

LICENSEE EVENT REPORT (LER)

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

POINT BEACH NUCLEAR PLANT, UNIT 2

DOCKET NUMBER (2)

05000301

PAGE (3)

1 OF 7

TITLE (4)

OPERABILITY CONCERN FOR CONTAINMENT ACCIDENT FAN BEARING

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
11	02	93	93	-- 004 --	00	12	06	93	FACILITY NAME	DOCKET NUMBER
										05000
										05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	74	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	<input checked="" type="checkbox"/> OTHER
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	(Specify in
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	Abstract below
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME

KEN ARNESON, LICENSING ENGINEER

TELEPHONE NUMBER (Include Area Code)

(414) 221-3362

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs

SUPPLEMENTAL REPORT EXPECTED (14)

YES

(If yes, complete EXPECTED SUBMISSION DATE).

X

NO

EXPECTED
SUBMISSION
DATE (15)

MONTH

DAY

YEAR

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

A bearing removed from Unit 2 containment accident fan W1D1 during the Fall, 1993 annual maintenance and refueling outage was identified as having a cage (retainer) made from fiberglass reinforced Type 66 nylon. This bearing was installed on fan W1D1 during the Fall, 1992 refueling outage. Discovery of the nylon cage raised a question as to whether the fan would perform its safety function during accident conditions. The bearing was replaced with one containing a bronze cage. An evaluation was performed to determine the operability of the containment accident fan with a nylon cage in the fan bearing. The evaluation provided reasonable assurance that the fan would perform its safety function under accident conditions and, therefore, was judged to be operable. A review of receipt inspection documentation associated with the bearings currently installed on all containment accident fans at PBNP confirmed that there are no containment accident fan bearings presently installed that have cages made of nylon. Although the containment accident fan was judged to be operable, this report is provided as an informational Licensee Event Report as this information may be of interest to other licensees.

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

EVENT DESCRIPTION

On November 2, 1993, with Point Beach Nuclear Plant (PBNP) Unit 2 operating at 74% power, we discovered a bearing removed from Unit 2 containment accident fan W1D1 contained a cage, or retainer, that was made from fiberglass reinforced Type 66 nylon. The existence of a nylon cage in the fan bearing raised a question as to whether the fan could perform its safety function during accident conditions. Bearings for this application should have metal cages such as machined bronze or steel.

Both bearings on containment accident fan W1D1 were replaced during the Fall, 1993, Unit 2 annual maintenance and refueling outage. The bearings were replaced while performing work under maintenance work request (MWR) 925593. MWR 925593 was initiated on October 26, 1992, to replace the W1D1 fan shaft and seal at the next opportunity because a slight scoring of the shaft was noted during the Fall, 1992, Unit 2 maintenance and refueling outage. While the shaft was being replaced, we decided to replace the bearings as well. The work was completed on October 12, 1993.

The two bearings removed from fan W1D1 were frisked clean and prepared for off-site disposal. On November 2, 1993, a quality specialist, looking for a containment accident fan bearing to use as a training aid, found one of the discarded bearings. After cleaning the bearing, he noticed the cage was made of nylon instead of bronze or steel and initiated a condition report (93-403) to document the discrepancy and initiate any necessary corrective action.

The bearings removed from fan W1D1 in October, 1993, were installed during the refueling outage in the Fall of 1992. They were installed while performing an annual callup item to inspect and maintain the grease on the fan bearings for environmental qualification purposes (Task Sheet 0040139).

The bearings installed on fan W1D1 in October, 1993, were both verified to have cages made of bronze. A review of receipt inspection documentation associated with all accident fan bearings installed in both units at PBNP confirmed that all bearings have either bronze or steel cages. An operability evaluation provided reasonable assurance that the containment accident fan with a nylon cage in the bearing would perform its safety function of preventing containment from exceeding design pressure under accident conditions. Therefore, containment accident fan W1D1 with a nylon cage in the fan bearing was judged to be operable during the approximately one-year period the bearing was installed.

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COMPONENT AND SYSTEM DESCRIPTION

The containment air recirculation system consists of four air cooling units (W1A1, W1B1, W1C1, and W1D1), a common distribution duct and individual compartment distribution duct work. Each air cooling unit contains two identical, independent vane-axial fans, (i.e., W1A1 and W1A2) sharing a common discharge and driven by 150 HP and 50 HP motors respectively. Back draft dampers are installed on the normal (50 HP) fans to prevent back flow when idle. Air recirculation and cooling is normally accomplished using three of the units. When an air handling unit is in service, both fans are operated. Air is drawn from underneath the containment dome and from the immediate area of the unit. The air passes through an inlet screen, a cooling coil bank and is discharged by the vane-axial fans into a common duct. The cooled air is evenly distributed above the operating floor and additional ducting directs a flow of cooled air to the various compartments.

In the event of a loss of coolant accident (LOCA), only the 150 HP (accident) fans in each unit continue to operate. The backdraft dampers prevent reverse flow through the idle 50 HP fans.

Each containment accident fan shaft is supported by two self-aligning, spherical roller bearings. Each bearing is housed in a pillow block assembly which also contains the labyrinth seal. The cage, also known as a retainer, keeps the roller bearings in alignment and acts as a spacer to keep rollers from contacting one another.

Bearings used for the containment accident fans at PDNP have been manufactured by either Link-Belt Bearing Division or SKF Bearing. Link-Belt originally manufactured these bearings with bronze cages. Since 1982 however, they have manufactured the bearings with nylon cages. The part number for the bearing was changed from 22222-LBK-W33-C3 to 22222-LBK/M/C3, where the "M" in the new part number denotes a bronze cage. SKF normally makes these bearings with steel cages, although a bronze cage can be specially ordered. SKF has never manufactured these bearings with nylon cages.

CAUSE

The cause of this event is a failure of the Quality Assurance Receipt (QAR) inspection to verify that the cage material was bronze or steel.

One of the two bearings removed from fan W1D1 in October, 1993, was manufactured by SKF Bearing. This bearing was inspected under QAR 7736 on November 28, 1990, and installed on fan W1D1 in the Fall of 1992. As

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stated above, SKF Bearing does not manufacture these bearings with nylon cages.

The other bearing removed from fan W1D1 in October, 1993, was one of two bearings manufactured by Link-Belt and ordered as complete pillow block assemblies. The order was received on February 25, 1992, and inspected on April 16, 1992, under QAR 9547. The bearings were inspected using Technical Evaluation (TE) 91-039, "Ball Roller Bearings." TE 91-039 is a generic procedure used to inspect all ball roller bearings for commercial grade dedication purposes. TE 91-039 lists several critical characteristics that are to be verified for dedication. The Receipt Inspection Checklist (RIC) generated from TE 91-039 instructed the inspector to verify the part number, dimensions, and that the bearing spins freely. There was no specific check for materials of construction or that the part matched the purchase order description. Because the purchase order was for complete pillow block assemblies, the part number of the bearings was not specifically identified. The part number of the pillow block assembly, not the bearing, was verified to be correct during receipt inspection. Thus, the cage was not verified to be made of bronze, as was called out in the purchase order description.

One of the pillow block assemblies inspected under QAR 9547, including the bearing, met all stated acceptance criteria and was released for use. This is the bearing that contained the nylon cage. The other pillow block assembly failed receipt inspection due to physical damage and was returned to the vendor. A replacement pillow block assembly was received on June 9, 1993. The bearing was inspected, again using TE 91-039, and was released to the storeroom for use. As was later discovered, this bearing also had a cage made of nylon.

CORRECTIVE ACTIONS

Immediate:

A condition report (93-403) was generated to document the discovery of the bearing with the nylon cage and initiate corrective action.

The bearing in the Link-Belt pillow block assembly in the storeroom was examined. It also had a cage made of nylon 66. A hold tag was placed on the bearing to prevent it from being used.

The receipt inspection package (QAR 9365) for the bearings that were installed in fan W1D1 in October, 1993, was reviewed. Six Link-Belt bearings were received from Westinghouse under this order on September 29, 1992. The bearings were inspected on November 17, 1992. The RIC for

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this order states that the bearings received had brass (inspector meant bronze) cages as specified. The four bearings from this order that are in the storeroom were inspected. All were confirmed to have bronze cages.

A search was conducted for the other bearing that was removed from fan W1D1, but it could not be found. As stated above, however, that bearing was manufactured by SKF Bearing, and therefore, did not contain a nylon cage.

Short-Term:

A review of all documentation, including MWRs and QARs, associated with the bearings currently installed on all containment accident fans was conducted. Of the 16 bearings installed inside both units at PBNP, five have never been replaced. The remaining 11 bearings have been replaced one or more times:

- Three were manufactured by SKF, who have never manufactured these bearings with nylon cages.
- Two were received in 1975 from Westinghouse. Although Westinghouse supplies SKF and Link-Belt bearings, this order was received before Link-Belt began manufacturing these bearings with nylon cages.
- Four were ordered from Link-Belt under Appendix B in 1987. A letter from Link-Belt to Bearing Headquarters (vendor) stated that, "Four spherical roller bearings, part number 22222LBKM/C3 were supplied on this order and the M designation in the spherical roller bearing component part designates a bronze retainer." Additionally, an on-site visual and dimensional inspection by a Bearing Headquarters representative and a number of PBNP's engineering staff verified that the correct parts were received.
- Two were from a shipment of six Link-Belt bearings ordered from Westinghouse. As mentioned above, the RIC (QAR 9365) for this order states that the bearings received had brass (inspector meant bronze) cages as specified. The four bearings from this order that are in the storeroom were inspected. All were confirmed to have bronze cages.

This review confirmed that there are no containment accident fan bearings presently installed at PBNP that have cages made of nylon. The cages in the bearings presently installed in the containment accident fans are made of either bronze or steel.

An evaluation was performed to determine the operability of the containment accident fan with a nylon cage in the fan bearing. The

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effects of temperature, humidity, radiation, and chemicals on the performance of the nylon cage were considered. Information from Link-Belt, Westinghouse reports on accident fan bearing testing, and EPRI reports on equipment aging technology, radiation data for qualification of nuclear plant equipment, and radiation effects on organic materials were examined. The evaluation provided reasonable assurance that the containment accident fan with a nylon cage in the bearing would perform its safety function of preventing the containment from exceeding design pressure under accident conditions. Therefore, the containment accident fan with a nylon cage in the fan bearing could be considered operable.

Long-Term:

The TE that was used for this inspection is a generic one used for all ball roller bearings. A specific TE will be developed that addresses bearings for this application only, and will specifically require verification of a bronze or steel cage. This will be completed by December 23, 1993.

REPORTABILITY

This Licensee Event Report is provided as an informational report as this information may be of interest to other licensees.

SAFETY ASSESSMENT

The function of the containment accident fans is to reduce containment pressure following a loss of coolant or steam line break accident inside the containment.

An evaluation of the operability of the containment accident fan with a nylon cage installed in the fan bearing provided reasonable assurance that the fan could be considered operable, and would perform its safety function during accident conditions.

Moreover, as stated in the Final Safety Analysis Report (FSAR), Section 6.3, "Containment Air Recirculation Cooling System," adequate heat removal capability for the containment is provided by two separate, full capacity, engineered safety features systems. These are the containment spray system and the containment air recirculation cooling system. 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

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pressure below the design value, assuming that the core residual heat is released to the containment as steam:

1. All four containment cooling units
2. Both containment spray pumps
3. Two containment cooling units and one containment spray pump.

Thus, even if fan W1D1 became inoperable because of the nylon cage, and another failure occurred either to a fan or a spray pump, heat removal capability would still be adequate to maintain containment pressure less than the design value during a LOCA.

If, however, fan W1D1 became inoperable because of the nylon cage, and a failure occurred on the opposite train emergency diesel generator, only one accident fan and one containment spray pump would be available for heat removal. Our recently completed Probabilistic Safety Analysis (PSA), using the Electric Power Research Institute's Modular Accident Analysis Program, demonstrates that even this configuration provides adequate heat removal capability to maintain containment pressure below the design value during an accident.

SIMILAR OCCURRENCES

There are no known occurrences similar to this event at PBNP.