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AUTH.NAME AUTHOR AFFILIATION
WEBB,T. Washington Public Power Supply System
SCHROCK,C.A. Washington Public Power Supply System
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-017-00:on 920915,turbine trip/reactor trip occurred. Cause not determined.Bushing replaced & breaker was tested. W/921015 ltr.

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October 15, 1992

10 CFR 50.73

U. S. Nuclear Regulatory Commission
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Washington, D.C. 20555

Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Reportable Occurrence 92-017-00

In accordance with the requirements of 10 CFR 50.73, "Licensee Event Report System," the attached Licensee Event Report for reportable occurrence 92-017-00 is being submitted.

Sincerely,

C. A. Schrock

C. A. Schrock
Manager-Nuclear Engineering

TJW\jac

Attach.

cc - INPO Records Center
Mr. Patrick Castleman, US NRC
US NRC, Region III

NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Kewaunee Nuclear Power Plant	0 5 0 0 0 3 0 5	1 OF 0 9

TITLE (4) Failure of Bushing on Main Generator Output Breaker Results in Turbine Trip/Reactor Trip

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 NAMES	DOCKET NUMBER(S)
0 9	1 5	9 2	9 2	0 1 7	0 0	1 0	1 5	9 2	N/A	0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.405(c)	X 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)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Tom Webb - Plant Licensing	AREA CODE 4 1 1 4 — 3 1 8 1 - 1 2 1 5

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	E L	B K R	W 1 2 0	N					

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

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

This report describes an event that resulted in a reactor trip from 100 percent power. The trip occurred at 0243 CDT on September 15,1992 and was caused by a failure of the number 4 bushing on the main generator output breaker (G-1 OCB). The bushing failure resulted in a generator lockout, a turbine trip, a reactor trip, and isolated the 345 kilovolt offsite power supplies to the substation. Offsite power continued to be supplied to the plant through the two 138 kilovolt substation power supplies. G-1 OCB is an oil circuit breaker and is located in the substation, which is outside of the protected area of the plant. Since the bushing is oil filled, the failed bushing resulted in a fire. The fire was isolated to G-1 OCB and was extinguished at 0400 hours.

The cause of the bushing failure could not be determined. The breaker had been overhauled during the 1992 refueling outage. In addition to the scheduled overhaul, annual predictive maintenance is performed. Neither indicated any degradation of the bushing; however, the inability to predict a bushing failure is not uncommon.

Prior to returning the plant to service, the bushing was replaced and the breaker was tested. Oil samples taken from the main transformer were analyzed to ensure that the fault on G-1 OCB did not damage the transformers. After repairs were completed, the plant was reconnected to the grid at 2050 hours on September 17, 1992.

DESCRIPTION OF THE EVENT

This report describes an event that resulted in a reactor (RX) [RCT] trip from 100 percent power. The trip occurred at 0243 hours CST on September 15, 1992 and was caused by a failure of the number 4 bushing on the main generator output breaker (G-1 OCB) [BKR]. The breaker is a Westinghouse oil circuit breaker (OCB) model number 3450-GW-2500. The bushing failure resulted in a generator lockout, a turbine trip [TG], and a RX trip.

At 0243 on Tuesday September 15 the RX tripped. Control room response indicated the cause of the trip as a generator lockout resulting from problems in the substation. The operators immediately took actions in accordance with emergency operating procedure E-0," REACTOR TRIP OR SAFETY INJECTION." The operators took the following actions:

1. Verified that the RX trip breakers were open and that the reactor was subcritical.
2. Verified the turbine was tripped.
3. Noted that the two 345 kilovolt (KV) power supplies to the substation had been isolated and that offsite power continued to be supplied to the plant by the two 138KV substation power supplies (refer to attachment 2).
4. Verified that safety injection was not required.
5. Verified that all three auxiliary feedwater pumps [P] were operating and supplying an adequate heat sink.

As expected, plant systems responded as designed.

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

At 0245 the Shift Supervisor was notified by security that an officer had heard a loud noise and had seen a fire inside the substation. At 0256 the Shift Supervisor called the local community fire department for assistance and activated the plant fire brigade. The fire brigade was dispatched to assess the situation in the substation. The Shift Supervisor also reviewed the emergency plan. Since the fire was confined to the substation, which is outside of the protected area, and was not threatening any other plant systems, no emergency action level was entered.

The city of Kewaunee Fire Department arrived at the site 15 minutes later at 0311 and the plant fire team was activated at 0328 to assist them. The brigade found a small fire isolated to the number 4 bushing located on the B phase OCB for the main generator. The fire was being sustained by the residual oil left on the bushing. The oil in the bushing is isolated from the oil in the OCB tank, therefore the fire was not threatening the integrity of the OCB tank or any other equipment. The plant fire team attempted to extinguish the fire with a 350 pound Ansul fire extinguisher but was unsuccessful. After conferring with system operating and the control room, the plant fire team assisted the local fire department in extinguishing the fire with foam and water at 0400 hours.

The plant was reconnected to the grid at 2050 hours on September 17, 1992, after G-1 was repaired and retested.

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

CAUSE OF THE EVENT

The fire and plant trip were caused by a failure of the number 4 bushing on the B phase OCB for the main generator. Attachment 1 provides a simplified diagram of an OCB tank. G-1 OCB is comprised of three individual OCB tanks mechanically connected to operate as a three phase circuit breaker. Each tank has two condenser type bushings, which provide electrical insulation between the OCB housing and the current carrying conductor running inside the bushing. The bushing failure caused the conductor to arc to ground. The arcing ignited the oil in the B phase bushing and damaged the number 6 bushing located on A phase.

Due to its catastrophic nature, the cause of the bushing failure could not be determined. A review of past maintenance records and discussions with the personnel responsible for switchyard maintenance could not identify any precursors to this event. G-1 OCB is overhauled on approximately a three year cycle and had been overhauled in March of 1992 during the annual refueling outage with no significant degradation noted. Prior to 1992, G-1 OCB had been overhauled in 1989 and 1985 with no significant problems identified. In addition to the preventive maintenance performed on a three year basis, the following predictive maintenance is performed during Kewaunee's annual refueling outage:

1. Power factor testing is performed to determine the integrity of the bushings. The results of this test are compared year to year to identify any adverse trends.

2. Micro-ohm testing is conducted to determine the conductivity of the OCB contacts.

3. Operational testing is conducted to verify the ability of the OCB to operate properly.

4. Thermography is performed prior to the outage to identify any areas of high temperature, which are indicative of high resistance that could lead to malfunction or failure. Thermography is also performed once during the middle of the cycle and had been completed approximately six weeks prior to this event with no adverse findings.

Nothing in the results of the 1992 predictive maintenance would have predicted this failure. However, the inability to predict the failure or its catastrophic nature is not uncommon for an electrical bushing.

Environmental conditions were also reviewed to determine if they could have caused the failure. Although it was extremely foggy the night of the trip and thunder storms had passed through the area earlier that week, no direct link could be made between the weather conditions and the bushing failure.

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

ANALYSIS OF THE EVENT :

This event is reportable in accordance with 10CFR50.73(a)(2)(iv) as an event that resulted in actuation of the reactor protection system. This event was also reported in accordance with 10CFR50.72(b)(2)(ii) at 0447 hours on September 15, 1992.

The reactor trip occurred, and the plant responded as designed:

1. The fault on G-1 OCB caused a generator trip, which as designed resulted in a turbine/reactor trip.

2. All three auxiliary feedwater pumps started .

3. The protective relaying for G-1 OCB opened breakers Q-303, R-304, 3450, 3451, 1099, and G-1 as designed (refer to attachment 2). This isolated the fault by isolating the 345 KV power supplies to the substation and the plant.

4. Offsite power continued to be supplied to the plant by the two 138 KV offsite supplies (refer to attachment 2).

Since all systems functioned as designed and nothing unusual or not understood occurred, this event had no safety significance.

CORRECTIVE ACTIONS:

The following actions were taken prior to returning the plant to service:

1. A post trip review was performed to verify that the plant responded as designed and that nothing occurred that was not understood.

2. G-1 OCB was repaired and post maintenance testing was performed to ensure proper mechanical and electrical operation. The number 4 bushing and the number 6 bushing were replaced. The lift rod assembly for the B phase, which was damaged during the event, was also replaced. Prior to returning the breaker to service, power factor testing, micro-ohm testing, and functional tests were completed on all three phases.

3. Oil samples from the main transformers were taken and analyzed to ensure that the fault on G-1 OCB had not damaged the transformer.

ADDITIONAL INFORMATION:

Equipment Failures: Westinghouse oil circuit breaker model number 3450-GW-2500

Similar Events: None

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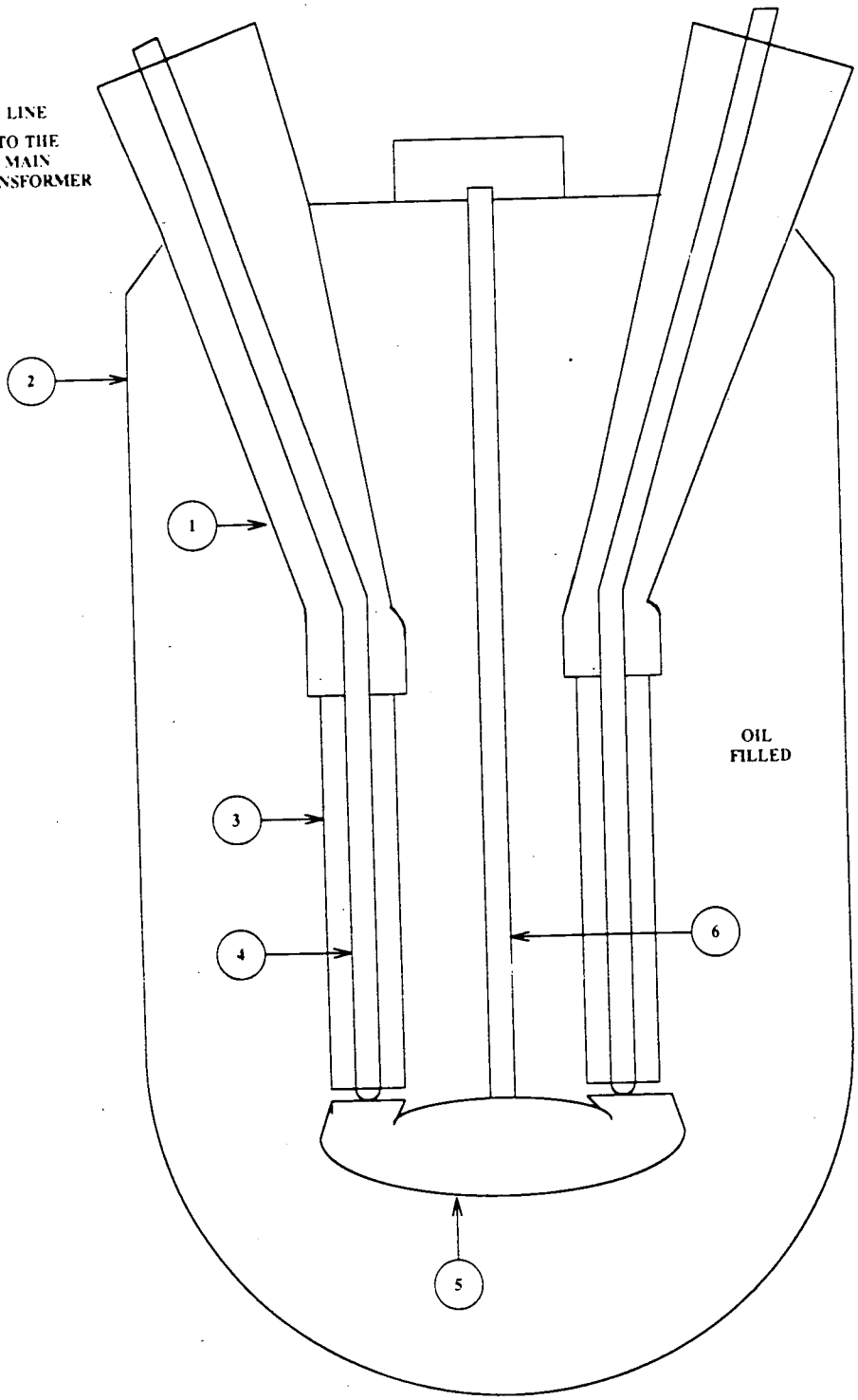
TEXT (If more space is required, use additional NRC Form 366A's) (17)

ATTACHMENT 1
OIL CIRCUIT BREAKER



ITEM	DESCRIPTION
1	BUSHING
2	TANK
3	STAT CONTACT ASSY
4	CONDUCTOR
5	CROSS ARM ASSY
6	LIFT ROD ASSY

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
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ATTACHMENT 2

PLANT AND SUBSTATION ELECTRICAL DISTRIBUTION