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September 1, 1983

Mr. H. R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. NUCLEAR REGULATORY COMMISSION
Washington, D. C. 20555

Attention: Mr. D. G. Eisenhut, Director
Division of Licensing

Gentlemen:

DOCKETS 50-266 AND 50-301
IMPLEMENTATION OF REGULATORY GUIDE 1.97
FOR EMERGENCY RESPONSE CAPABILITY
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

Supplement 1 to NUREG-0737 regarding "Requirements for Emergency Response Capability" requires that each licensee submit a report describing how it meets the requirements of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident." In our letter to you dated April 15, 1983 regarding "Response to Generic Letter No. 82-33 Update to Schedule Requirements for Emergency Response Capability" Wisconsin Electric committed to submit a report describing how it intends to meet the requirements of Type A, B, C, D, and E variables as described in Regulatory Guide 1.97 for Point Beach Nuclear Plant, Units 1 and 2 (PBNP). The enclosure to this letter contains such a report including the schedule for planned instrument upgrades.

We believe that the planned instrumentation configuration and sampling capabilities at PBNP meet the intent of Regulatory Guide 1.97 regarding post-accident monitoring capability. All of the PBNP modifications associated with post-accident monitoring as described in the enclosure to this letter are expected to be completed no later than May 1985. Equipment delivery delays, environmental qualification test difficulties, or other problems may cause delays in this schedule. Wisconsin Electric is strongly committed, however, to maintaining this schedule.

We would be pleased to answer any questions you may have regarding this information.

Very truly yours,

C. W. Fay

C. W. Fay

Vice President-Nuclear Power

Enclosure
Copy to NRC Resident Inspector

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September 1, 1983

ENCLOSURE

IMPLEMENTATION OF REGULATORY GUIDE 1.97

POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

I. Background

Revision 2 to Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident" was issued by the NRC in December 1980. Wisconsin Electric performed a detailed evaluation of Regulatory Guide 1.97 requirements in early 1981 so that implementation at PBNP could be conducted in a manner consistent with all of the other instrumentation backfits required in response to NUREG-0737, "Clarification of TMI Action Plan Requirements," and IE Bulletin 79-01B, "Environmental Qualification of Class 1E Equipment." Wisconsin Electric has undertaken a significant effort to upgrade the post-accident monitoring instrumentation at PBNP including the planned installation or replacement of 147 electronic pressure transmitters, 22 resistance temperature detectors, a completely new microprocessor-based radiation monitoring system with 105 radiation detectors, 8 hydrogen analyzers, 8 sump level transmitters, 4 safety valve position indicators, 6 high-range radiation monitors, 18 thermocouples, 156 core-exit thermocouple connectors, and an additional meteorological tower. Associated cables, electrical penetrations, instrument racks, indicators, and recorders were also planned for upgrading as required. In addition, the instrument bus power supplies are being upgraded with the addition of two new station batteries; two new Auxiliary Safety Instrumentation Panels (ASIPs) are being installed in the control room, and two Safety Assessment System (SAS) and two Plant Process Computer System (PPCS) computers with CRT displays in the control room are being added. Improvements to the post-accident sampling and analysis capabilities at PBNP were also planned to be consistent with Regulatory Guide 1.97 requirements. All of the above modifications are expected to be completed no later than May 1985. Equipment delivery delays, environmental qualification test difficulties, or other problems may cause delays in this schedule. Wisconsin Electric is strongly committed, however, to maintaining this schedule.

When modifications at PBNP were initiated due to the requirements of NUREG-0737 or IE Bulletin 79-01B, the requirements of Regulatory Guide 1.97 were factored into the modifications from the very beginning. This was done to reduce the long-term costs of these modifications and to reduce the adverse impact on the safety and reliability of PBNP due to constant backfitting of plant systems, operating procedures, training, and maintenance. Although a majority of the above instrumentation modifications were initiated to meet the requirements of NUREG-0737 and IE Bulletin 79-01B, a number of modifications were initiated in 1981 strictly to meet the requirements of Regulatory Guide 1.97. These modifications include the addition of new instrumentation for the containment consisting of spray flow, atmosphere temperature, and sump water temperature; the addition of redundant instrumentation for measurement of the Reactor Coolant System loop temperatures, Steam Generator wide-range water levels, Condensate Storage Tank water levels, and Refueling Water Storage Tank water levels; and the addition of qualified instrumentation for Safety Injection Accumulator pressure and Service Water header pressure.

Certain requirements of Regulatory Guide 1.97 were judged to be unnecessary or unreasonable to backfit in an operating plant. Justification is provided for those requirements to which we take exception. Wisconsin Electric believes that the planned final configuration for instrumentation and sampling and analysis capabilities at PBNP meets the intent of Regulatory Guide 1.97 for post-accident monitoring capability. We believe that no additional modifications are required for the protection of the public health and safety.

II. Submittal

Supplement 1 to NUREG-0737, which was transmitted with Mr. D. G. Eisenhut's Generic Letter 82-33 dated December 17, 1982, requested Wisconsin Electric to submit a report for NRC review describing how PBNP meets the requirements of Regulatory Guide 1.97. Section 6.2 of Supplement 1 to NUREG-0737 recommends the submittal of a table which includes information regarding instrument range, environmental qualification, seismic qualification, quality assurance, redundance and sensor location, power supply, location of display, and schedule for each type A, B, C, D, & E variable shown in Regulatory Guide 1.97 (Revision 2). This enclosure provides the requested information and is consistent in organization with Table 2 (PWR Variables) of Regulatory Guide 1.97, Revision 2 dated December 1980 with errata dated July 1981. The schedule for each instrument indicates when all of the Regulatory Guide 1.97 requirements as described in this enclosure will be met. Deviations from the guidance in Regulatory Guide 1.97 (Revision 2 with errata) are indicated by a darkened border around the associated parameter. Justification for each deviation is provided in the referenced footnotes located at the end of this enclosure. The general notes below provide clarifications for each category of information requested by Section 6.2 of Supplement 1 to NUREG-0737 with the exception of instrument range which is self-explanatory:

GENERAL NOTES

1. Sensor Location:

The "sensor(s) location(s)" information requested in Section 6.2(e) of Supplement 1 to NUREG-0737 is assumed to mean the application (e.g., "Reactor Coolant System Cold Leg Water Temp.") and not physical plant location. This information is provided in the column labeled "Variable."

2. Environmental Qualification:

Instruments reported as environmentally qualified (i.e., marked "Yes" in the column labeled "Envir. Qual.") are planned to meet the provisions of NRC Rule 10 CFR 50.49 on the schedule submitted in Wisconsin Electric letter to Mr. H. R. Denton dated May 20, 1983 regarding "Environmental Qualification of Electric Equipment Important to Safety Within the Scope of 10 CFR 50.49." As allowed by 10 CFR 50.49(k), original PBNP instrumentation located in a potentially harsh accident environment has been environmentally qualified in accordance with the "DOR Guidelines." Equipment ordered after May 23, 1980 is planned for environmental qualification in accordance with Category I of NUREG-0588 (For Comment) (i.e., IEEE Std. 323-1974) unless there are sound reasons to the contrary. Consistent with 10 CFR 50.49 and NRC Generic Letter 82-09, PBNP is not required to environmentally qualify equipment located in a mild environment.

3. Seismic Qualification:

Instruments reported as seismically qualified (i.e., marked "Yes" in the column labeled "Seis. Qual.") are planned to meet the provisions of the PBNP FSAR, p. 7.2-9 (i.e., protection grade equipment is designed such that "for design basis earthquake (DBE), the equipment will not lose its capability to perform its design objective; namely, shut the plant down and/or maintain the unit in a safe shutdown condition") Typical equipment of this type originally installed at PBNP was seismically tested by Westinghouse Electric Corporation as documented in WCAP-7397-L, "Topical Report Seismic Testing of Electrical and Control Equipment," dated January 1970. No industry standards regarding seismic qualification existed at that time. Equipment ordered after May 23, 1980 is planned for seismic qualification in accordance with Regulatory Guide 1.100 (i.e., IEEE Std. 344-1975) unless there are sound reasons to the contrary.

4. Quality Assurance:

Instruments reported as meeting quality assurance requirements (i.e., marked "Yes" in the column labeled "QA") are planned to meet the provisions of the PBNP quality assurance program described in Section 1.8 of the PBNP FSAR. This program, as described, satisfies the requirements of 10 CFR 50, Appendix B. The implementation of specific Regulatory Guides and ANSI Standards regarding quality assurance are consistent with the commitments of FSAR Section 1.8.

5. Redundancy:

Instruments reported as meeting the single failure criterion or redundancy requirements (i.e., marked "Yes" in the column labeled "Single Fail. Crit.") are planned for a minimum of two redundant electrically independent channels up to and including any isolation device. The display may be a common multi-pen recorder or dual indicator. The redundant channels are also physically separated in accordance with the PBNP FSAR, p. 7.2-4 through 7.2-9. PBNP meets the intent but not all of the strict requirements for physical separation of redundant channels defined in Regulatory Guide 1.75. Equipment ordered after May 23, 1980 was planned to meet the requirements of Regulatory Guide 1.75 as closely as practicable.

6. Power Supply:

Instruments reported as meeting Class 1E power supply requirements (i.e., marked "1E" in the column labeled "Power Supply") are planned to be powered from either a 120 V. A.C. instrument bus or a 125 V. D.C. bus as described in the PBNP FSAR, p. 8.2-4 & 5. At the present time the two main D.C. safeguards trains at PBNP are battery backed. The power supplies for only two of the four A.C. instrument channels for each PBNP unit are presently battery-backed. Wisconsin Electric is undertaking a battery bus upgrade program including the addition of two new station batteries. All A.C. instrument channels will be battery-backed after the completion of this upgrade. The upgrade was planned to meet the physical separation criteria of Regulatory Guide 1.75 as closely as practicable.

7. Display Location:

The display location is indicated as control room board or instrument rack, Safety Assessment System (SAS) or Plant Process Computer System (PPCS), Cathode Ray Tube (CRT), or Radiation Monitoring System (RMS) CRT. SAS, PPCS, and RMS CRTs will be located in the control room and will be accessible by the operator on demand. The time histories of most parameters marked SAS, PPCS, or RMS CRT are also available on demand by the operator. The final display configuration of many variables is dependent on the installations of the new SAS and PPCS computers and associated CRTs and the installation of the Auxiliary Safety Instrumentation Panels (ASIPs).

8. Schedule:

The implementation schedule provided for each variable is the current best estimate of the completion of the final configuration for the associated instrument including redundancy, final displays, power supplies, documentation of qualification, and official turnover to operations. The schedules are based on anticipated delivery and plant outage schedules. Wisconsin Electric is strongly committed to maintaining these schedules. Equipment delivery delays, environmental qualification test difficulties, or other problems, however, may cause delays in these schedules beyond our reasonable control. The final configuration for Class 1E power supply, display, qualification and quality assurance is dependent on the completion of the battery bus upgrade, SAS and PPCS computer installations, ASIP installations, and qualification upgrades and documentation. The schedule for final completion of those associated plant upgrades are consistent with separate schedule commitments previously submitted to the NRC Staff regarding those specific topics. Most variables listed are already measured with fully operational instruments, however, the instruments are not considered complete in this enclosure until they meet all Regulatory Guide 1.97 requirements as described in this enclosure. Note that instruments previously reported to the NRC staff as meeting the requirements of NUREG-0737 or IE Bulletin 79-01B do not, in most cases, meet all of the Regulatory Guide 1.97 requirements as specified in the attached table. For example, an instrument may be installed and operational, but the Class 1E power supply specified may not be met until the battery bus upgrade is completed or the final display configuration specified may not be completed until the ASIPs and/or SAS computers are installed and operational. The schedules provided in this enclosure for meeting Regulatory Guide 1.97 requirements are not intended to change any previous commitment regarding NUREG-0737 or 10 CFR 50.49, whose requirements may be different. Nevertheless, all final installations and upgrades described in this enclosure including instrument bus upgrades, SAS and PPCS computer installations, ASIP installations, and documentation of qualification are expected to be completed as indicated in the schedule column of this enclosure.

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

I. Type A Variables: "those variables to be monitored that provide the primary information required to permit the control room operator to take specific manually controlled actions for which no automatic control is provided and that are required for safety systems to accomplish their safety functions for design basis accident events." Note: these variables are plant-specific and based on review of the PBNP Emergency Operating Procedures (EOPs) plus anticipated future changes to the EOPs.

Purpose	Variable(1)	Plant Tag No.	Instrument Range	Envir. Qual.(2)	Seis. Qual.(3)	QA(4)	Single Fail. Crit.(5)	Power Supply(6)	Display Location(7)	Schedule(8)
Manual Shiftover of the ECCS to the Recirculation Mode on Low Level in the RWST	Refueling Water Storage Tank Water Level	1&2-LT972 & 973	0 to 100% (Essentially Top to Bottom)	No (a)	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
Manual Selection of High-Head or Low-Head ECCS Recirculation	RCS Wide-Range Pressure	1&2-PT420, 420A, & 420B	0 to 3000 psig	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Containment Narrow-Range or Intermediate Range Pressure (Added to RCS Gauge Pressure)	1&2-PT945, 947, & 949	-6 to 54 psig (Narrow-Range)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT946, 948, & 950	0 to 90 psig (Intermediate Range)							
Manual Trip of Reactor Coolant Pumps Based on RCS Pressure	RCS Wide-Range Pressure	1&2-PT420, 420A, & 420B	0 to 3000 psig	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
Manual Shiftover of AFW Pump Suction to Service Water on Low Level in the CSTs	Condensate Storage Tank Level	LT4038 & 4040 (Tank A) LT4039 & 4041 (Tank B)	0 to 21 ft. (Essentially Top to Bottom)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

I. Type A Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Manual Control of AFW Flow to S/Gs to Maintain Secondary Heat Sink for RCS or to Isolate Faulted S/G	Steam Generator Narrow-Range Water Level (Primary)	1&2-LT461, 462, & 463 (S/G A) 1&2-LT471, 472, & 473 (S/G B)	0 to 100% (Above Tube Bundle/ Below Feed Ring to Steam Separators)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Auxiliary Feedwater Flow to Steam Generators (Backup Only)	1&2-FT4036 & 4037	0 to 300 gpm (0 to 150% Design Flow)	Yes	Yes	Yes	No (Not Required for Backup)	1E	Control Room Board; SAS CRT	December 1984
Manual Control of RCS Pressure and Temperature for Steam Generator Tube Rupture	Core Exit Temperature	1&2-TE1 thru 39 (Core-Exit Thermocouples)	50 to 1600°F	Yes[f]	Yes[f]	Yes	Yes	1E	Control Room Board, SAS CRT	December 1984
	Degrees of Reactor Coolant Subcooling	1&2-TM970 & 971	200°F Sub-Cooling to 50°F Superheat	No[a]	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT420A&B (Pressure Input)	0 to 3000 psig	Yes	Yes	Yes	Yes	1E		
		1&2-TE450D & 451D or 1&2-TE1-39 (Temperature Input)[g]	50 to 750°F	Yes	Yes	Yes	Yes	1E		
	RCS Wide-Range Pressure	1&2-PT420, 420A, & 420B	0 to 3000 psig	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

I. Type A. Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Fail. Crit.	Single Power Supply[5][6]	Display Location[7]	Schedule[8]
Manual Control of RCS Pressure and Temperature for Steam Generator Tube Rupture (continued)	Steam Generator Pressure	1&2-PT468, 469, & 482 (S/G A) 1&2-PT478, 479, & 483 (S/G B)	0 to 1400 psig (0 to 129% Design Pressure)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Pressurizer Water Level	1&2-LT426, 427, 428, & 433	0 to 100% (Essentially Top to Bottom)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
Manual Termination or Reinitiation of Safety Injection for Steam Generator Tube Rupture	Pressurizer Water Level	1&2-LT426, 427, 428, & 433	0 to 100% (Essentially Top to Bottom)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	RCS Wide-Range Pressure	1&2-PT420, 420A, & 420B	0 to 3000 psig	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Degrees of Reactor Coolant Subcooling	1&2-TM970 & 971	200°F Sub-Cooling to 50°F Superheat	No[a]	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT420A&B (Pressure Input)	0 to 3000 psig	Yes	Yes	Yes	Yes	1E		
		1&2-TE450D & 451D or 1&2-TE1-39 (Temperature Input)[g]	50 to 750°F	Yes	Yes	Yes	Yes	1E		
	Auxiliary Feedwater Flow to Steam Generators (Backup Only)	1&2-FT4036 & 4037	0 to 300 gpm (0 to 150% Design Flow)	Yes	Yes	Yes	No (Not Required for Backup)	1E	Control Room Board; SAS CRT	December 1984
	Steam Generator Narrow-Range Water Level (Primary)	1&2-LT461, 462, & 463 (S/G A) 1&2-LT471, 472, & 473 (S/G B)	0 to 100% (Above Tube Bundle/Below Feed Ring to Above Steam Separators)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

II. Type B Variables: "those variables that provide information to indicate whether plant safety functions are being accomplished. Plant safety functions are (1) reactivity control; (2) core cooling; (3) maintaining reactor coolant system integrity, and (4) maintaining containment integrity (including radioactive effluent control)."

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Detection and Verification of Reactivity Control	Neutron Flux	1&2-N31&32 (Source Range)	1 to 10^{6} c/s	No[b]	No[b]	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-N35&36 (Intermediate Range)	10^{-11} to 10^{-3} Amps (SR and IR together cover approximately 10^{-11} to 100% rated power with one decade of overlap)							
	Control Rod Position	1&2-R1 thru 33 (Designated Also by Core Position)	Full In to Full Out	No	No	No	No	1E	Control Room Board	Original Plant Design
	RCS Soluble Boron Content	None (RCS Grab Sample with Analysis Capability Only)	20[c] to 6000+ ppm	N/A	N/A	N/A	N/A	N/A	N/A[d]	Original Plant Capability
	RCS Cold Leg Water Temperature	1&2-TE450A &C, 451A&C	50 to 750°F	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

II. Type B Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir.[2] Qual.	Seis.[3] Qual.	QA[4]	Single[5] Fail. Crit.	Power[6] Supply	Display[7] Location	Schedule[8]
Detection and Verification of Core Cooling	RCS Hot Leg Water Temperature	1&2-TE450B &D, 451B&D	50 to 750°F	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	RCS Cold Leg Water Temperature	1&2-TE450A &C, 451A&C	50 to 750°F	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	RCS Pressure	1&2-PT420, 420A, & 420B	0 to 3000 psig (Wide-Range)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT429, 430, 431, & 449	1700-2500 psig (Pressurizer Narrow-Range)							
	Core Exit Temperature	1&2-TE1 thru 39 (Core Exit Thermocouples)	50 to 1600+°F[e]	Yes[f]	Yes[f]	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Reactor Vessel Water Level	1&2-LT494 & 495 (Wide-Range)	0 to 125 ft. (Essentially Top to Bottom)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-LT496 & 497 (Narrow-Range)	0 to 45 ft. (Essentially Top to Bottom Except Narrow-Range is Off-Scale with RCPs Running)							

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

II. Type B Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Detection and Verification of Core Cooling (continued)	Degrees of Reactor Coolant Subcooling	1&2-TM970 & 971	200°F Sub-Cooling to 50°F Superheat	No[a]	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT420A&B (Pressure Input)	0 to 3000 psig	Yes	Yes	Yes	Yes	1E		
		1&2-TE450D & 451D or 1&2-TE1-39 (Temperature Input)[g]	50 to 750°F	Yes	Yes	Yes	Yes	1E		
Detection and Verification of Reactor Coolant System Integrity	RCS Pressure	1&2-PT420, 420A, & 420B	0 to 3000 psig	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Containment Sump Water Level	1&2-LT958 & 959(Sump A)	0 to 90" per Detector with Overlap (Equivalent to Approximately 0 to 350,000 Gallons which Exceeds Maximum Available Inventory)	Yes	Yes	Yes	Yes (Sump B only)	1E	Control Room Board; SAS CRT	December 1984
		1&2-LT960 & 961 (Sump B - Main Containment Floor)								
	Containment Pressure (Design Pressure is 60 psig)	1&2-PT945, 947, & 949	-6 to 54 psig (Narrow-Range)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT946, 948, & 950	0 to 90 psig (Intermediate-Range)							
Detection and Verification of Containment Isolation and Integrity	Containment Isolation Valve Position	See Table 1	Closed or Not Closed	Yes/No[h]	Yes	Yes	No[i]	1E	Control Room Board	March 1984
	Containment Pressure (Design Pressure is 60 psig)	1&2-PT945, 947, & 949	-6 to 54 psig (Narrow-Range)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT946, 948, & 950	0 to 90 psig (Intermediate-Range)							
		1&2-PT968 & 969	-5 to 195 psig (Wide-Range)							

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

III. Type C Variables: "those variables that provide information to indicate the potential for being breached or the actual breach of the barriers to fission product releases. The barriers are (1) fuel cladding, (2) primary coolant pressure boundary, and (3) containment."

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Detection and Verification of the Potential for or the Actual Breach of the Fuel Cladding	Core Exit Temperature	1&2-TE1 thru 39 (Core-Exit Thermocouples)	50 to 1600°F[e]	Yes[f]	Yes[f]	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Radioactivity Concentration in Circulating Primary Coolant	RCS Grab Samples and Analysis	5E-5 uCi/ml to 10 Ci/ml (Diluted) (Equivalent to Approximately 1E-6 to 1.5E5 Times the Tech. Spec. Limit)[j]	N/A	N/A	N/A	N/A	N/A	N/A[k]	Complete
	Analysis of Primary Coolant (Gamma Spectrum for Isotopic Analysis)	RCS Grab Samples (Germanium-Lithium (Ge-Li) Gamma Radiation Detectors with Multi-channel Spectrum Analyzer)	0 to 1875 Kev (Minimum)	N/A	N/A	N/A	N/A	N/A	N/A	Complete
Detection and Verification of the Potential for or the Actual Breach of the Reactor Coolant Pressure Boundary	RCS Pressure	1&2-PT420, 420A, & 420B	0 to 3000 psig (Wide-Range)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT429, 430, 431, & 449	1700 to 2500 psig (Pressurizer Narrow-Range)							
	Containment Pressure (Design Pressure is 60 psig)	1&2-PT945, 947, & 949	-6 to 54 psig (Narrow-Range)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT946, 948, & 950	0 to 90 psig (Intermediate Range)							

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

III. Type C Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Detection and Verification of the Potential for or the Actual Breach of the Reactor Coolant Pressure Boundary (continued)	Containment Sump Water Level	1&2-LT958 & 959 (Sump A) 1&2-LT960 & 961 (Sump B-Main Containment Floor)	0 to 90" per Detector with Overlap (Equivalent to Approximately 0 to 350,000 Gallons Which Exceeds Maximum Available Inventory)	Yes	Yes	Yes	Yes (Sump B only)	1E	Control Room Board; SAS CRT	December 1984
	Containment Area Radiation	1&2-RE126, 127, & 128	1 to 1E8 R/hr Gamma (High-Range)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-RE102 & 107	0.1 to 1E4 mR/hr Gamma	No	No	Yes	No	1E	Control Room RMS CRT	December 1984
	Effluent Radioactivity-Noble Gas Effluent from Condensor Air Removal System Exhaust	1&2-RE215 (Air Ejector Gases)	0.01 to 100 mR/hr (Equivalent to 5.72E-4[11] to 5.72 µCi/cc)	No	No	Yes	No	1E	Control Room RMS CRT	December 1984
		RE225 (Combined Air Ejector Delay Duct Low-Range)	0.01 to 100 mR/hr (Equivalent to 1.94E-4 to 1.94 µCi/cc)	No	No	Yes	No	1E	Control Room RMS CRT	December 1984
		RE226 (Combined Air Ejector Delay Duct High-Range)	0.01 to 100 R/hr (Equivalent to 0.589 to 5.89E3 µCi/cc)	No	No	Yes	No	1E	Control Room RMS CRT	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97

POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

III. Type C Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir.[2] Qual.	Seis.[3] Qual.	QA[4]	Single[5] Fail. Crit.	Power[6] Supply	Display[7] Location	Schedule[8]
Detection and Verification of the Potential for or the Actual Breach of the Containment	RCS Pressure	1&2-PT420, 420A, & 420B	0 to 3000 psig (Wide-Range)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT429, 430, 431, & 449	1700 to 2500 psig (Pressurizer Narrow-Range)							
	Containment Hydrogen Concentration	1&2-HA964, 965, 966, & 967	0 to 10%	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Containment Pressure (Design Pressure is 60 psig)	1&2-PT945, 947, &949	-6 to 54 psig (Narrow-Range)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT946, 948, & 950	0 to 90 psig (Intermediate Range)							
		1&2-PT968 & 969	-5 to 195 psig (Wide-Range)							
	Containment Effluent Radioactivity-Noble Gases from Identified Release Points	See Table 3 (Containment Purge Exhaust)	See Table 3	No[a]	No	Yes	No	1E	Control Room RMS CRT	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

III. Type C Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Detection and Verification of the Potential for or the Actual Breach of the Containment (continued)	Radiation Exposure Rate (Inside Buildings or Areas, e.g., Auxiliary Building, Which Are in Direct Contact with Primary Containment Where Penetrations and Hatches are Located)	See Table 4	See Table 4	No[m]	No	Yes	No	1E	Control Room RMS CRT	December 1984
	Effluent Radioactivity-Noble Gases (From Buildings as Indicated Above)	See Table 3	See Table 3	No[a]	No	Yes	No	1E	Control Room RMS CRT	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables: "Those variables that provide information to indicate the operation of individual safety systems and other systems important to safety."

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitor Operation of the Residual Heat Removal System	RHR System Flow	1&2-FT626	0 to 4000 gpm (0 to 256% Design Flow)	Yes	Yes	Yes	No	1E	Control Room Board; SAS CRT	December 1984
	RHR Heat Exchanger Outlet Temperature	1&2-TE622 & 623 (Individual RHR HXs)	50[n] to 350°F	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
		1&2-TE627 (Common Outlet Temp.) 1&2-TE630 (Common Inlet Temp.)	100 to 400°F	No	No	No	No	1E	Control Room Board; SAS CRT	December 1984
	RHR Pump Discharge Pressure	1&2-PT628 & 629	0 to 600 psig (0 to 100% Design Pressure)	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
Monitor Operation of the Safety Injection Systems	Accumulator Tank Level	1&2-LT934 & 935 (Tank B) 1&2-LT938 & 939 (Tank A)	0 to 14" (Equivalent to a Design Level Range of 62 to 65%)[o]	No[o]	No[o]	No[o]	Yes	1E	Control Room Board	Original Plant Design
	Accumulator Tank Pressure	1&2-PT936 & 937 (Tank B) 1&2-PT940 & 941 (Tank A)	0 to 800 psig (0 to 100% Design Pressure)	Yes	Yes	Yes	Yes	1E	Control Room Board	December 1984
	Accumulator Isolation Valve Position	1&2-MOV841A (Tank A) 1&2-MOV841B (Tank B)	Closed or Open	No[p]	Yes	Yes	No	1E	Control Room Board	Original Plant Design

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variable (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitor Operation of the Safety Inspection Systems (continued)	Boric Acid Charging Flow	1&2-FIT128 (Charging Line Flow)	0 to 140 gpm (0 to 111% Maximum Design Flow)	No[q]	No[q]	No[q]	No	1E	Control Room Board; SAS CRT	December 1984
	Flow in HPI System	1&2-FT924 & 925	0 to 1500 gpm (0 to 107%[r] Design Flow)	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
	HP Safety Injection Pump Discharge Pressure	1&2-PT922 & 923	0 to 2000 psig (0 to 111% Design Pressure)	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
	Flow in LPI System	1&2-FT626 (Train A)	0 to 4000 gpm (0 to 256% Design Flow)	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
		1&2-FT928 (Train B)	0 to 2000 gpm (0 to 130% Design Flow)							
	LP Safety Injection (RHR) Pump Discharge Pressure	1&2-PT628 & 629	0 to 600 psig (0 to 100% Design Pressure)	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
	RHR Heat Exchanger Outlet Temp. (ECCS Recirculation)	1&2-TE622 & 623	50 to 350°F	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
	RHR Heat Exchanger Inlet Temp. (Containment Sump Water During ECCS Recirculation)	1&2-TE3294 & 3295	50 to 350°F	Yes	Yes	Yes	No	1E	Control Room Board	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitor Operation of the Safety Injection Systems (continued)	Boric Acid Storage Tank (BAST) Water Level	LT102, 171, & 189 (Tank B) 1&2-LT106, 172, & 190 (Tanks A & C)	0 to 100% (Essentially Top to Bottom)	Yes	Yes	Yes	Yes	1E	Control Room Board	December 1984
	Refueling Water Storage Tank (RWST) Water Level	1&2-LT972 & 973	0 to 100% (Essentially Top to Bottom)	No[a]	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
Monitoring of the Reactor Coolant System	Reactor Coolant Pump Status	1&2-P1A&B (Motor Current)	0 to 1.2E3 Amps	No	No	No	No	Non-1E	Control Room Board	Original Plant Design
	Reactor Coolant System Loop Flow	1&2-FT411, 412, 413, 414, 415, & 416	0 to 110% Design Flow	No	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Reactor Coolant System Code Safety Valve Position	1&2-PCV434 & 435 (Valve-Mounted Magnetic Reed Switches)	Closed-Intermediate-Open	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	May 1985
	Pressurizer Power-Operated Relief Valve (PORV) Position	1&2-PCV430 &431C (Limit Switches)	Closed-Open	Yes	Yes	Yes	No	1E	Control Room Board; SAS CRT	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97

POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring of the Reactor Coolant System (cont.)	RCS Code Safety Valve and Pressurizer PORV Discharge Line Fluid Temperature	1&2-TE436 & 437 (Code Safeties) 1&2-TE438 (PORV Common Line)	0 to 400°F	No	No	No	No	1E	Control Room Board	Original Plant Design
	Pressurizer Water Level	1&2-LT426 427, 428, & 433	0 to 100% (Essentially Top to Bottom)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Pressurizer Heater Status	1&2-T1A&B (Non-Safeguards Powered Backup Groups)	Breaker[s] Closed-Open	No	No	No	No	Non-1E	Control Room Board	Original Plant Design
		1&2-T1C&D (Safeguards-Powered Backup Groups)		No[a]	Yes	Yes	No	1E		
		1&2-T1E (Safeguards-Powered Control Group)								
	Pressurizer Temperature	1&2-TE424 (Liquid Space) 1&2-TE425 (Steam Space)	0 to 700°F	No	No	No	No	1E	Control Room Board	Original Plant Design
	RCS Pressure	1&2-PT420, 420A, & 420B	0 to 3000 psig (Wide-Range)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT429, 430, 431, & 449	1700 to 2500 psig (Pzr.-Narrow-Range)							

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring of the Reactor Coolant System (cont.)	RCS Temperature	1&2-TE1 thru 39 (Core-Exit Thermo-couples)	50 to 1600+°F[e]	Yes[f]	Yes[f]	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-450A&C, and 451A&C (Cold Leg Loop Wide-Range)	50 to 750°F	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-450B&D and 451B&D (Hot Leg Loop Wide-Range)								
	Degrees of Reactor Coolant Subcooling	1&2-TM970 & 971	200°F Subcooling to 50°F Superheat	No[a]	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-PT420A&B (Pressure Input)	0 to 3000 psig	Yes	Yes	Yes	Yes	1E		
		1&2-TE450D & 451D or 1&2-TE1-39 (Temperature Input)[g]	50 to 750°F	Yes	Yes	Yes	Yes	1E		
	Pressurizer Relief Tank Water Level	1&2-LT442	0 to 100% (Essentially Top to Bottom)	No	No	No	No	1E	Control Room Board	Original Plant Design
	Pressurizer Relief Tank Temperature	1&2-TE439	0 to 300°F[t]	No	No	No	No	1E	Control Room Board	Original Plant Design
	Pressurizer Relief Tank Pressure	1&2-PT440	0 to 100 psig (0-100% Design Pressure)	No	No	No	No	1E	Control Room Board	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir.[2] Qual.	Seis.[3] Qual.	QA[4]	Single[5] Fail. Crit.	Power[6] Supply	Display[7] Location	Schedule[8]
Monitoring of the Reactor Coolant System (cont.)	Reactor Vessel Water Level	1&2-LT494 & 495 (Wide-Range)	0 to 125 ft. (Essentially Top to Bottom)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
		1&2-LT496 & 497 (Narrow-Range)	0 to 45 ft. (Essentially Top to Bottom except Narrow-Range Offscale with RCPs Running)							
	RCS Gas Vent Isolation Valve Position	1&2-RC570 A&B, 575 A&B, and 580 A&B	Open-Closed	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
	RCS Gas Vent System Pressure	1&2-PT498	0 to 3000 psig	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
Monitoring the Operation of the Secondary System (Steam Generator)	Steam Generator Water Level	1&2-LT461, 462, & 463 (S/G A Narrow-Range) 1&2-LT471, 472, & 473 (S/G B Narrow-Range)	0 to 100% (Above Tube Bundle/Below Feed Ring to Above Steam Separators)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring the Operation of the Secondary System (Steam Generator) (continued)	Steam Generator Water Level (cont.)	1&2-LT460A&B (S/G A Wide-Range) 1&2-LT470A&B (S/G B Wide-Range)	0 to 518" (Above Tubesheet/Below Bottom of of Wrapper Assembly to Above Steam Separators)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Steam Generator Pressure (Lowest Safety Valve Set at 1085 psig)	1&2-PT468, 469, & 482 (S/G A) 1&2-PT478, 479, & 483 (S/G B)	0 to 1400 psig (0 to 129% Design Pressure)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Main Steam Flow (for Safety/Relief Valve Flow)	1&2-FT464 & 465 (S/G A) 1&2-FT474 & 475 (S/G B)	0 to 4E6 lb/hr (0 to 120% Design Flow)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Main Feedwater Flow	1&2-FT466 & 467 (S/G A) 1&2-FT476 & 477 (S/G B)	0 to 4E6 lb/hr (0 to 120% Design Flow)	No	No	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
Monitoring the Operation of the Auxiliary Feedwater System	Auxiliary Feedwater Flow to Steam Generators	1&2-FT4036 & 4037	0 to 300 gpm (0 to 150% Design Flow)	Yes	Yes	Yes	No	1E	Control Room Board; SAS CRT	December 1984
	Auxiliary Feedwater Pump Discharge Line Flow	1&2-FT4002 (Turbine-Driven Pumps)	0 to 400 gpm (0 to 100% Design Flow)	No[a]	Yes	Yes	No	1E	Control Room Board	December 1984
		FT-4007 & 4014 (Motor-Driven Pumps)	0 to 200 gpm (0 to 100% Design Flow)							

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

VI. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring the Operation of the Auxiliary Feedwater System (continued)	Auxiliary Feedwater Pump Discharge Line Pressure	1&2-PT4005 (Turbine-Driven Pumps)	0 to 1600 psig	No[a]	No	No	No	1E	Control Room Board	Original Plant Design
		PT4012 & 4019 (Motor-Driven Pumps)	0 to 1600 psig							
	Auxiliary Feedwater Pump Suction Line Pressure	1&2-PT4044 (Turbine-Driven Pumps)	0 to 100 psig	No[a]	Yes	Yes	No	1E	Control Room Board	December 1984
		PT4042 & 4043 (Motor-Driven Pumps)	0 to 100 psig							
	Condensate Storage Tank Water Level (Primary Source of Water for AFW Pumps	LT4038 & 4040 (Tank A) LT4039 & 4041 (Tank B)	0 to 21 ft. (Essentially Top to Bottom)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Service Water Header Pressure (Backup Water Supply to AFW)	PT2844 (North Header) PT2845 (South Header)	0 to 150 psig (0 to 150% Design Pressure)	No[a]	Yes	Yes	No	1E	Control Room Board	December 1984
Monitoring the Operation of the Containment Cooling Systems	Containment Spray Flow	1&2-FT962 & & 963	0 to 1320 gpm (0 to 110% Design Flow)	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
	Containment Spray Additive Tank Water Level	1&2-LT931	0 to 100% (Essentially Top to Bottom)	Yes	Yes	Yes	No	1E	Control Room Board	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring the Operation of the Containment Cooling Systems (continued)	Heat Removal by the Containment Emergency Fan Coolers	1&2-TE3270, 3272, 3274, & 3276 (Containment Fan Cooler Air Outlet Temperature)	40 to 320°F	No[v]	No[v]	No[v]	No	1E	Control Room Board	Original Plant Design
		1&2-FS3225, 3229, 3239, & 3240 (Flow Switch on Containment Emergency Fan Cooler Air Outlet)	5 ft./sec. (Alarm Setpoint)	No[v]	No[v]	No[v]	No	1E	Control Room Board (Alarm only)	Original Plant Design
		1&2-W1A1, W1B1, W1C1, & W1D1 (Breaker Position for Containment Emergency Fan Cooler Motors)	Open-Closed	No[a]	Yes	Yes	No	1E	Control Room Board	Original Plant Design
		1&2-FT2896, 2898, 2900, & 2902 (Service Water Flow-Return Line from Containment Fan Cooler)	0 to 1200 gpm (0 to 120% Design Flow)	No[v]	No[v]	No[v]	No	1E	Control Room Board	Original Plant Design

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir.[2] Qual.	Seis.[3] Qual.	QA[4]	Single[5] Fail. Crit.	Power[6] Supply	Display[7] Location	Schedule[8]
Monitoring the Operation of the Containment Cooling Systems (continued)	Heat Removal by the Containment Emergency Fan Coolers (continued)	1&2-TIS2893, 2901, 2903, 2972 (Service Water Return Line From Containment Fan Cooler Temperature Alarm)	100°F Increasing) (Alarm - Setpoint)	No[v]	No[v]	No[v]	No	1E	Control Room Board (Alarm Only)	Original Plant Design
	Containment Atmosphere Temperature	1&2-TE3292 & 3293	50 to 350°F	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
	Containment Sump B Water Temperature	1&2-TE3294 & 3295	50 to 350°F	Yes	Yes	Yes	Yes	1E	Control Room Board	December 1984
Monitoring the Operation of the Chemical and Volume Control System	Charging Line Flow	1&2-FIT128	0 to 140 gpm (0 to 127% Maximum Design Flow)	No[w]	No[w]	No[w]	No	1E	Control Room Board; SAS CRT	December 1984
	Letdown Line Flow	1&2-FT134	0 to 150 gpm (0 to 125% Design Flow)	No[w]	No[w]	No[w]	No	1E	Control Room Board; SAS CRT	December 1984
	Volume Control Tank Water Level	1&2-LT112 & 141	0 to 100% (Essentially Top to Bottom)	No[w]	No[w]	No[w]	Yes	1E	Control Room Board; SAS CRT (112 Only)	December 1984
	Boric Acid Storage Tank (BAST) Water Level	LT102, 171, & 189 (Tank B) 1&2-LT 106, 172, & 190 (Tanks A&C)	0 to 100% (Essentially Top to Bottom)	Yes	Yes	Yes	Yes	1E	Control Room Board	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir.[2] Qual.	Seis.[3] Qual.	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring the Operation of the Cooling Water Systems	Component Cooling Water Heat Exchanger Outlet Temperature (Cooling Water to ECCS)	1&2-TE621	50[n] to 200°F	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
	Component Cooling Water Flow	1&2-FT619	0 to 8000 gpm (0 to 110% Design Flow)	Yes	Yes	Yes	No	1E	Control Room Board	December 1984
	Service Water Header Pressure	PT2844 (North Header) PT2845 (South Header)	0 to 150 psig (0 to 150% Design Pressure)	No[a]	Yes	Yes	No	1E	Control Room Board	December 1984
Monitoring the the Operation of Radwaste Systems	High-Level Radioactive Liquid Tank Level	LT1001 (Waste Holdup Tank)	0 to 100% (Essentially Top to Bottom)	No	No	No	No	1E	Boron Recycle and Waste Disposal Control Panel C59 (Auxiliary Building)	Original Plant Design
	Radioactive Gas Decay Tank Pressure	PT1037, 1038, & 1039	0 to 150 psig (0 to 100%[x] Design Pressure)	No	No	No	No	1E	Boron Recycle and Waste Disposal Control Panel C59 (Auxiliary Building)	Original Plant Design
Ventilation Systems	Emergency Ventilation Damper Position	See Table 2	Open-Closed	No[y]	No[y]	No[y]	No	1E	Control Room Board	Original Plant Design

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring the Operation of the Power Supplies (All Safety-Related Power Supplies are Monitored as Listed Here)	Station Batteries	D05, 06 105, & 106	-100 to 1000 Amps (Charge/ Discharge Rate) Open-Closed (Battery Breaker Position)	No[a]	Yes	Yes	No	1E	Control Room Board	December 1984
	125 Volt D.C. Buses	D01, 02, 03 & 04	0 to 150 Volts D.C. Open-Closed (Battery Charger Supply Breakers)	No[a]	Yes	Yes	No	1E	Control Room Board	December 1984
	120 Volt A.C. Instrument Buses	1&2-Y01,101, 02, 102, 03, 103, 04, & 104	0 to 150 Volts A.C.	No[a]	Yes	Yes	No	1E	Control Room Board	December 1984
	4160 Volt A.C. Safeguards Buses	1&2-A05 & 06	0 to 5300 Volts	No[a]	Yes	Yes	No	1E	Control Room Board	Original Plant Design
	480 Volt A.C. Safeguards Buses	1&2-B03 & 04	0 to 600 Volts 0 to 400 Amps (Safeguards Station Service Transformer Output)	No[a]	Yes	Yes	No	1E	Control Room Board	Original Plant Design
	Emergency Diesel Generators	G01 & 02	52 to 68 HZ 500 to 5000 Volts A. C. 50 to 600 Amps 0 to 5000 Kw 1000 in to 4000 out KVARS 165 psig - Alarm Only (~95% of Minimum Allowed Diesel Air Start Pressure)	No[a]	Yes	Yes	No	1E	Control Room Board	Original Plant Design

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IV. Type D Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring the Operation of the Power Supplies (All Safety-Related Power Supplies are Monitored as Listed Here)(cont.)	Diesel Fuel Oil Day Tank Level	LT & LS-3932 & 3934; LS3930A&B and 3931A&B	0 to 100% (Essentially Top to Bottom)	No[a]	Yes	Yes	No	1E	Control Room Board	Original Plant Design
	Instrument Air Pressure	PI3001	0 to 125 psig (0 to 100% Design Pressure)	No[a]	No	No[z]	No	N/A (Direct Reading Gauge Only)	Control Room Board	Original Plant Design

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

V. Type E variables: "those variables to be monitored as required for use in determining the magnitude of the release of radioactive materials and continually assessing such releases."

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring of Containment Radiation for Release Assessment and Emergency Plan Actuation	Containment Area Radiation - High Range	1&2-RE126, 127, & 128	1 to 1E8 R/hr Gamma	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984
Monitoring of Area Radiation Inside Buildings or Areas Where Access is Required to Service Equipment Important to Safety	Area Radiation	See Table 4	See Table 4	No[aa]	No	Yes	No	1E	Control Room RMS CRT	December 1984
Monitoring of Airborne Radioactive Materials Released from Plant for Release Detection and Assessment	Special Particulate Iodine Noble Gas System (SPINGS)[bb]	See Table 3	See Table 3	No[a]	No	Yes	No	1E	Control Room RMS CRT	December 1984
	Process Radiation Monitor and Vent Flow from Steam Generator Safety and Atmospheric Dump Valves	1&2-RE231 & 232	1 to 1E4 mR/hr (Equivalent to .15 to 1.5E3 µCi/cc)	No[dd]	No	Yes	No	1E	Control Room RMS CRT	December 1984
		1&2-FT464, 465,474,475 (Steam Line Flow)	0 to 4E6 lb/hr (0 to 120% Design Flow)	Yes	Yes	Yes	Yes	1E	Control Room Board; SAS CRT	December 1984

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

V. Type E Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring of Airborne Radioactive Materials Released from Plant for Release Detection and Assessment (continued)	Particulates and Halogens from All Identified Release Points (except Steam Generator Safety Valve and Atmospheric Steam Dump Valves) Sampling with Onsite Analysis Capability	Grab Samples from Isokinetic Stack Sampling System with On-Site Analysis Capability (Auxiliary Building and Drumming Area Vent Stacks) (Containment Purge Is Isolated During Power Operation)	1E-6 to 1E2 µCi/cc	N/A	N/A	N/A	N/A	N/A	N/A	Complete
			0 to 6000 fpm (Equivalent to 0 to 155+% Design Flow)	No	No	Yes	No	1E	Control Room RMS CRT	December 1984
Monitoring of Environs Radiation and Radioactivity for Release Detection and Assessment	Airborne Radiohalogens and Particulates	Grab Samples with Onsite Analysis	1E-9 to 1E-3 uCI/cc	N/A	N/A	N/A	N/A	N/A	N/A	Complete
	Plant and Environs Radiation	Portable Radiation Survey Meters	1E-4 to 1E3 (ee) R/hr Gamma; 1E-3 to 5E2 (ee) Rad/hr Beta	N/A	N/A	N/A	N/A	N/A	N/A	Complete
		Thermoluminiscent Dosimeters (TLDs)	1.0 mR to 1E5 R Gamma	N/A	N/A	N/A	N/A	N/A	N/A	Complete
	Plant and Environs Radioactivity (Isotopic Analysis)	Grab Samples (Germanium-Lithium(Ge-Li) Gamma Radiation Detectors with Multi-Channel Spectrum Analyzer)	0 to 1875 Kev (Minimum)	N/A	N/A	N/A	N/A	N/A	N/A	Complete

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

V. Type E Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir. Qual.[2]	Seis. Qual.[3]	QA[4]	Single Fail. Crit.[5]	Power Supply[6]	Display Location[7]	Schedule[8]
Monitoring of Meteorological Conditions for Release Assessment	Wind Direction	MT1WDHI, MT1WDLO, &MI2WD	0 to 540° (Accuracy of ±5°, starting threshold of 0.6 mph, distance constant of 3.7 ft., damping ratio of 0.4)	No	No	No	Yes	Non-1E	Control Room PPCS CRT	December 1984
	Wind Speed	MT1WSHI MT1WSLO, & MT2WS	0 to 108 mph (Accuracy of ±.15 mph, starting threshold of 0.6 mph)	No	No	No	Yes	Non-1E	Control Room PPCS CRT	December 1984
	Estimation of Atmospheric Stability	MT1DT (Vertical Temperature Gradient)	-10 to +10°F[ff] (Interval of 114 ft. on 150 ft. tower, accuracy of 0.3°F)	No	No	No	No	Non-1E	Control Room PPCS CRT	December 1984
		MT1WDSD & MT2WDSD (Standard Deviation of Wind Direction)	0 to 108°	No	No	No	Yes	Non-1E	Control Room PPCS CRT	December 1984
Accident Sampling and Analysis Capability On-Site for Release Assessment and Verification	Primary Coolant and Sump[gg] Grab Samples	Gross Activity	5E-5 uCi/ml to 10 Ci/ml (Diluted)	N/A	N/A	N/A	N/A	N/A	N/A	Complete
		Gamma Spectrum (Germanium-Lithium (Ge-Li) Gamma Radiation Detectors with Multichannel Spectrum Analyzer)	0 to 1875 KeV (Minimum)	N/A	N/A	N/A	N/A	N/A	N/A	Complete

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

V. Type E Variables (cont.)

Purpose	Variable[1]	Plant Tag No.	Instrument Range	Envir.[2] Qual.	Seis.[3] Qual.	QA[4]	Single[5] Fail. Crit.	Power[6] Supply	Display[7] Location	Schedule[8]
Accident Sampling and Analysis Capability On-Site for Release Assessment and Verification (continued)	Primary Coolant and Sump[gg] Grab Samples (Cont.)	Boron Content	20[c] to 6000 ppm	N/A	N/A	N/A	N/A	N/A	N/A	Complete
		Chloride Content	.1[hh] to 20+ ppm	N/A	N/A	N/A	N/A	N/A	N/A	Complete
		Dissolved Hydrogen (Primary Coolant Only)	10[ii] to 2000+ cc/Kg	N/A	N/A	N/A	N/A	N/A	N/A	Complete
		Dissolved Oxygen	None[jj]	N/A	N/A	N/A	N/A	N/A	N/A	Complete
		pH	1 to 13	N/A	N/A	N/A	N/A	N/A	N/A	Complete
	Containment Air Grab Samples	Hydrogen Content	0 to 10%	N/A	N/A	N/A	N/A	N/A	N/A	Complete
		Oxygen Content	None[jj]	N/A	N/A	N/A	N/A	N/A	N/A	Complete
		Gamma Spectrum (Isotopic Analysis)	0 to 1875 KeV (Minimum) (Germanium-Lithium (Ge-Li) Gamma Radiation Detectors with Multichannel Spectrum Analyzer)	N/A	N/A	N/A	N/A	N/A	N/A	Complete

TABLE 1
CONTAINMENT ISOLATION VALVE POSITIONS

Item	Plant Tag No.	Description
1.	1&2-CV313 & 313A	Reactor Coolant Pump Seal Return Line Isolation
2.	1&2-CV371 & 371A	Reactor Coolant Letdown Line Isolation
3.	1&2-RC508	Reactor Makeup Water Line to Pressurizer Relief Tank (PRT) Isolation
4.	1&2-RC538 & 539	Gas Analyzer Line from PRT Isolation
5.	1&2-CC769	Component Cooling Water Return Line from Excess Letdown Heat Exchanger Isolation
6.	1&2-SI846	Safety Injection Accumulator Nitrogen Fill Isolation
7.	1&2-SV966A & 951*	Pressurizer Steam Space Sample Line Isolation
8.	1&2-SV966B & 953*	Pressurizer Liquid Space Sample Line Isolation
9.	1&2-SV966C & 955*	Reactor Coolant Hot Leg Sample Line Isolation
10.	1&2-WL1003A&B	Reactor Coolant Drain Tank (RCDT) Pump Suction Line Isolation
11.	1&2-CV1296	Auxiliary Charging Line Isolation
12.	1&2-WL1698	RCDT Pump Suction from -19'3" Auxiliary Building Sump Isolation
13.	1&2-WL1721	RCDT Pump Common Suction Line Isolation
14.	1&2-WL1723 & 1728	Containment Sump A to -19'3" Auxiliary Building Sump Line Isolation
15.	1&2-WL1786 & 1787	Vent Header Line from RCDT Isolation
16.	1&2-WL1788 & 1789	Gas Analyzer Line from RCDT Isolation
17.	1&2-CV2042, 2045, 5958, & 5959	Steam Generator Blowdown Line Isolation
18.	1&2-CV2083 & 2084	Steam Generator Sample Line Isolation
19.	1&2-IA3047 & 3048	Instrument Air to Containment Supply Line Isolation
20.	1&2-CV3200A, B, & C	Containment Atmosphere R211 & 212 Radiation Monitor Supply and Exhaust Line Isolation
21.	1&2-HV3212, 3213, 3244, & 3245	Containment Purge Supply and Exhaust Line Isolation

* Indication for 1&2-SV951, 953, and 955 are located on the sample valve control panel in the auxiliary building.

September 1, 1983

TABLE 2

EMERGENCY VENTILATION DAMPER POSITIONS

Item	Plant Tag No.	Description
1.	CV3246 & 3247	Service Building Controlled Access Area Exhaust Dampers
2.	CV3248 & 3249	Auxiliary Building Stack Exhaust Dampers
3.	CV3258A1, A2, B1, & B2	Auxiliary Building Carbon Filter Exhaust System Dampers
4.	CV3265 & 3266	Auxiliary Building Filter Fan Dampers
5.	CV4849A&B	Computer Room Air Supply and Return Dampers
6.	CV4849C	Control Room Outside Air Intake Isolation Damper
7.	CV4849D&E	Computer Room and Control Room Smoke & Heat Ventilation Dampers
8.	CV4948F	Control Room Return Air Damper
9.	CV4850	Cable Spreading Room Outside Air Intake Isolation Damper
10.	CV4850B&C	Cable Spreading Room Smoke & Heat Ventilation and Return Air Dampers
11.	CV4851A, B, & C	Control Room Emergency Filter System Dampers

September 1, 1983

TABLE 3
SPINGS

Plant Tag No.	Item	Range
	Unit 1 Containment Purge Exhaust SPING-4 (Field Unit 21)	
1-RE-301 1-RE-302	Beta Particulate Alpha Particulate	6.3E-12 to 2.4E-6 µCi/cc Particulate
1-RE-303 1-RE-304B	Iodine Iodine Background	1.4E-11 to 3.82E-6 µCi/cc (Fixed Filter at 60 lpm for one hour)
1-RE-305 1-RE-306B	Low Range Gas Area Monitor (Low Range Gas Background)	1.0E-7 to 6.0E-2 µCi/cc (Equivalent Xe-133)
1-RE-307 1-RE-308B	Medium Range Gas Medium Range Gas Background	2.5E-2 t 4.0E2 µCi/cc (Equivalent Xe-133)
1-RE-309	High Range Gas	1.0 to 1.0E5 µCi/cc (Equivalent Xe-133)
	Unit 2 Containment Purge Exhaust SPING-4 (Field Unit 22)	
2-RE-301 2-RE-302	Beta Particulate Alpha Particulate	6.3E-12 to 2.4E-6 µCi/cc Particulate
2-RE-303 2-RE-304B	Iodine Iodine Background	1.4E-11 to 3.82E-6 µCi/cc (Fixed Filter at 60 lpm for one hour)
2-RE-305 2-RE-306B	Low Range Gas Area Monitor (Low Range Gas Background)	1.0E-7 to 6.0E-2 µCi/cc (Equivalent Xe-133)
2-RE-307 2-RE-308B	Medium Range Gas Medium Range Gas Background	2.5E-2 to 4.0E2 µCi/cc (Equivalent Xe-133)
2-RE-309	High Range Gas	1.0 to 1.0E5 µCi/cc (Equivalent Xe-133)
	Auxiliary Building Exhaust SPING-4 (Field Unit 23)	
RE-311 RE-312	Beta Particulate Alpha Particulate	6.3E-12 to 2.4E-6 µCi/cc Particulate
RE-313 RE-314B	Iodine Iodine Background	1.4E-11 to 3.82E-6 µCi/cc (Fixed Filter at 60 lpm for one hour)
RE-315 RE-316B	Low Range Gas Area Monitor (Low Range Gas Background)	1.0E-7 to 6.0E-2 µCi/cc (Equivalent Xe-133)
RE-317 RE-318B	Medium Range Gas Medium Range Gas Background	2.5E-2 to 4.0E2 µCi/cc (Equivalent Xe-133)
RE-319	High Range Gas	1.0 to 1.0E5 µCi/cc (Equivalent Xe-133)

TABLE 3
SPINGS

Plant Tag No.	Item	Range
	Drumming Area Vent SPING-3 (Field Unit 24)	
RE-321	Beta Particulate	6.3E-12 to 2.4E-6 µCi/cc
RE-322	Alpha Particulate	Particulate
RE-323	Iodine	1.4E-11 to 3.82E-6 µCi/cc
RE-324B	Iodine Background	(Fixed Filter at 60 lpm for one hour)
RE-325	Low Range Gas	1.0E-7 to 6.0E-2 µCi/cc
RE-326B	Area Monitor (Low Range Gas Background)	(Equivalent Xe-133)
RE-327	Medium Range Gas	2.5E-2 to 4.0E+3 µCi/cc
RE-328B	Medium Range Gas Background	(Equivalent Xe-133)

TABLE 4
AREA RADIATION MONITORS

Plant Tag No.	Item	Range*
RE-101	Control Room	$0.1\text{-}10^4$ mR/hr
1-RE-102	Unit 1 Containment	$0.1\text{-}10^4$ mR/hr
2-RE-102	Unit 2 Containment	$0.1\text{-}10^4$ mR/hr
RE-103	Radiochemistry Lab	$0.1\text{-}10^4$ mR/hr
1-RE-104	Unit 1 Charging Pump Room	$0.1\text{-}10^4$ mR/hr
2-RE-104	Unit 2 Charging Pump Room	$0.1\text{-}10^4$ mR/hr
RE-105	Spent Fuel Pit	$0.1\text{-}10^4$ mR/hr
1-RE-106	Unit 1 Sampling Room	$0.1\text{-}10^4$ mR/hr
2-RE-106	Unit 2 Sampling Room	$0.1\text{-}10^4$ mR/hr
1-RE-107	Unit 1 Seal Table	$0.1\text{-}10^4$ mR/hr
2-RE-107	Unit 2 Seal Table	$0.1\text{-}10^4$ mR/hr
RE-108	Drumming Station	$0.1\text{-}10^4$ mR/hr
1-RE-109	Unit 1 Sample Line	$0.1\text{-}10^4$ mR/hr
2-RE-109	Unit 2 Sample Line	$0.1\text{-}10^4$ mR/hr
RE-110	S.I. Pump Room	$0.1\text{-}10^4$ mR/hr
RE-111	C-59 Panel	0.01-100 R/hr
RE-112	Central Primary Auxiliary Building	0.01-100R/hr
RE-113	Auxiliary Building Sump	$0.1\text{-}10^4$ mR/hr
RE-114	CVCS Holdup Tank	0.01-100 R/hr
RE-116	Valve Gallery	0.01-100 R/hr
1-RE-134	Unit 1 Charging Pump Room High Range	$1\text{-}10^4$ R/hr
2-RE-134	Unit 2 Charging Pump Room High Range	$1\text{-}10^4$ R/hr
RE-135	Spent Fuel Pit High Range	$1\text{-}10^4$ R/hr

TABLE 4
AREA RADIATION MONITORS

Plant Tag No.	Item	Range*
1-RE-136	Unit 1 Sampling Room High Range	$1\text{-}10^4$ R/hr
2-RE-136	Unit 2 Sampling Room High Range	$1\text{-}10^4$ R/hr
RE-140	S.I. Pump Room High Range	$1\text{-}10^4$ R/hr

*Range is based on expected post-accident radiation dose rates. Two overlapping detectors are used where required to cover the entire expected range.

FOOTNOTES

IMPLEMENTATION OF REGULATORY GUIDE 1.97
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

a. This equipment is located in a mild environment as defined by 10 CFR 50.49. Therefore, consistent with NRC Generic Letter 8-09 and 10 CFR 50.49, environmental qualification is not required for this equipment (see General Note 2). This equipment is not in the scope of 10 CFR 50.49(b), as reported in our May 20, 1983 letter to Mr. H. R. Denton regarding environmental qualification.

b. The source and intermediate range neutron flux monitors are not required for LOCA/HELB mitigation. Reactivity control is automatically achieved and maintained by reactor scram and the injection of boric acid into the RCS by the safety injection system following a postulated LOCA/HELB. The control rod positions are verified as an immediate action by the operator in the control room before the harsh environment could significantly degrade the rod position indication signals. The proper operation of the safety injection system is monitored and verified through the use of environmentally and seismically qualified instrumentation. The reactor scram and boration by the safety injection system ensures reactor core shutdown with significant margin under all postulated conditions. The RCS soluable boron content can be verified by analysis of RCS grab samples, which are taken using environmentally and seismically qualified valves. The RCS soluable boron content is not expected to change rapidly, if at all, following the initial boration during the ECCS injection phase of an accident. Therefore, periodic analysis of RCS samples would detect any significant changes in boron concentration. Therefore, control rod position indication and analysis of RCS samples for boron are considered adequate to ensure reactor shutdown and environmental and seismic qualification of the source and intermediate range neutron flux monitors is not required. These monitors are not within the scope of 10 CFR 50.49(b) as reported in our May 20, 1983 letter to Mr. H. R. Denton regarding environmental qualificiation.

c. A lower range limit of 0 ppm boron is not practicable to measure. A lower limit of 20 ppm is adequate since a difference in reactivity between a boron concentration of 0 and 20 ppm in the reactor coolant is negligible.

d. The automatic injection of boric acid into the RCS by the safety injection system following a postulated LOCA/HELB is monitored and verified through the use of qualified instrumentation. In addition, since all sources of water for the safety injection system (SI Accumulators, Boric Acid Storage Tanks, and Refueling Water Storage Tanks) are required by Technical Specifications to contain boric acid solution of a minimum concentration, the proper operation of the safety injection system ensures an adequate boron concentration in the reactor coolant to achieve and maintain the safe shutdown of the reactor core. The RCS soluable boron content is not expected to change rapidly, if at all, following the initial boration during the ECCS injection phase of an accident. Therefore, periodic analysis of RCS samples would detect any significant changes in boron concentration. Instrumentation to continuously monitor RCS soluable boron concentration is

not required since periodic analysis of RCS grab samples is adequate for verification of reactivity control.

e. The T/C system has a recommended upper range temperature limit of 1600°F with its stainless steel sheathing and No. 20 AWG extension wire (ANSI Standard MC 96.1-1975, "Temperature Measurement Thermocouples"). The ISA Type K (Chromel-Alumel) T/Cs themselves and the readout devices have the capability of indicating temperatures of up to 2300°F or greater. The 1600°F upper limit is considered adequate, however, since temperatures above 1200°F indicate inadequate core cooling.

f. The original thermocouples (T/Cs) in the reactor vessel upper internals cannot be replaced but can be qualified by analysis. The connectors, cables, splices, electrical penetration assemblies, and reference junctions are being replaced with new equipment qualified in accordance with 10 CFR 50.49.

g. Temperature inputs are from either qualified RCS Hot Leg Loop RTDs (1&2-TE450D & 451D) or qualified Core-Exit Thermocouples (1&2-TE1-39). Temperature input is selectable between loop RTDs and core-exit T/Cs.

h. Consistent with NRC Generic Letter 82-09 and 10 CFR 50.49, those containment isolation valves located in a mild environment outside containment are not required to be environmentally qualified. The valve position indicators located in a potentially harsh accident environment are being environmentally qualified in accordance with 10 CFR 50.49.

i. The indication on each containment isolation valve is not redundant. However, the isolation itself is redundant and is achieved by the use of redundant containment isolation valves, design of the system for greater than containment design pressure or the use of normally shut isolation valves or check valves in accordance with the licensing basis of the plant. Therefore, the single failure criteria for indication is essentially met by redundant isolation capability.

j. The Tech Spec. limit is expressed as $A = 100/\bar{E}$ µCi/gm where $\bar{E}$ = the average sum of the beta and gamma energies per disintegration in Mev and A is the specific activity. Assuming that $\bar{E}$ is 1.5 Mev, which is a typical value for a PBNP Unit, then the specific activity limit is approximately 67 µCi/gm or 67 µCi/ml.

k. Instrumentation to continuously monitor RCS radioactivity concentration is not required. Analysis of RCS grab samples, which will be taken using environmentally and seismically qualified valves, is adequate to detect the breach of the fuel cladding. Periodic samples and analyses are more than timely enough to detect any slow deterioration of the fuel cladding. The remote possibility of rapid breach of the fuel cladding would most likely result only from an inadequate core cooling (ICC) event which would be detected by numerous other diverse instruments. In the event of approach to ICC, the RCS sampling frequency would be appropriately increased to detect fuel failures. As a diverse backup, an area radiation monitor in the sample room could be used provided containment isolation has not been initiated thus securing RCS sample flow. In the event of a LOCA, the containment radiation monitors could be used as a diverse backup for this purpose.

l. The detectors are currently strapped to a pipe. New detectors are planned to be mounted in a pipe well to increase the sensitivity. The new range will be determined when the new detectors are installed and is expected to cover the range recommended by Regulatory Guide 1.97.

m. Radiation exposure rate is an ineffective means of detecting the breach of containment. Since other variables (e.g., Auxiliary Building Exhaust Radioactivity) would be used for this purpose, the environmental qualification of this instrument is not required. This instrument is not within the scope of 10 CFR 50.49(b) as reported in our May 20, 1983 letter to Mr. H. R. Denton regarding environmental qualification.

n. This value (50°F) is the lowest possible value expected for this variable. Therefore, this range meets the intent of Regulatory Guide 1.97 and is adequate for monitoring system operation.

o. The accumulator level instruments are not required for mitigation of LOCA/HELB since the safety injection accumlators are passive devices. The accumulator pressure instruments, which are qualified, could be used to derive an equivalent accumulator water level. Therefore, the range, quality assurance, environmental qualification, and seismic qualification requirements of Regulatory Guide 1.97 for accumulator level are unnecessary.

p. This valve is normally open with power administratively removed (i.e., breaker locked open) from the motor operator. Since the closing of this valve is not required for accident mitigation, environmental qualification of the valve position indicator is not required. This valve is not within the scope of 10 CFR 50.49(b) as reported in our May 20, 1983 letter to Mr. H. R. Denton regarding environmental qualification.

q. The charging pumps are not used for mitigation of design-basis accidents. Therefore, environmental and seismic qualification and quality assurance of the charging line flow instrument is not required. Boric acid is injected into the RCS during LOCA/HELB accident conditions using the safety injection system, which has qualified flow instruments. The charging line flow transmitter is not within the scope of 10 CFR 50.49(b) as reported in our May 20, 1983 letter to Mr. H. R. Denton regarding environmental qualification.

r. The upper range of 107% of high pressure safety injection flow is adequate to monitor the expected range of flow conditions. The 107% is close to 110% and is adequate to determine pump runout flow rate in an accident.

s. Pressurizer heaters are not required for mitigation of design-basis accidents. Breaker positions for the heater groups are an adequate indication of heater status. Pressurizer temperature and pressure are also available as backup indications of heater status.

t. This upper range limit (300°F) is close to the saturation temperature (338°F) for the tank design pressure and rupture disk release pressure of 100 psig. This range is adequate for post-accident monitoring of this tank since pressure can be used as a backup and no operator action is required for accident mitigation based on this parameter.

u. Deleted

v. The containment atmosphere temperature RTDs (1&2-TE3292 and 3293) and containment pressure instruments are the primary instruments used to monitor heat removal by the containment emergency fan coolers. These instruments meet QA, qualification, and single failure requirements. Therefore, qualification and QA on the backup instruments are not required. The backup instruments are not within the scope of 10 CFR 50.49(b) as reported in our May 20, 1983 letter to Mr. H. R. Denton regarding environmental qualification.

w. The CVCS except the BASTs are not required for mitigation of design-basis LOCA/HELB accidents. RCS makeup and boric acid injection is performed by the separate safety injection system. Therefore, qualification and QA on these instruments are not required. These instruments are not within the scope of 10 CFR 50.49(b) as reported in our May 20, 1983 letter to Mr. H. R. Denton regarding environmental qualification.

x. The upper range limit of 100% of tank design pressure is adequate to monitor storage capacity as required by Regulatory Guide 1.97. This range does not need to be changed.

y. This indication is not required for mitigation of design-basis LOCA/HELB accidents. The Radiation Monitoring System provides a backup indication if these dampers are out of position. Therefore, qualification and QA of these damper position indicators is not required. These position indicators are not within the scope of 10 CFR 50.49(b) as reported in our May 20, 1983 letter to Mr. H. R. Denton regarding environmental qualification.

z. Instrument air is not a safety-related system and is not required for design-basis LOCA/HELB mitigation. Therefore, quality assurance is not required for this instrument.

aa. Portable survey meters are the primary means of measuring radiation levels for personnel access. Area radiation monitors are only used as an approximation for planning purposes. Area radiation monitors are not appropriate for radioactivity release detection and assessment. Therefore, environmental qualification is not required. These monitors are not within the scope of 10 CFR 50.49(b) as reported in our May 20, 1983 letter to Mr. H. R. Denton regarding environmental qualification.

bb. Locations include containment purge exhaust vent, auxiliary building exhaust vent, and drumming area vent. All other identified airborne radioactivity release points (e.g., gas decay tank effluent, air ejector effluent, steam generator blowdown vent condensors, etc.), except steam generator safety and atmosphere relief valve discharge, are released through these monitored vent paths (see PBNP FSAR, Figure I2-3). Since containment purge is not allowed at power and is not planned to be used post-accident, the containment purge exhaust vent SPINGs are not normally required for post-accident monitoring, but would, nevertheless be available for operation in the event of an accident.

cc. The actual lower range limit of 0.15μCi/cc (0.10μCi/cc is recommended by Regulatory Guide 1.97) is judged to be adequate.

dd. The detectors are located outside containment on the steam line upstream of the main steam isolation valves. These detectors are located in a mild environment except for the extremely remote possibility of a steam line break outside containment near these detectors. In this case, feedwater flow to the faulted S/G will be isolated and the only radioactive release will be the contents of the S/G whose low-level radioactivity is known from periodic samples. Therefore, environmental qualification of these instruments is not required. This instrument is not within the scope of 10 CFR 50.49(b) as reported in our May 20, 1983 letter to Mr. H. R. Denton regarding environmental qualification.

ee. The upper range limit is adequate since entrance to any High Radiation Area (i.e., $\geq$100 mR/hr) would be under tight administrative controls to preclude overexposure except in an emergency.

ff. This range is based on an autoconvective lapse rate of approximately 7°F per 325 meters which is the maximum theoretical temperature gradient above which turbulent mixing occurs to equalize the temperatures. Therefore, this range is judged to be adequate.

gg. Capability exists to sample the containment sump through the RHR sample lines when the ECCS is in the recirculation mode. The capability exists to sample liquid radioactive wastes. These wastes would include collected wastes from ECCS pump room drains and auxiliary building sumps.

hh. Analysis equipment is available from Wisconsin Electric's Laboratory Services Division, approximately one hundred miles from the plant site. The equipment would be transported to the plant site for analysis of grab samples within 24 hours. The sensitivity of the analysis is approximately 1 ppb or 0.1 ppm assuming a dilution of the highly radioactive sample by a factor of 100.

ii. This is the minimum sensitivity for this measurement and is adequate for the purpose stated.

jj. Oxygen content is not required to be measured at PBNP. This was stated by the NRC Staff as documented in a letter to Mr. C. W. Fay of Wisconsin Electric, dated June 30, 1982, regarding "NUREG-0737, Item II.B.3, Post-Accident Sampling System".