TVA

Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609

July 1, 1991

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Dear Sir:

TVA - BROWNS FERRY NUCLEAR PLANT (BFN) UNIT 1 - DOCKET NO. 50-259 - FACILITY OPERATING LICENSE DPR-33 - REPORTABLE OCCURRENCE REPORT BFRO-50-259/91007

The enclosed report provides details concerning emergency diesel generators that automatically started due to a degraded voltage condition on 4kV shutdown boards. This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv).

Very truly yours,

TENNESSEE VALLEY AUTHORITY

Kevin W Myers for

O. J. Zeringue

Enclosure
cc: See page 2

IE22
1/1

U.S. Nuclear Regulatory Commission

July 1, 1991

cc (Enclosure):
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NRC Resident Inspector, BFN

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U.S. Nuclear Regulatory Commission
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NRC Form 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

Approved OMB No. 3150-0104
Expires 4/30/92

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Browns ferry Unit 1	0 5 0 0 0 2 5 9	1 OF 0 4

TITLE (4) Emergency Diesel Generators Auto-Started Due to a Degraded Voltage Condition on 4kV Shutdown Board

EVENT DAY (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 5	3 1	9 1	9 1	0 0 7	0 0	0 7	0 1	9 1		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)	0 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 (AREA CODE)
Clare Hsieh, Compliance Licensing Engineer	2 0 5 7 2 9 - 2 6 3 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

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 fifteen single-space typewritten lines) (16)

On May 31, 1991 at 1406 hours, emergency diesel generators (EDGs) A and B automatically started due to a degraded voltage condition on 4 kilovolt (kV) shutdown boards A and B respectively. The shutdown boards are fed from the unit station service transformer (USST). The event occurred because the winding selection switch of the USST 1B automatic tap changer was set to monitor the lighter loaded winding of the transformer. As a result, when the tap changer responded to lower the voltage on this winding, the voltage of the heavier loaded winding of the transformer dipped below the degraded voltage setpoint of the 4kV shutdown boards for the automatic start of EDGs A and B.

The root cause of the event was inadequate procedure control. There was no procedure or checklist in place that required the loading of the USST with auto tap changer to be checked periodically to ensure that the heavier loaded winding of the USST is monitored.

Corrective actions include a revision of the Assistant Shift Operations Supervisor's daily electrical log of the operations routine sheets to include a note that informed personnel to set USST winding selector switch to monitor the heavier loaded winding. Additionally, live time training on this event has been completed with Operations personnel.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
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Browns Ferry Unit 1	0 5 0 0 0 2 5 9	9 1	-- 0 0 7	-- 0 0	0 2 OF 0 4

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

DESCRIPTION OF EVENT

On May 31, 1991 at 1406 hours, emergency diesel generators (EDGs) [EK] A and B automatically started due to a degraded voltage condition on 4 kilovolt (kV) shutdown boards [EB] A and B respectively. The degraded voltage on 4kV shutdown board A tripped raw cooling water [KI] pump 1D, control air [LD] compressor A, and fire [KP] pump A. No loads tripped on 4kV shutdown board B, which remained energized from its normal power source (shutdown bus 1). EDG A tied onto 4kV shutdown board A. EDG B did not complete its tie on the 4kV shutdown board B before the degraded voltage signal was cleared. Emergency equipment cooling water (EECW) [BI] pump D3 started as required to support the EDGs. Residual heat removal service water (RHRSW) [CC] pumps A1 and A2 were placed in service to prevent EDG A from being run at low loads. The affected components/systems responded as expected to the degraded voltage condition.

The EDGs were returned to standby readiness on May 31, 1991. EDG A was secured at 1441 hours and EDG B was secured at 1522 hours. Both the EECW and RHRSW pumps were restored to normal operation.

ANALYSIS OF EVENT

At the time of this event, both 4kV shutdown boards A and B were aligned to their normal feeds from 4kV shutdown bus 1 (see Figure 1). Shutdown bus 1 was being fed by its normal supply, 4kV unit board 1A. This unit board in turn was being fed from the X winding of the unit station service transformer (USST) 1B. The USST 1B load tap changer was set on automatic, with the X/Y winding selector switch of USST 1B set to monitor the lightly loaded Y winding.

The load tap changer on USST 1B automatically regulates the secondary transformer voltage when the USST primary transformer voltage changes or when heavier loading of the USST causes a drop in the secondary voltage. Because the tap changer is adjusted to provide a fast response for any voltage perturbations in the USST, the tap changer sometimes overshoots. The voltage overshoot will not cause a degraded condition if the X/Y winding selector switch is set to monitor the heavier loaded winding of the transformer.

However, in this event the selector switch was set to the lightly loaded Y winding of USST 1B (the Y winding supplied the lightly loaded Unit 1, while the X winding supplied the heavily loaded Unit 2 and 4kV shutdown bus 1). The voltage on the heavily loaded X winding may have been as much as 200 volts lower than that of the Y winding. Therefore, when the voltage changed sufficiently on the Y winding to require a tap change, an overshoot of one tap could easily cause voltage on the X winding to dip below the degraded voltage setpoint of the 4kV shutdown boards for the automatic start of EDGs A and B.

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

The procedure that governs the operation of the USST is the Switchyard Operating Procedure (SOP 6055). This procedure is not routinely used by plant personnel. SOP 6055 does specify that the most loaded winding should be the one being monitored. After reviewing the SOP, the USST 1B selector switch was reset to monitor the more heavily loaded X winding.

This event is reportable per 10 CFR 50.73(a)(2)(iv) since it involved the actuation of Engineered Safety Features (ESF) [JE] (i.e. EDGs, RHRSW, and EECW). Unit 2 was in cold shutdown condition and Units 1 and 3 were defueled. In addition, no fuel handling or other operations over spent fuel were in progress.

The affected components/systems operated as designed to the degraded voltage condition. The plant's safe shutdown capabilities would not have been diminished had the unit been in operation.

CAUSE OF THE EVENT

The root cause of this event was inadequate procedure control. The SOP is not routinely used by Operations, and there was no procedure or checklist in place that requires Operations to periodically check the loading of the USST equipped with auto tap changers. Although the SOP specified that the heavier loaded winding of the USST should be monitored, this operating procedure was only used when switchyard equipment is required to be manipulated.

CORRECTIVE ACTIONS

Troubleshooting was performed on the USST 1B load tap changer control to verify that the auto tap changer was responding as designed. No deficiencies were identified.

To ensure that the heavily loaded windings of USSTs are monitored, the Assistant Shift Operations Supervisor's daily electrical log of the Operations Routine Sheets (O-GOI-300-1) has been revised to include a note informing personnel to set the X/Y winding selector switch to monitor the heavier loaded winding.

Additionally, a live time training on this event has been completed with Operations personnel to emphasize the importance of monitoring the most loaded winding on the USSTs with auto tap changer mechanisms.

PREVIOUS SIMILAR EVENTS

None

COMMITMENTS

None

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

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

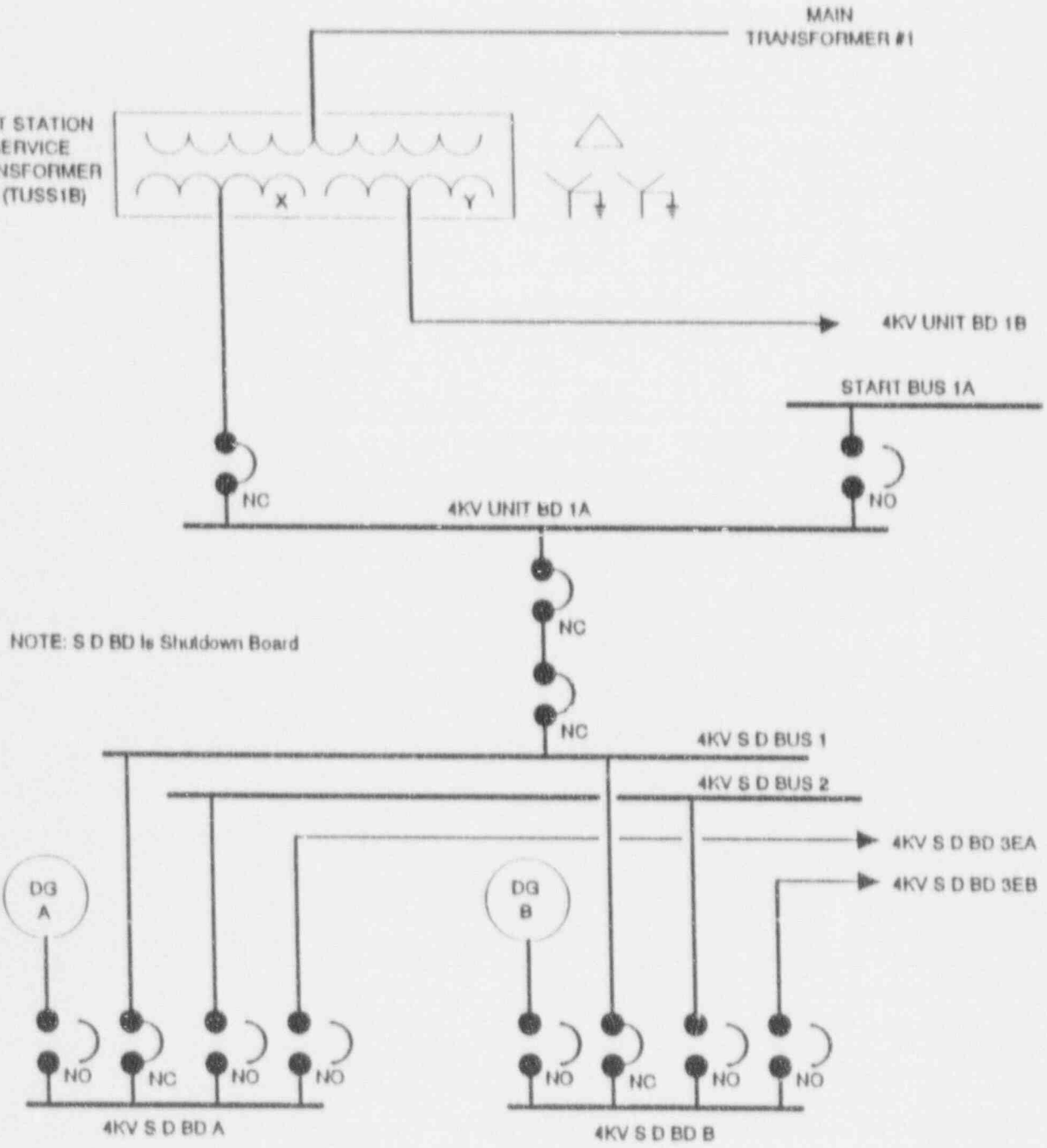

Figure 1