NRC FORM 366
(7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: ☐☐☐☐☐☐ ① (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1 | LICENSEE CODE: O H D B S 1 ② | LICENSE NUMBER: 0 0 - 0 0 0 0 0 - 0 0 ③ | LICENSE TYPE: 4 1 1 1 1 ④ | CAT ⑤

CON'T 0 1 | REPORT SOURCE: L ⑥ | DOCKET NUMBER: 0 5 0 0 0 3 4 6 ⑦ | EVENT DATE: 0 8 1 6 8 1 ⑧ | REPORT DATE: 0 9 1 1 8 1 ⑨

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES ⑩

0 2 (NP-33-81-55) On 8/16/81 at 1403 hours, the steady state quadrant power tilt limit was
0 3 exceeded due to a large difference in the Reactor Coolant System cold leg temperature.
0 4 The difference was caused by a mismatch in feedwater flow to the OTSGs. The station
0 5 entered the action statement of Technical Specification 3.2.4.a when the quadrant
0 6 power reached a maximum of +3.4. There was no danger to the health and safety of the
0 7 public or station personnel. The operators immediately took manual control of feed-
0 8 water. During the transient, the transient limit was not approached.

0 9 | SYSTEM CODE: R A ⑪ | CAUSE CODE: D | CAUSE SUBCODE: Z ⑬ | COMPONENT CODE: Z Z Z Z Z Z ⑭ | COMP. SUBCODE: Z ⑮ | VALVE SUBCODE: Z ⑯

⑰ LER/RO REPORT NUMBER | EVENT YEAR: 8 1 | — | SEQUENTIAL REPORT NO.: 0 4 7 | / | OCCURRENCE CODE: 0 3 | REPORT TYPE: L | — | REVISION NO.: 0

ACTION TAKEN: G ⑱ | FUTURE ACTION: Z ⑲ | EFFECT ON PLANT: Z ⑳ | SHUTDOWN METHOD: Z ㉑ | HOURS ㉒: 0 0 0 0 | ATTACHMENT SUBMITTED: Y ㉓ | NPRD-4 FORM SUB.: N ㉔ | PRIME COMP. SUPPLIER: Z ㉕ | COMPONENT MANUFACTURER: Z 9 9 9 ㉖

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS ㉗

1 0 The cause was procedure inadequacy. The mismatch in feedwater flows was due to the
1 1 delta Tc controller changing the feedwater demand ratio. When the delta Tc controller
1 2 was placed into automatic during startup, the manual signal had been changed to signi-
1 3 ficantly ratio feedwater to the 1-2 OTSG. The delta Tc controller manual output
1 4 should have been set at 50% but the startup procedure did not specify this.

1 5 | FACILITY STATUS: E ㉘ | % POWER: 0 3 2 ㉙ | OTHER STATUS ㉚: NA | METHOD OF DISCOVERY: A ㉛ | DISCOVERY DESCRIPTION ㉜: Operator observation

1 6 | ACTIVITY RELEASED: Z ㉝ | CONTENT OF RELEASE: Z ㉞ | AMOUNT OF ACTIVITY ㉟: NA | LOCATION OF RELEASE ㊱: NA

PERSONNEL EXPOSURES
1 7 | NUMBER: 0 0 0 ㊲ | TYPE: Z ㊳ | DESCRIPTION ㊴: NA

PERSONNEL INJURIES
1 8 | NUMBER: 0 0 0 ㊵ | DESCRIPTION ㊶: NA

LOSS OF OR DAMAGE TO FACILITY ㊸
1 9 | TYPE: Z ㊷ | DESCRIPTION: NA

PUBLICITY
2 0 | ISSUED: N ㊹ | DESCRIPTION ㊺: NA

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NRC USE ONLY

DVR 81-114

NAME OF PREPARER: John Johnson

PHONE: (419) 259-5000, Ext. 267

TOLEDO EDISON COMPANY
DAVIS-BESSE NUCLEAR POWER STATION UNIT ONE
SUPPLEMENTAL INFORMATION FOR LER NP-33-81-55

DATE OF EVENT: August 16, 1981

FACILITY: Davis-Besse Unit 1

IDENTIFICATION OF OCCURRENCE: Steady state quadrant power tilt limit exceeded due to a large difference in Reactor Coolant System (RCS) cold leg temperature

Conditions Prior to Occurrence: The unit was in Mode 1 with Power (MWT) = 887 and Load (Gross MWE) = 240

Description of Occurrence: At 1403 hours on August 16, 1981, the reactor operator was attempting to bring the Once Through Steam Generators (OTSG) off low level limits. As power was increased, feedwater flow to the 1-2 OTSG increased and it came off low level limits. Feedwater flow to the 1-1 OTSG, however, responded only slightly. The operators correctly diagnosed the problem as the delta T_c controller and knew it would respond properly if the 1-1 OTSG could be taken off low level limits. The operators continued to increase power in order to bring the 1-1 OTSG off low level limits but the feedwater flow increase was not sufficient to bring the 1-1 OTSG off low level limits. The power increase further increased feedwater flow to the 1-2 OTSG.

The mismatch in feedwater flows and levels to the two steam generators caused a delta T_c of 15°F to occur and the delta T_c in turn caused a quadrant power tilt in the reactor core. The operators immediately took manual control of the feedwater control valves to correct the delta T_c when the station computer indicated quadrant power tilt was increasing. While the operators were manually controlling the feedwater valves to correct the delta T_c and to stop the quadrant power tilt increase, quadrant power tilt reached a maximum of +3.4 as measured by power range channels which placed the station in the action statement of Technical Specification 3.2.4.a.

Quadrant power tilt finally returned below its steady state limit of 1.96 by 1427 hours due to the operators manually controlling feedwater valves and delta T_c.

Designation of Apparent Cause of Occurrence: The quadrant power tilt was caused by the large difference in RCS cold leg temperatures created by the mismatch in feedwater flow to the OTSGs. This mismatch was due to the delta T_c controller changing the feedwater demand ratio between the two loops.

The delta T_c controller has a calibrating integral circuit to correct for long term changes in the OTSG when the delta T_c controller is in automatic. If the delta T_c controller is in manual or if either OTSG is on low level limit, the normal input is blocked and an artificial zero error input is fed to the integral preventing it from sensing an actual difference in cold leg temperatures. The output of the integral is blocked only if the delta T_c controller is in manual but another circuit in the delta T_c controller will drive the output of the integral to match the manual output signal.

When the delta T_c controller was placed into automatic during the startup the manual signal had been changed earlier to significantly ratio feedwater to the 1-2 OTSG. This incorrect manual signal was blocked by placing the delta T_c controller in automatic, but the integral had followed the manual signal and was still sending the incorrect signal to ratio feedwater to the 1-2 OTSG. Initially, this had no effect due to low level limits controlling feedwater flow. When the operator tried to come off low level limits, only the level in the 1-2 OTSG increased while the 1-1 OTSG remained on low level limits. This caused the difference in RCS cold leg temperatures and this error was blocked to the delta T_c controller by the 1-1 OTSG still on low level limits.

The delta T_c controller manual output should have been set at 50% on the Bailey hand/auto station before placing the delta T_c controller in automatic. The Plant Startup Procedure PP 1102.02 is deficient since it does not specify the delta T_c controller output when placing the feedwater loop demands and delta T_c controller in automatic.

Analysis of Occurrence: There was no danger to the health and safety of the public or to station personnel. The operators immediately took manual control of feedwater as soon as the quadrant power tilt started to increase as indicated by the station computer. During the transient only the steady state limit was exceeded, and the transient limit was not approached.

Corrective Action: The initial action of the operators was to manually control the feedwater valves to bring quadrant power tilt to within the steady state limit in twenty-four minutes. This is the action of Technical Specification 3.2.4.a.1.a.

Modification T-5701 was written to the Plant Startup Procedure PP 1102.02 to ensure that the delta T_c controller manual output is set at a 50% feedwater ratio before the feedwater loop demands or delta T_c controller is placed in automatic.

Failure Data: There have been no previous similar reports.

LER #81-047