

LICENSEE EVENT REPORT (LER)

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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

FACILITY NAME (1) Point Beach Nuclear Plant, Unit 1		DOCKET NUMBER (2) 05000266	PAGE (3) 1 of 7
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TITLE (4)
Postulated Fire Could Lead To Loss Of Redundant Trains Of Charging Capacity

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
10	4	1999	1999	008	00	11	3	1999	PBPN Unit 2	05000301
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9) N	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)			
POWER LEVEL (10) 100	20.2203(a)(1)		20.2203(a)(3)(i)	X	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)		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 Charles Wm. Krause, Senior Regulatory Compliance Engineer	TELEPHONE NUMBER (Include Area Code) (920) 755-6809
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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 conducting a review of Appendix R alternate and dedicated safe shutdown analyses and exemption requirements, the licensee determined that for certain postulated Appendix R design basis fires, a hot short on a conductor of the control cable for valve CV-112C, the normal suction supply from the volume control tank (VCT) to the charging pumps, could cause the valve to shut. The same fire could also damage the cables for the alternate charging water supply valve, CV-112B and prevent that valve from opening. Under these conditions, there is a potential for causing damage to any of the operating, positive displacement charging pumps if an alternate charging water supply is not established or the pump(s) are not turned off. Compensatory measures consisting of increased fire rounds and administrative controls on charging pump operations have been initiated. A plant modification is planned to eliminate the potential for this fire induced spurious valve operation. A safety assessment of this condition has determined that an alternate means of reactor coolant inventory control is available using a safety injection pump; however, this source would not satisfy the Appendix R performance goals which makes this event reportable as a condition outside the plant's Appendix R design basis.

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Event Description:

Wisconsin Electric, licensee for the Point Beach Nuclear Plant (PBNP), is conducting a 10 CFR 50 Appendix R rebaselining project to verify and revalidate plant configuration and conformance with the Appendix R Safe Shutdown performance criteria. This project consists of reviews and revalidation of the bases and assumptions for the Appendix R Safe Shutdown analyses, and also includes verification of assumptions for any exemptions granted by the NRC as described in the PBNP Fire Protection Evaluation Report (FPER). During this rebaselining effort, we discovered that for certain postulated Appendix R design basis fires, a hot short on the appropriate conductor of the control cable for valve CV-112C, normal suction supply from the volume control tank (VCT) to the charging pumps, could cause that valve to shut. The control cables for the alternate supply to the charging pumps, valve CV-112B also could be damaged by the same fire. Under these conditions, there is a potential for causing damage to any of the operating, positive displacement charging pumps if an alternate charging water supply is not established immediately or the charging pump(s) are not stopped.

The alternate supply source for the charging pumps is from the Refueling Water Storage Tank. Our investigation determined that the cables for the isolation valve associated with this alternate water supply, which is valve CV-112B, are routed in the same fire zones (listed below) containing the routing for the CV-112C valve cables. As a result of damage from the postulated Appendix R fire, the charging system alternate supply valves may require local manual operation in order to establish the backup water source to the charging pumps. We have concluded that it is likely that there would be insufficient time to accomplish this manual action before failure of any running charging pumps. Because the expected alarms for the normal supply valve closing could be caused by problems other than loss of charging supply, and the valve position indications could not be relied upon (the indicating lights are part of the same cables which cause the spurious operation); stopping the running charging pump(s) immediately would not be an expected operator response to the alarms. Thus, it could take operators some time to recognize what has occurred and it is considered unlikely that the appropriate action could or would be taken to prevent damaging the operating pump(s). Therefore, for this specific Appendix R fire event, it is assumed that any charging pumps operating at the time of the event will not be available. If the running pump(s) is the only credited pump available for that Appendix R fire event (i.e. the other pumps are determined to be not available because of other fire induced failures), then there would be the potential for a total loss of charging capability. This is a fire induced failure which, per the requirements of Appendix R, assumes no other accident occurs at the same time, thus other accident scenarios related to charging pumps are not applicable. The fire zones (FZ) and associated room locations for this fire concern are as follows:

- FZ 156 - U1 Motor Control Center (MCC) Room (8' PAB Charging area)
- FZ 166 - U2 MCC Room (8' PAB Charging area)
- FZ 185 - Chemical Mixing Tank Room (U1 26' PAB)
- FZ 186 - U1 VCT Tank Room (U1 26' PAB wing)
- FZ 187 - Monitor Tank Room (PAB 26' central area)
- FZ 216 - U2 VCT Tank Room (U2 26' PAB wing)
- FZ 318 - Cable Spreading Room
- FZ 326 - Control Room

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This event was documented in a licensee condition report (CR 99-2341) and is applicable to both PBNP Units 1 and 2. At the time of this discovery, both units were operating at 100% power. A one hour non-emergency event notification was made to the NRC at 1347 CDT on October 4, 1999, pursuant to 10 CFR 50 72(b)(1)(ii)(B) for a condition discovered while operating which was outside the Appendix R design basis for the plant (Event number 36259).

Component and System Description:

The Charging Pumps, VCT and valves CV-112C and CV-112B are components of the chemical and volume control system (CVCS). This system and its components are discussed in Section 9.3 of the PBNP FSAR. The following summary discussion is for the CVCS for one unit but applies equally to either unit. The CVCS provides a means for injection of the neutron control chemical in the form of boric acid solution, chemical additions for corrosion control, and reactor coolant cleanup and degasification. This system also adds makeup water to the reactor coolant system, reprocesses water letdown from the reactor coolant system, and provides seal water injection to the reactor coolant pump seals. The charging pumps, three per unit, are positive displacement pumps with variable speed motor drives. The speed of each pump can be controlled manually or automatically with a maximum charging capacity for each pump of 60 gpm. The motor operated charging pump suction valves are CV-112C, the normal supply from the VCT, and CV-112B, the alternate supply from the RWST. With the valve controls in their normal AUTO position, the CV-112C will close on a low-low signal from the VCT level instruments. In order to ensure a continuous water source for the charging pumps, the normal and alternate charging water supply valves are interlocked so that CV-112C does not begin to close until CV-112B leaves its fully closed position.

The PBNP Appendix R design basis requires that at least one Charging Pump must be available for a postulated fire event in order to safely shut down the Unit. In order to accomplish this, at least one train of charging pumps must remain free of fire damage in order to meet the Appendix R Alternate and Dedicated Shutdown Capability performance goals specified in 10 CFR 50, Appendix R, Section III.L.1(b) to maintain reactor coolant inventory.

Cause:

The cause of this event was the failure to identify the vulnerability of the charging system to a single fire location. Previous evaluations of the Appendix R Safe Shutdown fire vulnerabilities were not conducted in sufficient detail to have uncovered this potential situation. The licensee has previously identified weaknesses in other areas of the original Appendix R analyses and had initiated a rebaselining of the evaluations which identified this concern (see Similar Occurrences).

Safety Assessment:

The Appendix R analyses for the at risk fire zones assume that, at the time of the fire event, the plant is in normal conditions with all equipment available. Any Appendix R required equipment taken out of service, will have appropriate compensatory measures taken. The normal operation of the Charging Pumps is for two pumps to be running with

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the third pump secured in standby. The operating pumps are typically rotated periodically to provide even wear for all the pumps. Any non-running pump at the time of a fire event will not be damaged. Temporary loss of charging is acceptable as long as at least one charging pump can be restored within 30 minutes with full pump capacity.

Point Beach Nuclear Plant's Fire Protection Program employs a defense-in-depth approach, which includes both fire detection and suppression provisions, to mitigate the significance of fire events and provide a high likelihood that postulated in plant fires would be prevented or controlled adequately and the safe shutdown equipment would remain available. These provisions include a well trained five man Fire Brigade which is available at all times to respond to a fire alarm and perform manual fire suppression activities.

Additional specifics concerning the safety significance of the discovered conditions are dependent on the Fire Zones involved and are grouped as follows:

Fire Zones 185, 186, 187 and 216:

For FZ's 185, 186, 187 and 216, all three charging pumps will be available for each unit for this postulated fire event. Therefore, at least the non-running Charging Pump will remain available to support the Appendix R requirements in these FZ's; therefore, the presence of the CV-112B and CV-112C control cables in these fire zones is not safety significant.

Fire Zones 318 and 326:

For FZ's 318 and 326 (control room and cable spreading room), the only credited available pump is Charging Pump "A" for each Unit. As long as the "A" pumps remain secured in standby, they will remain available for a postulated fire event in either of these FZ's. These FZs are alternate shutdown zones which do not credit power availability for the SI Pumps (i.e. alternate shutdown power is not supplied to the SI pumps which are powered from the 4.16 KV Safeguard Busses), thus the SI Pumps may not be available to mitigate the consequences of the event. A loss of charging could potentially leave the affected unit without adequate inventory control for the Reactor Coolant System (RCS). By restricting the use of the "A" Pumps (see Corrective Actions) there is assurance that the RCS charging capability will not be lost in these Fire Zones and adequate inventory control will be maintained.

Fire Protection provisions for the Control Room (FZ 326) include area detection and the availability of hose reels and fire extinguishers on both the Unit 1 and 2 side of the room. This FZ is continuously manned and combustible loading is controlled to assure that a low combustible loading classification is maintained at all times. Should a fire occur, it would be recognized and suppressed with manual fire fighting equipment immediately. These provisions provide a high likelihood that fire damage would be minimal and adequate safe shutdown equipment would remain available.

For the Cable Spreading Room (FZ 318) there is full area detection and full area fire suppression. Hose reels are located outside the entrances to the room. Cable trays within the FZ are totally enclosed with steel covers and Kaowool underneath the covers. Should a fire occur, it would be detected immediately and the automatic fire

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suppression system would be actuated. These features would mitigate the consequences of the fire and provide a high likelihood that a postulated fire would be rapidly controlled and adequate safe shutdown equipment would remain available. In addition, the fire protection design features in the room includes credit for 20' separation of equipment; therefore, any fire damage would be limited to one side of the room and only one unit's charging capacity could be affected.

For both Fire Zones, regardless of the consequences of the postulated fire, the 4.16 KV Safeguards busses would remain undamaged; however, it is possible, but unlikely, that a loss of control power for these buses could occur. The on-site alternate AC source, a 20 MW gas turbine (G-05) could be utilized to power any or all of the 4.16 KV Safeguards Busses if necessary. Although control power would be lost, the necessary breakers could be manually operated to provide power to the buses and start the SI Pumps. Existing plant procedures (ECA 0.0 and 0.1) specifically provide guidance to operations for establishing this electrical power source line up from G-05 in the event of loss of safeguards power. G-05 is more than capable of powering all the 4.16 KV Buses even if the buses were fully loaded. Use of the SI pumps for RCS inventory control does not satisfy the Appendix R performance goals, but does allow a safe shutdown of a unit in the event of loss of charging capability.

Fire Zones 156 and 166:

For FZ 156 and 166 the location of the fire in those fire zones determines whether the "A" pump or the "C" pump is relied upon for the Appendix R analyses. These rooms credit 20 foot separation of the redundant train Charging Pump cables with the "A" and "B" pump cables and the MCC on one side of the room and the "C" pump cables on the other side. It is not desirable to have the "A" and "B" pumps continuously secured during normal operation due to wear and tear on the one remaining pump. Thus, depending on the side of the room and the running pump at the time, it is possible to lose all charging for the affected Unit for a fire event in these zones (i.e. power is lost to the "A" & "B" Pump and the "C" Pump is damaged due to loss of suction). In order to minimize the possibility of a fire in these zones, hourly fire rounds have been implemented. Additionally, these zones contain full area smoke and heat detection and area fire suppression. The existing transient combustible control procedure also specifically restricts and controls transient combustible material in these zones. Hose reels and fire extinguishers are located near the entrances to these areas to provide fire brigade personnel quick access to manual fire suppression equipment. Restricting operation of the "A" Pump, as discussed in FZ 318 and 326 above, provides little added value for these fire zones because the side of the room which requires the "A" Pump available does not contain the MCC, which is the primary risk fire initiator for these rooms. Thus, the probability of a fire on that side of the room is well below risk significant values.

With the addition of hourly fire rounds to FZ 156 and 166 (see Corrective Actions), the possibility of an undetected fire occurring in these areas is low and should it occur, the damage will be minimized. Additionally, both redundant train SI pumps will remain fully functional for a fire in these areas to provide any needed make-up water for the Reactor Coolant System should normal charging capability actually be lost. The use of SI will not allow the Appendix R performance goals to be maintained, but will allow a safe shutdown of the affected unit. With the existing fire detection and suppression for the area and the addition of hourly fire rounds, there is reasonable assurance that

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one train of charging pumps would remain available for a postulated fire event in these fire zones. Should the Charging Pumps actually be lost, then the SI Pumps will remain available to support safe shutdown of the plant.

Based on the above fire zone safety assessments, and the corrective actions discussed below, we believe the safety significance of this event, and the potential impact on the health and safety of the public and plant staff, is minimal.

Corrective Actions:

1. In accordance with the provisions of procedure OM 3.27, "Control of Fire Protection and Appendix R Safe Shutdown Equipment," hourly fire rounds were immediately initiated as a compensatory measure in fire zones 156 and 166.
2. When Appendix R safe shutdown requirements are in effect (RCS temperature above 200°F), the "A" Charging Pump is being administratively controlled to be maintained in standby status until the potential of spurious operation from a postulated fire in FZs 318 or 326 can be prevented. For those times when maintenance or testing activities would necessitate the need to run, or take out of service (make inoperable) an "A" Charging Pump, hourly fire rounds shall be performed in FZ 318 which is the Cable Spreading Room (FZ 326, the Control Room, is already continuously manned). If the conditions which cause the "A" charging to be inoperable last longer than 72 hours, then the hourly fire rounds in FZ 318 shall be changed to a continuous fire watch until the "A" pump is operable and placed back in standby.
3. The Operations on-shift crews have been made aware of the need to secure any running Charging Pumps immediately should the CV-112C valve spuriously close.
4. A modification is being designed to correct the specific cable routing concerns identified in FZs 318 and 326. Because of the restrictions on operation of the "A" charging pumps until that condition is corrected, this modification has been given a high priority. After that modification is installed and accepted, the restrictions on the "A" charging pump operations identified in item 2 may be relaxed.
5. A modification is also being designed to address the cable separation concerns identified in FZs 156 and 166. After that modification is installed and accepted, the hourly fire rounds compensatory action discussed in item 1 may be suspended.

System and Component Identifiers:

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

<u>Component/System</u>	<u>Identifier</u>
Fire Detection System	IC
Chemical and Volume Control Makeup System	CB
High Pressure Safety Injection System	BQ
Auxiliary Building	NF
Control Center, Motor	MCC

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Gas Turbine	TRB
Cable, Medium-Voltage Power	CBL5
Breaker	BKP
Tray, Cable	TY
Pump	P

Similar Occurrences:

A review of recent LERs (past two years) identified the following events which involved the Appendix R safe shutdown equipment design basis. These events have been identified during the licensee's Appendix R rebaselining program:

<u>LER NUMBER</u>	<u>Title</u>
266/1999-007-00	Cable Tray Fire Stops Do Not Meet Appendix R Exemption Requirements
266/1999-006-00	Postulated Fire and Inability to Isolate PORV Outside Appendix R Design Basis
266/1999-004-00	Fuel Oil Transfer Pump Cable in the AFW Pump Room Outside Appendix R Design Basis
301/1999-002-00	Red Channel of Steam Generator Pressure Indication Passes Through Fire Zone
266/98-030-00	Assumptions for Equipment Necessary To Maintain Hot Safe Shutdown Outside Appendix R Design Basis
266/97-020-01	Conditions Outside 10 CFR 50 Appendix R Safe Shutdown Analysis
266/97-022-00	Electrical Short Circuits During A Control Room Fire Could Affect Safe Shutdown Capability