Wisconsin Electric
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NPL 2000-0171

April 7, 2000 10 CFR 50.73

Document Control Desk
U.S. NUCLEAR REGULATORY COMMISSION
Mail Station P1-137
Washington, DC 20555

Ladies/Gentlemen:

DOCKET NOS 50-266 AND 50-301
LICENSEE EVENT REPORT 2000-005-00
TERMINATION CRITERIA FOR CONTAINMENT SPRAY IN EMERGENCY OPERATING PROCEDURE NON-CONSERVATIVE WITH SAFETY ANALYSIS ASSUMPTIONS
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

Enclosed is Licensee Event Report 266/2000-005-00 for Point Beach Nuclear Plant, Unit 1 and 2. This report is provided in accordance with 10 CFR 50.73(a)(2)(vi) as a "procedural inadequacy" which could have prevented the fulfillment of the safety function of systems that are needed to, "(C) Control the release of radioactive material; or (D) Mitigate the consequences of an accident." This report describes the discovery that the containment spray early termination criteria incorporated into an emergency operating procedure during an update to include revised emergency response guidelines was not consistent with the assumptions for spray duration in the FSAR safety analysis.

Corrective action commitments within this report are indicated in italics.

Please contact us if you require additional information concerning this event.

Sincerely,

A. J. Cayia
Manager,
Site Services and Assessment

Enclosure

CWK/tja

cc: NRC Resident Inspector
NRC Regional Administrator
NRC Project Manager
PSCW
INPO Support Services

IE22

NRC FORM 366 (4-95)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Point Beach Nuclear Plant, Unit 1	05000266	1 of 6

TITLE (4)

Termination Criteria for Containment Spray in Emergency Operating Procedure Non-Conservative with Safety Analysis Assumptions

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	09	2000	2000	- 005	- 00	04	07	2000	Unit 2	05000301
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	N
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)	X	50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Charles Wm. Krause, Senior Regulatory Compliance Engineer	(920) 755-6809

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

While reviewing the design basis document for the Safety Injection and Containment Spray System a PBNP engineer questioned whether the early containment spray termination criteria identified in Emergency Operating Procedure (EOP) 1.3 was consistent with the duration of spray assumptions in the FSAR safety analyses (Section 14.3.5). Subsequent evaluation of this concern determined that there was a reasonable possibility that the reduction of spray duration due to the early spray termination criteria could prevent the fulfillment of a safety function necessary to control the release of radioactive material or mitigate the consequences of an accident. This concern was considered to be a procedural inadequacy. Mitigating circumstances were identified which would result in a reduction of potential radiological releases following a postulated design basis accident. However, given the assumptions required by the safety analysis for spray duration, this event was determined to be a reportable under 10 CFR 50.73(a)(2)(vi). The EOP was promptly changed on March 8, 2000, to remove the early spray termination criteria. The cause of this event was an inadequate 10 CFR 50.59 evaluation of the procedure change.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

Event Description:

During the preparation of the design basis description for the Safety Injection and Containment Spray Systems Design Basis Document (DBD-11), licensing and design basis calculations were reviewed to determine the draw down requirements for the refueling water storage tank (RWST) after the design basis accident. This review included the Post-LOCA sump pH analysis, the FSAR Chapter 14 large break LOCA (LBLOCA) radiological analysis, and those calculations which determined radiation doses to equipment outside containment. A review of Point Beach Nuclear Plant (PBNP) emergency operating procedures (EOP) was also conducted to verify that the procedural actions and guidance were consistent with these licensing and design basis calculations. During that review, we determined that the containment spray termination criteria in EOP-1.3, Revision 22, dated November 24, 1999, "Transfer to Containment Sump Recirculation," may not be consistent with the assumptions in the licensing and design basis calculation assumptions in FSAR Section 14.3.5, "Radiological Consequences of Loss of Coolant Accident." A condition report was initiated on March 6, 2000 (CR 00-0759) and the significance of this discovery was referred to the PBNP nuclear safety analysis group for evaluation.

On March 8, 2000, PBNP established that EOP 1.3, Revision 22, directs the shift operations personnel to secure containment spray when containment pressure is less than 15 psig and after a 12% reduction in the spray addition tank level has occurred. However, we also determined that it is possible that both of these conditions could be met before enough spray volume would be released into the containment atmosphere. The volume of spray pumped into the containment is important to maintaining offsite and control room doses at or below the limits listed in FSAR 14.3.5.

The containment spray system is used not only for containment pressure reduction, but also to scrub iodine from the atmosphere and maintain sump pH. Under the postulated condition where only one train of spray is available, a 12% reduction in the spray addition tank level could occur as early as approximately 32 minutes into the transient. The PBNP containment pressure analysis is described in FSAR 14.3.4, "Containment Integrity Evaluation." Figure 14.3.4-16 gives the LOCA pressure profile for demonstrating containment integrity, and shows a containment pressure of 15 psig well beyond two hours. However, this analysis assumes worst case mass and energy releases from a LBLOCA, and conservatively models containment heat removal mechanisms, i.e., structural heat sinks, containment fan coolers, and containment sprays may perform more effectively in an accident than assumed in the safety analysis. Therefore, it cannot be demonstrated that a containment pressure of less than 15 psig could not exist in less than the 65 minutes assumed for spray duration in the FSAR Section 14.3.5 analysis.

Containment Spray termination under these conditions, 12% reduction in spray addition tank level and containment pressure of 15 psig, could result in roughly half the amount of spray duration assumed in the FSAR 14.3.5 analysis (Table 14.3.5-4)of 65 minutes. The current analysis shows that with one train of spray available, 65 minutes of spray injection is assumed in the calculation. Based on that assumption, enough water is sprayed into the containment atmosphere for iodine removal such that 10 CFR 100 limits at the site boundary and the dose limits to control room personnel in the 30 days following the accident are met. A reduction of the spray volume under the termination criteria mentioned above may increase the dose consequences offsite and in the control

room beyond the limits in the FSAR. This is notwithstanding that the radiological analysis in FSAR 14.3.5 assumes the Technical Specification leak rate based on a containment pressure at the design value of 60 psig. Therefore if the actual containment pressure was less then 15 psig, the containment leak rate would be significantly less than the leak rate assumed in the analysis.

Engineering judgement concluded that although the licensing basis analysis of record in the FSAR could be exceeded, the design basis exposure limits in 10 CFR 100 would not be exceeded, based on several mitigating considerations (see Safety Assessment for further details). A temporary procedure change to EOP 1.3 to remove the containment spray termination criteria was completed later in the day on March 8, 2000. This change was subsequently included in a revision of the procedure issued on March 27, 2000.

After a further examination and review of the radiological release and dose calculation of record, engineering personnel determined on March 9, 2000, that there was a reasonable expectation that the results of a revised analysis using a reduced containment spray interval may not justify the early containment spray termination criteria for PBNP. The impact of the reduction in spray time on the overall removal of iodine from the containment atmosphere by the containment spray system is dependent on the rate of iodine removal by spray and the rate of mixing between sprayed and unsprayed volumes in the containment. Because the removal rate is time dependent, ratios cannot be used to factor in both the reduction in spray time and the mitigating considerations described in the Safety Assessment to demonstrate analysis doses would be within the prescribed limits. A formal reanalysis would be required. At that time we concluded that this event should be reported under Paragraph 50.73(a)(2)(vi) of 10 CFR 50 as a "procedural inadequacy" which could have prevented the fulfillment of the safety function of systems that are needed to, "(C) Control the release of radioactive material; or (D) Mitigate the consequences of an accident."

Cause:

The cause of this condition was an inadequate 10 CFR 50.59 screening and review of a revision to EOP-1.3 which added the Containment Spray Shutdown Criteria, in step 3 and to the foldout page of that procedure. This change to the EOP, designated as Revision 20, was initiated in April 1999 as a total rewrite of the procedure to incorporate a new procedure format and to include the Revision 1C of the Westinghouse Owner's Group (WOG) Emergency Response Guidelines (ERGs). The WOG ERGs contain the technical basis for construction of plant specific Emergency Operating Procedures. The EGRs specify operator actions, information, and control needs which will return the plant to a safe, stable condition during emergency situations without the need to diagnose specific events. This procedure change was screened for 10 CFR 50.59 applicability (SCR 99-0490) in May 1999. That screening concluded that the proposed changes did not change the facility as described in the CLB, did not change procedures described in the CLB, and did not affect the operation, function, or method of performing the function of an SSC as described in the CLB. That screening; however, failed to identify the FSAR Section 14.3.5 as a relevant CLB document and did not evaluate the impact of the procedure changes on that safety analysis description.

Corrective Actions:

As mention previously, a temporary change to EOP-1.3 was completed to remove the non-conservative containment spray termination criteria. This change has been incorporated into Revision 23 of EOP 1.3 which was issued on March 27, 2000.

A root cause evaluation of this event has been initiated (RCE 00-028) to identify why the appropriate CLB screening and evaluations were not completed for the EOP change.

The extent of condition and the process for incorporating the WOG ERG Revision 1C information into plant specific EOPs is also being evaluated.

Component and System Description:

Adequate heat removal capability for the containment is provided by two separate, full capacity, engineered safety features systems. These are the Containment Spray System, whose components are described in FSAR Section 6.4, and the Containment Air Recirculation Cooling System, whose components operate as described in FSAR Section 6.3.2. These systems are of different engineering principles and serve as independent backups for each other.

Any of the following combinations of equipment will provide sufficient heat removal capability to maintain the post accident containment pressure below the design value, assuming that the core residual heat is released to the containment as steam.

1. Both containment spray pumps
2. All four containment cooling fans
3. One containment spray pump and two of the four containment cooling fans.

The primary purpose of the Containment Spray System is to spray cool water into the containment atmosphere, when appropriate, in the event of a loss-of-coolant accident and thereby ensure that containment pressure does not exceed its design values. This protection is afforded for all pipe break sizes up to and including the hypothetical instantaneous circumferential rupture of a reactor coolant pipe. The containment spray system design is based on the conservative assumption that the core residual heat is released to the containment as steam. The containment spray system is designed to spray at least 2,400 gpm of borated water into the containment building whenever the coincidence of two sets of two out of three (Hi-Hi) containment pressure signals or a manual signal is given. Either of two subsystems containing a pump and associated valving and spray headers are independently capable of delivering one-half of this flow, or 1,200 gpm.

A second function served by the containment spray system is to remove iodine from the containment atmosphere should it be released in the event of a loss-of-coolant accident. The analysis showing the system's ability to limit off-site thyroid dose to within 10 CFR 100 limits after a hypothetical loss-of-coolant accident is presented in FSAR Chapter 14. A third function of the containment spray system is to provide sufficient sodium hydroxide from the spray additive tank to achieve the required sump pH level in order to prevent chloride induced stress corrosion cracking.

During the period of time that the spray pumps draw from the refueling water storage tank, each spray pump will cause a spray additive (NaOH) to be added to the refueling water by using a liquid eductor and the spray pump discharge. The fluid passing from the spray additive tank will then mix with the fluid entering the pump suction. The results will be a solution suitable for the removal of iodine.

Safety Assessment:

As mentioned in the Event Description, this event was determined to be reportable because of a procedural inadequacy in the EOP that could have resulted in an early containment spray termination following a postulated design basis accident under the unlikely condition that containment pressure decreases to 15 psig or less within the first hour of the DBA transient. An early spray termination, before the 65 minute spray duration assumed in the FSAR Section 14.3.5 analysis, could result in changes to the radiological release. This, in turn, could result in a change to the offsite and control room doses listed in the FSAR. Since an EOP change had been promptly completed, the complex and expensive calculation to fully assess the impact of this procedural inadequacy on the FSAR analysis results has not been completed; however, we have identified several mitigating considerations that would result in the actual radioactivity release following the postulated design basis accident being less than the releases assumed in the analysis. These factors include:

- The spray removal rate (i.e. spray lamda) assumed in the radiological consequence analysis for elemental iodine is limited to 20 hr^{-1} based on guidance in Standard Review Plan 6.5.2. The actual calculated elemental iodine spray removal rate based on PBNP containment system performance is 31.4 hr^{-1} for one train of containment spray operating.

- Approximately 37% of the total calculated thyroid dose is due to iodine release from ECCS leakage. The ECCS leak rate assumed in the analysis is 800 cc/min for offsite doses and 400 cc/min for control room doses. The ECCS leak rate measured during U1R25 was 256.2 cc/min. The ECCS leak rate measured during U2R23 was 157.3 cc/min.

- The containment leak rate assumed in the radiological consequences analysis is the Technical Specification value of 0.4 weight percent (w/o) per day for the initial 24 hours following a LOCA and 0.2 w/o per day for the remaining 29 days based on the design containment pressure of 60 psig. PBNP maintains an administrative limit of allowable containment leak of 0.2% w/o per day. The actual measured leak rate for the latest integrated leak rate test was 0.0465% for Unit 1 (10/5/97) and 0.1005% for Unit 2 (3/30/97).

- The EOP 1.3 criteria for securing sprays specified that containment pressure be less than 15 psig. This would result in an additional reduction in containment leakage.

Although the FSAR analysis for radioactive release from containment following a design basis LBLOCA assuming a termination of containment spray before the 65 minutes considered in the analysis may result in an increase in the off site and control room doses as identified in FSAR Table 14.3.5-6, the above considerations would tend to off set the actual release which would result had an actual accident occurred. Based on these considerations, coupled with the very low probability of the initiating event, we

have concluded that the affect of this event on the health and safety of the public and the plant staff was negligible.

We have further determined that although we have conservatively chosen to report this event under 10 CFR 50.73(a)(2)(vi), this event is not a safety system functional failure since the failure of the spray system to perform its safety function would be dependant on more than just the procedural inadequacy identified in this report.

System and Component Identifiers:

The Energy Industry Identification System component function identifier for each component/system referred to in this report are as follows:

Component/System	Identifier
Containment Spray System	BE
Safety Injection System	BQ
Containment Fan Cooling System	BK
Reactor Containment Building	NH
Spray Pump	P
Eductor	EDR

Similar Occurrences:

A review of LERs over the past three years identified no similar or related events resulting in reportability due to inadequate procedures.