Wisconsin Electric
POWER COMPANY

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NPL 97-0145

10 CFR 50.4
10 CFR 50.90

April 2, 1997

Document Control Desk
US NUCLEAR REGULATORY COMMISSION
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Mail Station P1-137
Washington, DC 20555

Ladies/Gentlemen:

DOCKETS 50-266 AND 50-301
SUPPLEMENT TO TECHNICAL SPECIFICATIONS CHANGE REQUEST 192
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

In a letter dated September 30, 1996, Wisconsin Electric requested Technical Specifications Change Request 192. This Technical Specifications change request proposes to modify Technical Specifications Section 15.3.3, "Emergency Core Cooling System, Auxiliary Cooling Systems, Air Recirculation Fan Coolers, and Containment Spray" to incorporate allowed outage times similar to thosc contained in NUREG-1431, Revision 1, "Westinghouse Owner's Group Improved Standard Technical Specifications," and modify the operability requirements for the service water system. The proposed changes to Technical Specifications Section 15.3.7, "Auxiliary Electrical Systems," also reflect the modified service water operability requirements. The proposed change to Technical Specifications Section 15.5.2, "Containment," modifies the heat removal capacity of the reactor containment air cooler units. Previous supplements to this Technical Specifications change request were provided in a letters dated November 26, 1996; December 12, 1996; February 13, 1997; and March 5, 1997.

This letter also provides supplemental information for Technical Specifications Change Request 192. Specifically, Attachment 1 is additional information for the determination of the spray duration, Attachment 2 is additional information for the determination of spray iodine removal constant, Attachment 3 is additional information regarding the basis for the assumed control room occupancy factor and ECCS leakage, and a correction to Table 4 from the February 13, 1997 letter.

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We have determined that the additional information does not involve a significant hazards consideration, authorize a significant change in the types or total amounts of any effluent release, or result in any significant increase in individual or cumulative occupational exposure. Therefore, we conclude that the

statement or negative declaration and environmental impact appraisal need not be prepared. The original "No Significant Hazards" determinations for operation under the proposed Technical Specifications remain applicable.

Please contact us if you have any questions.

Sincerely,

G M Frieson
for

Douglas F. Johnson
Manager-Regulatory Services
and Licensing

CAC

Attachment

cc: NRC Resident Inspector
NRC Regional Administrator
PSCW

Subscribed and sworn before me on
this 2nd day of April, 1997.

Jacqueline Gorecki
Notary Public, State of Wisconsin

My commission expires 10/26/2000.

ATTACHMENT 1

MINIMUM SPRAY DURATION TIME

The minimum spray duration time was determined to be 4825 seconds based on the following assumptions:

- Safety injection and containment spray are actuated at the same time.
- Spray flow enters the containment 56.4 seconds after SI/CS signal actuation due to signal processing, equipment actuation and spray piping fill time delays.
- Sodium hydroxide solution enters the containment 139.4 seconds after SI/CS signal actuation based on spray additive timer delay and spray piping flush time.
- Containment spray is stopped when the RWST level reaches 6%. Note, sodium hydroxide additive is stopped when 650 gallons of solution is delivered into the containment.
- The minimum available refueling water is based on a maximum tank level of 95% at the start of the accident.
- Two Safety Injection (SI) pumps, two Residual Heat Removal (RHR) pumps and one Containment Spray (CS) pump are initially in service [Ref. 1 below].
- One SI pump and one RHR pump stopped at 60% level in RWST.
- SI and RHR pump suction switched from RWST to sump at 38% level in RWST (recirculation mode). One CS pump remains in service until RWST level reaches 6%.
- Pump head/flow curves raised uniformly by 3% of the design head (280 x .03 = 8.4 ft.- RHR; 2600 x .03 = 78 ft. - SI; 475 x .03 = 14 ft. - CS)
- System resistances (RHR and CS subsystems) reduced 20%.

ATTACHMENT 2

1. The elemental iodine spray removal coefficient was calculated using the mathematical model given in SRP 6.5.2, Rev 2. An actual value of 31.46 hr^{-1} was calculated; however, as directed in SRP 6.5.2, Rev. 2, the removal coefficient was limited to 20 hr^{-1} in the LOCA radiological analysis.

   The removal rate constant was determined as follows:

$$\lambda_s = \frac{6\,(K_g)\,(T)\,(F)}{(V)\,(D)}$$

Where:

λ_s	=	Spray Removal Constant, hr^{-1}
K_g	=	Gas-Phase Mass-Transfer Coefficient, ft/min
T	=	Time of Fall of the Spray Drops, min
F	=	Volume Flow Rate of Sprays, ft^3/hr
V	=	Containment Sprayed Volume*, ft^3
D	=	Mass-Mean Diameter of the Spray Drops, ft

Gas-Phase Mass-Transfer Coefficient:

$K_g = 3$ m/min = 9.84 ft/min (the minimum observed K_g, BNL-Technical Report A-3788, dated 8/12/86, p A-18, 21.)

Time of Fall of the Spray Drops:

T = 6.21 sec = 0.10 min (calculated by Westinghouse based on spray flow rate, fall height, containment temperature and pressure)

Volume of Flow Rate of Sprays:

F = 1,190 gpm (provided by Wisconsin Electric)

F = 1,190 gpm (0.1337 ft^3/gal)(60 min/hr) = 9546 ft^3/hr

Containment Sprayed Volume*:

V = 475,168 ft^3 (provided by Wisconsin Electric)

Mass-Mean Diameter of the Spray Drops:

D = 0.115 cm = 3.77E-3 ft (calculated by Westinghouse based on spray flow rate, fall height, containment temperature and pressure)

$$\lambda_s = \frac{6\,(9.84\ \text{ft/min})\,(0.1\ \text{min})\,(9546\ \text{ft}^3/\text{hr})}{(475{,}168\ \text{ft}^3)\,(3.77\text{E-3 ft})} = 31.46\ \text{hr}^{-1}$$

* It should be noted that although SRP 6.5.2 states that the containment free volume is to be used, the spray removal coefficients have been calculated based only on the sprayed containment volume. In the Westinghouse calculations these removal coefficients only apply to activity while it is in the sprayed region of containment. This applies to both the elemental and particulate iodine removal coefficients.

2. The particulate iodine spray removal coefficient was calculated using the mathematical model given in SRP 6.5.2, Rev. 2. The removal rate constant was determined as follows:

$$\lambda_p = \frac{3\,(h)\,(F)\,(E)}{2(V)(D)}$$

Where:

λ_p	-	Spray Removal Constant hr^{-1}
h	-	Drop Fall Height, ft
F	-	Volume of Flow Rate of Sprays, ft^3/hr
V	-	Containment Sprayed Volume*, ft^3
E/D	-	Ratio of a Dimensionless Collection Efficiency E to the Average Spray Drop Diameter D.

Drop Fall Height: The fall height is defined as the distance from the operating deck to the lowest spray ring header.

$h = 131.58 - 66.0 = 65.58$ ft

Volume Flow Rate of Sprays:

F = 1,190 gpm (provided by Wisconsin Electric)

$F = 1{,}190 \text{ gpm } (0.1337 \text{ ft}^3/\text{gal})(60 \text{ min/hr}) = 9546 \text{ ft}^3/\text{hr}$

Containment Sprayed Volume*:

$V = 475{,}168 \text{ ft}^3$ (provided by Wisconsin Electric)

E/D ratio: These values were taken from SRP 6.5.2.

$E/D = 10 \text{ m}^{-1}$ for $M_o/M_t \leq 50$ used to calculate λ_{p-1}

$E/D = 1 \text{ m}^{-1}$ for $M_o/M_t > 50$ used to calculate λ_{p-2}

Where M_o/M_t is the ratio of the initial aerosol mass to the aerosol mass at time t

$$\lambda_{p-1} = \frac{3\,(65.58 \text{ ft})\,(9546 \text{ ft}^3/\text{hr})\,(10 \text{ m}^{-1})\,(0.3048 \text{ m/ft})}{2(475{,}168 \text{ ft}^3)} = 6.02 \text{ hr}^{-1}$$

$$\lambda_{p-2} = 0.1 \times 602 \text{ hr}^{-1} = 0.602 \text{ hr}^{-1}$$

* See note for previous question.

3. The maximum achievable elemental iodine decontamination factor (DF) for the containment atmosphere achieved by the containment spray system was calculated using the mathematical model from SRP 6.5.2, Rev. 2. The elemental iodine DF for the containment atmosphere is determined by the following equation:

$$DF = 1 + [V_S / (V_C - V_S)](PC)$$

Where:
- DF = decontamination factor
- V_s = volume of liquid in containment sump and sump overflow, ft^3
- PC = partition coefficient for iodine in water
- V_c = containment net free volume, ft^3

Volume of Liquid in Containment Sump and Sump Overflow

Mass in the containment sump = 1,788,481 lbm. (Westinghouse calculation)

Using a very conservative density of 62.2 lbm/ft^3, this converts to 28754 ft^3 (the actual sump volume during the accident would be larger since the density would be lower during accident conditions).

Spray Volume trapped in the refueling cavity = 46,000 gallons (6149 ft^3) (Provided by Wisconsin Electric)

$$V_s = 28754\ ft^3 + 6149\ ft^3 = 34{,}903\ ft^3$$

It is appropriate to combine these two volumes together as V_s for the following reason. Although the 46,000 gallons which may be trapped in the refueling cavity is not in the containment sump and available for recirculation following a LOCA, this volume is completely comprised of containment spray and will consist of both elemental and particulate iodine which has been removed by containment spray. The pH of this volume will be greater than the 7.0 assumed for the containment sump because of the high NaOH concentration and the volume will retain the iodine for the duration of the accident as in the containment sump.

Containment Net Free Volume

V_c = 1.065E6 ft^3 (Provided by Wisconsin Electric)

Partition Coefficient for Iodine in Water

PC = 10,000

Figure 33 from NUREG/CR-2900, "Predicted Rates of Formation of Iodine Hydrolysis Species at pH Levels, Concentrations, and Temperatures Anticipated in LWR Accidents," which shows partition coefficient for different pH solutions as a function of time (the PC increases with time) for water at 100°C was used to determine the appropriate partition coefficient. Using a pH of 7.0, the partition coefficient is 2000 at 100 seconds, about 16,000 at 1000 seconds (16.7 minutes), about 160,000 at 10,000 seconds (2.78 hr), and even higher as time continues. From these values, a partition coefficient of 10,000 would be a conservative value to use since the spray will be used for at least 80 minutes in order to reach an RWST level of 6%.

$$DF = 1 + \frac{(3.49E4)(1.0E4)}{(1.065E6 - 3.49E4)} = 340$$

4. With a removal coefficient of 6.02 hr^{-1}, a decontamination factor of 19.8 would be reached in a half hour only if the removal coefficient were applied to the entire containment free volume and the simple equation $1/DF = e^{-\lambda t}$ could be used.

However, the elemental and particulate iodine spray removal coefficients only apply to the sprayed regions of containment and are calculated specifically for the sprayed containment volume as shown in response to questions 1 and 2 above. It is assumed that there is mixing between the sprayed and unsprayed volumes in containment due to the containment fan coolers. This allows activity in the unsprayed region to be transferred to the sprayed region at an appropriate mixing rate to simulate actual conditions in the containment atmosphere. Thus, since the removal coefficients only apply to the sprayed volume, activity is only removed while it is in the sprayed volume. This makes it necessary to determine the decontamination factors based on actual calculated activity levels in containment at various time intervals.

Table 4 of the submittal states that containment spray is terminated at 1.37 hours which is based on 4825 seconds of spray and a 90 second delay in spray actuation. The following calculations were made to determine what DF for particulate iodine had been achieved at the termination of containment spray.

Determination of the times to reach DF limits

The particulate iodine would continue to be removed by a removal coefficient of 6.02/hr until an overall DF of 50 is achieved. Based on the use of particulate I-131, the airborne activity that would indicate a DF of 50 had been reached is determined as follows:

Fraction of core inventory of I-131 that is particulate = 0.05
Fraction of core inventory of I-131 that is released to the containment = 0.25
Core inventory of I-131 at accident initiation = 4.13E7 Ci
Total particulate I-131 released to the containment atmosphere
= (0.05) (0.25) (4.13E7) = 5.16E5 Ci
At a DF of 50 the airborne activity = (5.16E5) / 50 = 1.03E4 Ci of particulate I-131

Since the containment spray is terminated at 1.365 hours, the particulate I-131 airborne in the containment (sum of the sprayed and unsprayed volumes) was calculated below for this time period to determine if a DF of 50 has been reached for the particulate iodines as follows:

	Airborne Particulate Iodine (Ci)			Particulate
Time	Sprayed Vol.	UnSprayed Vol.	Fraction as I-131	I-131 Airborne (Ci)
1.365 hr	6.061E4	1.048E5	0.1576	2.61E4

As shown above, an overall DF of 50 for particulate iodine is not reached before the containment spray is terminated since the airborne activity is above 1.03E4 Ci; therefore, it is not necessary to reduce the particulate iodine removal coefficient during the time interval the sprays are on. At the end of containment spray the following particulate decontamination factor has been reached:

DF = (5.16E5) / (2.61E4) = 19.77

ATTACHMENT 3

Control Room Occupancy Factors

Table 3 that was attached to the supplement letter dated February 13, 1997, shows the occupancy factors used for the control room loss-of-coolant accident dose analysis. Typically, occupancy factors are based on the Murphy-Campe paper, "Nuclear Power Plant Control Room Ventilation System Design for Meeting General Design Criterion 19", presented at the 13th AEC Air Cleaning Conference. The occupancy factors used for the PBNP large break LOCA control room dose analysis directly compares to the Murphy-Campe values, as follows:

TIME AFTER ACCIDENT	PBNP LOCA OCCUPANCY FACTORS	MURPHY-CAMPE OCCUPANCY FACTORS
0-12 hours	1.0	1.0
12-24 hours	0.0	1.0
24-36 hours	1.0	0.6
26-48 hours	0.0	0.6
48-60 hours	1.0	0.6
60-72 hours	0.0	0.6
72-84 hours	1.0	0.6
84-96 hours	0.5	0.6
4-30 days	0.4	0.4

Westinghouse has submitted information to the NRC documenting the use of a more realistic control room occupancy factor for the AP600 program than the model defined in the Murphy-Campe paper. The justification for this revised occupancy factor is that it is unrealistic to assume that the operators will be in the control room for the first 24 hours following an accident. With a nominal shift length of 8 hours, it is reasonable to assume individuals would remain in the control room for 1 1/2 shifts. Additionally, the twelve hour shifts are continued through the first four days of the analysis.

PBNP procedure NP 1.6.6, "Work Duration Restrictions," prohibits working more than 16 hours in any 24, 24 hours in any 48, and 72 hours in 7 days, without verbal authorization of the plant manager or his designee. The occupancy factors used for the PBNP control room LOCA dose analysis are consistent with the 24 hours in any 48 work restriction and higher than the 72 hours in 7 days work restriction.

ECCS Leakage

Previous analyses for control room LOCA dose (ca. 1983) assumed ECCS leakage of 25,000 cc/hr. The analyses provided with this license amendment assume 400 cc/min, which is based on 25,000 cc/hr divided by 60 minutes/hour and rounded down to 400 cc/min.

The current leakage reduction and preventive maintenance program for Point Beach was developed in response to item 2.1.6.a of the category "A" items of NRC recommendations resulting from TMI-2 lessons learned. The NRC review of WEPCO compliance with this item is documented in an attachment to a letter dated April 9, 1980, from A. Schwencer-NRC to S. Burstein-WEPCO. This review states the following:

> A leakage program has been developed and implemented for Point Beach. No leakage criteria were established but a commitment was made to keeping leakage as low as practicable. Point Beach is in compliance with these lessons learned requirements.

It is expected that when this amendment is approved by the NRC and implemented, the 400 cc/min will be considered the ECCS leakage limit for each units' ECCS systems at Point Beach.

Correction to Previous Information

In the conclusion of attachment 1 to the February 13, 1997 letter it was stated that by the use of potassium iodide pills, the control room dose would be reduced by approximately 28 rem... This should state that the dose would be reduced to approximately 28 rem.

Also, attached is copy of Table 4 from the February 13, 1997 letter. Note that the units for containment spray flowrate are "gpm" not "cfm" as previously shown in that table.

TABLE 4
ASSUMPTIONS USED FOR LARGE BREAK LOCA DOSE ANALYSIS
CONTAINMENT LEAKAGE

Power (102%)	1549 MWt
Iodine Chemical Species	
Elemental	91%
Methyl	5%
Particulate	4%
Iodine Removal in Containment	
Instantaneous Iodine Plateout	50%
Containment Spray	
Start delay time	90 seconds
Injection spray flowrate	1190 ~~cfm~~ gpm
Duration of injection spray	1.37 hours
Spray removal coefficient	
Elemental	20 hr^{-1}
Particulate	6.02 hr^{-1}
Containment Net Free Volume	1.065E6 ft^3
Sprayed Volume	475,000 ft^3
Unsprayed Volume	590,000 ft^3
Containment Mixing	
Containment Fan Coolers	
Start Delay Time	90 seconds
Number of Units	2
Flow Rate per Unit	38,500 cfm
Containment Leak Rate	
0-24 hr	0.4%/day
> 24 hr	0.2%/day