

NRC FORM 366
(7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

EXHIBIT A

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

01 AIRANO 200-000000-000 41111 4 5
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EVENT DESCRIPTION AND PROBABLE CONSEQUENCES 10
02 During Mode 1 operation, the Steam Driven Emergency Feedwater (EFW) Pump,
03 12P7A, turbine driver, 2K3, tripped on overspeed on the following dates:
04 7/17/80, 8/4/80, and 10/14/80. The electric driven EFW Pump, 2P7B and as-
05 sociated valves were verified operable. This occurrence is similar to
06 LER's 50-368/79-032, 79-055, 79-072, 79-081, 79-104, 80-022, 80-030, 80-
07 1036, and related to 80-039. Reportable per T.S. 6.9.1.9.b.
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7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

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ACTION TAKEN 18 Z 19 Z 20 Z 21 00000 Y 23 N 24 A 25 T 1 4 7 26
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CAUSE DESCRIPTION AND CORRECTIVE ACTIONS 27
10 Cause of the EFW turbine overspeed trips was determined to be design re-
11 lated. Modifications to the governor valve control optimized governor
12 valve response to speed signals. A testing program verified EFW turbine
13 reliability. See attached for further information.
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7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

15 E 10 0 0 NA 30 A 31 Control Room Indication 32
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

16 Z 33 Z 34 NA 35 NA 36
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17 0 0 0 37 Z 38 NA 39
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18 0 0 0 40 NA 41
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19 Z 42 NA 43
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

20 N 44 NA 45
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

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ATTACHMENT TO LER 50-368/80-050/03x-4

Investigation indicated that the overspeed trips always occurred during the initial speed transient. The turbine governor valve position has been visually observed either to have never moved during the transient or to have begun to move only at about the same time as the turbine speed reached the overspeed trip setpoint. Unsuccessful attempts to start the turbine could usually be followed by successful attempts. The likelihood of producing an overspeed trip with a rapid start was seen to be time related. The longer the time span between successive starts, the greater the likelihood of an overspeed trip.

Initially, condensate in the steam line feeding the turbine was considered to be the probable cause for the overspeed trips. Steam traps were added to the low points in the line, but the problem persisted.

Vendor representatives from Terry Turbine and Woodward Governor were brought on site. Preventive Maintenance was performed, adjustments were made, and questionable components were replaced. Subsequent testing resulted in an overspeed trip.

Plant Engineering personnel reduced the idle speed setting from 1100 RPM to 800 RPM, delayed the initiation of the ramp signal by six seconds, and reduced the governor valve travel from 7/8" to 5/8". The testing program was restarted, initially starting the EFW turbine at one hour intervals, and doubling the interval for each successive start. The turbine started successfully until the elapsed time between starts reached 48 hours, at which time it tripped on overspeed. Subsequent testing indicated that these adjustments enhanced the governor valve response.

An outside consultant was contacted to investigate the overspeed trip problem and make recommendations. Their conclusion was that a design modification was required to increase the margin to overspeed trip on startup of the EFW pump. The following modifications were made based on the consultant's recommendations:

- (1) Replace the governor actuator hydraulic fluid sump with one of like design as a preventive measure.
- (2) Increase tubing internal size (from existing 0.065" wall thickness tubing to 0.035" thickness tubing) from governor actuator (electric to hydraulic signal convertor) to the remote Servo (governor valve operator) which effectively reduced hydraulic flow resistance.
- (3) Install a sight glass on the hydraulic sump to allow monitoring of oil level in the sump during and between startups.

A new testing program was begun. Elapsed time between starts was initially one day. Two starts were made at each interval and then the time was increased. The test program was completed when two starts at one month intervals were successfully completed. Test results indicate that the slow response of the governor valve was no longer noted. The amount of overshoot, which is the highest RPM reached by the turbine during the initial speed transient, was no longer seen to increase as time intervals increased.

The EFW turbine driver governor responsiveness is considered to be optimum. Through surveillance testing and preventive maintenance, this condition should be acceptably maintained.