and accuracy.

WPSC Response: 2 (a) A procedure (RC-C-86) has been developed for relating radionuclide concentration to percent failed fuel. The procedure is based on I-131 and/or Xe-133 levels present in the reactor coolant. The results of the percent failed fuel analysis will be evaluated in the Technical Support Center at which time other physical parameters such as core temperature data and sample location will be taken into consideration.

2 (b) The capability to quantify the hydrogen levels in the containment atmosphere is provided by two redundant hydrogen analyzers. WPSC is evaluating a modification to the Containment Atmosphere Sample Panel to allow inline sample acquisition and analysis.

2 (c) The capability exists to sample and analyze for all the variables listed in Reg. Guide 1.97 Revision 2 using the high radiation sample system, except containment atmosphere oxygen concentration and containment atmosphere isotopic analysis. All of the primary coolant analysis can be done inline except for the boron and isotopic analysis.

Hydrogen content of containment air is done inline with the hydrogen analyzers. The analysis of containment air for oxygen content and isotopic analysis will be performed using the Interim Sampling System.

2 (d) The inline equipment that was purchased is considered appropriate for this application. The instruments are newly installed state of the art equipment. Reliability and maintenance information will be compiled following adequate system operation time to determine which components are to be included in the spare parts list.

Criterion: (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 the sampling system.

Clarification: System schematics and discussions should clearly demonstrate that post accident sampling, including recirculation, from each sample source is possible without use of an isolated auxiliary system. It should be verified that valves which are not accessible after an accident are environmentally qualified for the conditions in which they must operate.

WPSC Response: A sample of primary coolant can be obtained from the following sample points:

i) Reactor Coolant System Hot Leg (Loop B)

ii) Pressurizer Liquid or Vapor

iii) Residual Heat Removal Loop. (When operating in the post-accident recirculation mode, this sample point provides the containment sump sample.)

These sample points are tapped off already existing sampling piping. The sample points and associated piping are used only during the sampling process and are not associated with any other auxiliaries. The RHR sample requires the RHR system to be put into service. The RHR sample would be acquired only when the RHR system is in operation.

The containment isolation valves on the sampling system have been reviewed under the equipment qualification program. Both isolation valves on the Hot Leg sample line (RC-422 and RC-423) are environmentally qualified. The isolation valves inside (RC-402 and RC-412) and outside (RC-403 and RC-413) containment on the pressurizer sample lines are intended to be replaced with environmentally qualified valves per the equipment qualification program prior to the end of the 1983 refueling outage.

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.

Clarification: Regulatory Guide 1.97 requires the measurement of dissolved oxygen in the reactor coolant. Discuss the method whereby total dissolved gas or hydrogen and oxygen can be measured and related to reactor coolant system concentrations. Additionally, if chlorides exceed 0.15 ppm, verification that dissolved oxygen is less than 0.1 ppm is required.

Verification that dissolved oxygen is $<$0.1 ppm by measurement of a dissolved hydrogen residual of $\geq$10 cc/kg is acceptable for up to 30 days after the accident. Within thirty days, consistent with ALARA, direct monitoring for dissolved oxygen is required.

WPSC Response: We have the capability to measure the dissolved oxygen, dissolved hydrogen and chlorides with the inline analysis instrumentation. The dissolved oxygen will be measured using the Rexnord and YSI oxygen analyzers; the amount of dissolved hydrogen can be obtained by the inline gas chromatograph, and the chloride concentration can be obtained using the inline ion chromatograph.

With the inline analyzers we can measure both chloride and oxygen concentrations, which can be evaluated to determine the potential for chloride stress corrosion.

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 onsite.

Clarification: BWR's on sea or brackish water sites, and plants which use sea or brackish water in essential heat exchangers (e.g. shutdown cooling) that have only single barrier protection between the reactor coolant are required to analyze chloride within 24 hours. All other plants have 96 hours to perform a chloride analysis. Samples diluted by up to a factor of one thousand are acceptable as initial scoping analysis for chloride, provided (1) the results are reported as ___ ppm Cl (the licensee should establish this value; the number in the bank should be no greater than 10.0 ppm Cl) in the reactor coolant system and (2) that dissolved oxygen can be verified at <0.1 ppm, consistent with the guidelines above in clarification No. 4. Additionally, if chloride analysis is performed on a diluted sample, an undiluted sample must also be taken and retained for analysis within 30 days, consistent with ALARA.

WPSC Response: We have inline capability to analyze for chloride with the inline ion chromatograph and would therefore be capable of analyzing for chloride within the four day limit.

The 0737 clarification also requires that an undiluted sample be taken and retained for analysis within 30 days. We have the capability to obtain undiluted samples with the Liquid Sample Panel, as described in Appendix A (Section A-2).

Criterion: (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 individual 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).

Clarification: Consistent with Reg. Guide 1.3 or 1.4 source terms, provide information on the predicted man rem exposures based on person-motion for sampling, transport and analysis of all required parameters.

WPSC Response: As stated previously (Criteria 1) the WPSC procedure is formatted to allow specific sampling and analysis dependent on plant conditions (i.e. no need to immediately know chloride concentration during accident transient).

Sample acquisition and analysis times during the test runs are listed below. The associated dose rates for the High Radiation Sample Room were obtained from the Fluor Services Report.

Task	Time	Location	Dose Rate[1]	Total Integrated Dose
1) H_2 Analysis & Gaseous Activity				
i) Sample Acquisition	20 min.	HRSR	1000 mr/hr	333 mr
ii) Gas Chromatograph	6 min.	HRSR	1000 mr/hr	100 mr
iii) Flush	6 min.	HRSR	1000 mr/hr	100 mr
iv) Transport	2 sec.	Outside HRSR	6,500 mr/hr	3.6 mr
	4 min.	TSC	0	0
	15 sec.	*Turbine Floor	10 mr/hr	0.04 mr
	5 sec.	*Access to Hot Lab	601,000 mr/hr	835 mr
v) Count	6 min.	*Count Room	1400 mr/hr	140 mr
				1512 mr
2) Inline Sampling; Conductivity, pH, O_2, Cl-	35 min.	HRSR	1000 mr/hr	583 mr
				583 mr
3) Liquid Activity and Boron Analysis				
i) Sample Acquisition	42 min.	HRSR	1000 mr/hr	700 mr
ii) Transport	2 sec.	Outside HRSR	6,500 mr/hr	3.6 mr
	4 min.	TSC	0	0.0 mr
	15 sec.	Turbine Floor	10 mr/hr	0.04 mr
	5 sec.	Access to Hot Lab	601,000 mr/hr	835 mr
iii) Set up Curcumine Procedure	8 min.	Hot Lab	220 mr/hr	29.3 mr
iv) Count Liquid	6 min.	*Count Room	1400 mr/hr	140 mr
				1708 mr

* Not applicable after new counting facility in the RAF is operational (Late 1982-early 1983)

1 Fluor Shielding Study with built in conservatism

The access path to and from the HRSR and sample acquisition and analysis times have been reviewed. Based on these estimates, it is possible to obtain and analyze a sample without radiation exposures to any individual exceeding the criteria of GDC 19 (i.e. 5 rem whole body, 75 rem extremities).

The doses in Table 1 were obtained from the design review of post-accident plant shielding and equipment radiation qualification, as prepared by Fluor Power Services, Inc. The doses calculated by Fluor are conservative as shown in section 3.2.1 of the study; Design Basis Criteria. The Fluor Shielding Study is available upon request.

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

Clarification: PWR's are required to perform boron analysis. BWR's are required to have the capability to perform boron analysis but do not have to do so unless boron was injected.

WPSC Response: Boron analysis is performed by use of the Curcumin method. A diluted grab sample (10^3 dilution) will be obtained from the sample panel and the chemist will use the equipment in the Hot Chem Lab to perform a boron analysis per procedure RC-C-82. The Curcumin method is adequate in that it fulfills the intent of a post accident boron analysis.

WPSC is evaluating the purchase of an inline boron analyzer to be added to the High Radiation Sample Panel at a later date.

Criterion: (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 7 days following onset of the accident and at least one sample per week until the accident condition no longer exists.

Clarification: A capability to obtain both diluted and undiluted backup samples is required. Provisions to flush inline monitors to facilitate access for repair is desirable. If an off-site laboratory is to be relied on for the backup analysis, an explanation of the capability to ship and obtain analysis for one sample per day for the seven days following the accident and one sample per week thereafter, is required until accident condition no longer exists.

WPSC Response: We have the capability to obtain a grab sample from various locations as detailed in response #3. The analysis capability of these samples is outlined below:

Boron: We currently don't use inline monitoring for boron sampling and analysis. The Curcumin method is used to analyze a diluted grab sample. The Sentry System does provide the capability to draw an undiluted sample; however, the Curcumin method is applicable only in the .1-1.0 ppm range. Therefore, an undiluted sample would not fall within the applicable range for this analysis method. Procedure

EP-RET-3B details the Interim Sampling Procedure in the Hot Chemistry Lab for obtaining and analyzing a grab sample for Boron.

Radionuclides: WPSC has purchased an inline gamma spectrometer and is awaiting delivery. Once the inline capability for gamma spectroscopy is installed, the current grab sample procedure (EP-RET-3C Section 5.1) will be used as a backup sampling system. Procedure EP-RET-3B, Post Accident Reactor Coolant Interim Sampling Procedure, provides the present backup for obtaining and analyzing a grab sample for isotopic content.

Chlorides: We have the inline capability to analyze for chlorides as detailed in response #4. Should a failure of the ion chromatograph occur, the sample panel can be flushed to accommodate maintenance of the system within the 4 day time frame. A diluted grab sample could be analyzed using normal chloride analysis procedures; however, the minimum detectable concentration by the chloride analysis procedure is .05 ppm. Therefore, a coolant sample which has been diluted by a factor of 10^3 must contain at least 50 ppm of chlorides to be detected.

pH: In the event of a failure of the inline pH probe, we could utilize procedure EP-RET-3B Post Accident Reactor Coolant Interim Sampling Procedure or flush the panel and perform the required repairs.

Conductivity, Hydrogen, and Oxygen:

If the inline analysis equipment were inoperable and required maintenance, the sample panel could be flushed and repaired.

Containment Hydrogen and Oxygen:

A grab sample of containment atmosphere can be obtained and analyzed using the Post LOCA Hydrogen control panels. Procedure EP-RET-2C, Containment Air Sampling and Analysis, details the actions necessary to perform the sample analysis in the event of a failure of the redundant Hydrogen Analyzers.

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 onsite liquid sample analysis capability should be such as to permit measurement of nuclide concentration in the range from approximately 1μ Ci/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 of 2). This can be accomplished through the use of sufficient shielding around samples and outside sources, and by the use of ventilation system design which will control the presence of airborne radioactivity.

Clarification: 9a) Provide a discussion of the predicted activity in the samples to be taken and the methods of handling/dilution that will be employed to reduce the activity sufficiently to perform the required analyses. Discuss the range of radionuclide concentration which can be analyzed for, including an assessment of the amount of overlap between post accident and normal sampling capabilities.

9b) State the predicted background radiation levels in the counting room including the contribution from samples which are present. Also provide data demonstrating what the background radiation levels and radiation effect will be on a sample being counted to assure an accuracy within a factor of 2.

WPSC Response: 9a) The Liquid Sample Panel (LSP) has the capability to dilute a sample by a factor of 10^3. EP-RET-3C provides instructions for a sample dilution of 10^4 for boron analysis and a sample dilution of 10^8 which can be used for isotopic analysis.

WPSC has evaluated the expected dose rates from a diluted and an undiluted sample. The results indicate a 1 ml sample (assuming

10 ci/cc and FSAR isotopic concentration) that has been diluted by a factor of 10^4 for Boron analysis will have a dose rate of .17 mr/hr at 1 meter. WPSC feels this activity is sufficiently low to perform the required analysis.

9b) The inline Gas Chromatograph, oxygen analyzer, ion chromatograph, conductivity probe and pH probe in the High Rad Sample Room will not be affected by background radiation. The analysis for boron concentration is performed in the Hot Chem Lab and also is not affected by background radiation levels. Identification and quantification of the nuclide isotopes present in a grab sample can be performed on a gamma spectroscopy system (MCA) located in the Count Room, taken offsite to a neighboring nuclear plant for analysis, or in the near future analyzed in the RAF.

The MCA in the Count Room is sufficiently shielded to provide results with an acceptably small error. According to the Shielding Study the expected dose rate in the Count Room at 8 hours post-accident will be 1400 mr/hr.

WPSC has constructed a Radiological Analysis Facility (RAF) which is provided with sufficient shielding and ventilation to limit background radiation to negligible levels. A gamma spectroscopy system has been purchased and will be located in the RAF. This gamma spectroscopy system will be installed for site acceptance testing by October 1, 1982.

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.

Clarification: The ranges for the required analyses are given in Reg. Guide 1.97, Revision No. 2. The necessary accuracy within the required ranges are as follows:

- Gross activity, gamma spectrum: measured to estimate core damage these analysis should be accurate within a factor of two across the entire range
- Boron: measure to verify shutdown margin.

In general this analysis should be accurate within ± 5% of the measured value (i.e. at 6,000 ppm B the tolerance is ± 300 ppm while at 1,000 ppm B the tolerance is ± 50 ppm). For concentrations below 1,000 ppm the tolerance band should remain at ± 50 ppm.

- Chloride: measured to determine coolant corrosion potential.

For concentrations between 0.5 and 20.0 ppm chloride the analysis should be accurate within ± 10% of the measured value. At concentrations below 0.5 ppm the tolerance band remains at ± 0.05 ppm.

- Hydrogen or Total Gas: monitored to estimate core degradation and corrosion potential of the coolant.

An accuracy of ± 10% is desirable between 50 and 2000 cc/kg but ± 20% can be acceptable. For concentration below 50 cc/kg the tolerance remains at ± 5.0 cc/kg.

- Oxygen: monitored to assess coolant corrosion potential.

For concentrations between 0.5 and 20.0 ppm oxygen the analysis should be accurate within ± 10% of the measured value. At concentrations below 0.5 ppm the tolerance band remains at ± 0.05 ppm.

- pH: measured to assess coolant corrosion potential.

Between a pH of 5 to 9 the reading should be accurate within ± 0.3 pH units. For all other ranges ± 0.5 pH units is acceptable.

To demonstrate that the selected procedures and instrumentation will achieve the above listed accuracies, it is necessary to provide information demonstrating their applicability in the post accident water chemistry and radiation environment. This can be accomplished by performing tests utilizing the standard test matrix provided below or by providing evidence that the selected procedure or instrument has been used successfully in a similar environment.

STANDARD TEST MATRIX
FOR
UNDILUTED REACTOR COOLANT SAMPLES IN A POST-ACCIDENT ENVIRONMENT

Constituient	Concentration (ppm)	Added as (chemical salt)
I-	40	Potassium Iodide
Cs+	250	Cesium Nitrate
Ba+2	10	Barium Nitrate
La+8	5	Lanthanum Chloride
Ce+4	5	Ammonium Cerium Nitrate
Cl-	10	
B	2000	Boric Acid
Li+	2	Lithium Hydroxide
NO+3	150	
NH+	5	
K+4	20	
Gamma Radiation (Induced Field)	10^4 Rad/GM of Reactor coolant	Absorbed Dose

NOTES:

1) Instrumentation and procedures which are applicable to diluted samples only, should be tested with an equally diluted chemical test matrix. The induced radiation environment should be adjusted commensurate with the weight (GMS) of actual reactor coolant in the sample being tested.

2) Applicable to PWRs only - procedures which may be affected by spray additive chemicals must be tested in both the standard test matrix plus appropriate spray additives. Both procedures (with and without spray additives) are required to be available.

3) For BWR's, if procedures are verified with boron in the test matrix, they do not have to be tested without boron.

4) In lieu of conducting tests utilizing the standard test matrix for instruments and procedures, provide evidence that the selected instrument or procedure has been used successfully in a similar environment.

All equipment and procedures which are used for post accident sampling and analyses should be calibrated or tested at a frequency which will ensure, to a high degree of reliability, that it will be available if required. Operators should receive initial and refresher training in post accident sampling, analysis and transport. A minimum frequency for the above efforts is considered to be every six months if indicated by testing. These provisions should be submitted in revised Technical Specifications in accordance with Enclosure 1 of NUREG-0737.

WPSC Response: NUS has agreed to provide WPSC with the design basis for each instrument that has been chosen for the sampling and analysis system. This information will include design specifications and the results of accuracy tests that were performed in the NUS laboratories. We will provide this information to the NRC as it becomes available.

WPSC is evaluating the effectiveness of a training test for the Chemistry personnel. The training test would utilize a test matrix (standard sample solution containing appropriate inorganic compounds) similar to that suggested in the NRC letter and would assure WPSC personnel that the instruments and equipment are applicable for post accident water chemistry analyses.

Criterion:(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 to minimize 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.

Clarification: 11a) A description of the provisions which address each of the items in clarification 11.a should be provided. Such items, as heat tracing and purge velocities, should be addressed. To demonstrate that samples are representative of core conditions, a discussion of mixing, both short and long term, is required. If a given sample location can be rendered inaccurate due to the accident (i.e. sampling from a hot or cold leg loop which may have a steam or gas pocket) describe the backup sampling capabilities or address the maximum time that this condition can exist.

BWR's should specifically address samples which are taken from the core shroud area and demonstrate how they are representative of core conditions.

Passive flow restrictors in the sample lines may be replaced by redundant, environmentally qualified, remotely operated isolation valves to limit potential leakage from sampling lines. The automatic containment isolation valves should close on containment isolation or safety injection signals.

11b) A dedicated sample station filtration system is not required, providing a positive exhaust exists which is subsequently routed through charcoal absorbers and HEPA filters.

WPSC Response: The Containment Air Sample Panel (CASP) at KNPP is equipped with heat tracing to prevent sample plate-out. (Appendix A, section A2). The sample line is heat traced from containment to a common header located upstream from the CASP. There is one sample port off of this header that is heat traced and three other sample ports that are not. The intent of the heat tracing is to provide for a representative sample of containment atmosphere.

The Liquid Sample Panel (LSP) can be flushed with deionized water and spent fuel pool water. The intent of the spent fuel pool flush is to flush the sample lines from the process lines to the LSP and the deionized water to flush the LSP. The spent fuel pool flush and deionized water flush are monitored at 200 cc/min with an orfice flow meter (Appendix A, section A1). Steps have also been included in EP-RET-3C (Appendix A, Section A1) for flushing all instruments in the Chemical Analysis Panel (CAP).

Sample recirculation is provided for in the procedures regarding operation of the CASP, LSP, and the CAP (EP-RET-3C, Appendix A, Section A1) to insure that a representative sample is obtained.

If one of the primary coolant sample locations is unavailable (steam voids, line rupture, etc.) there are other available sample points as addressed under criterion #2.

The sample line tubing was chosen with a small diameter to minimize the primary coolant withdrawn and to prevent obstructions from entering the sample system.

Included in Appendix A, Section A3, is a flow diagram of the ventilation system for the HRSR. The ventilation system for the HRSR is normally exhausted to the Auxiliary Building Vent Stack; however, in a post accident condition, the flow will be diverted to the zone SV which exhausts through charcoal and HEPA filters.