

PDR

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ACTION PLAN # 1CTITLE: AFPT MANUAL/AUTO-ESSENTIAL CONTROL PROBLEM

REV	DATE	REASON FOR REVISION	BY	CHAIRMAN TASK FORCE	APPR. FOR IMPL.
0	6/24/85	Initial Issue	S.C. Jain	<i>[Signature]</i>	
		8507300094 850624 PDR ADOCK 05000346 P PDR			

TITLE: AFPT MANUAL/AUTO-ESSENTIAL CONTROL PROBLEM

PREPARED BY: Sushil C. Jain

PLAN NO. 1C

DATE PREPARED: June 24, 1985

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## I. INTRODUCTION

This report provides an evaluation of the June 9, 1985, trip in relation to the apparent inability to take manual and auto-essential control of the auxiliary feed pump turbines (AFPT) from the Control Room. This inability was experienced following the full SFRCS trip actuation of both Auxiliary Feedwater System (AFWS) trains and subsequent trip of both AFPT's on overspeed. This report has been prepared in accordance with the "Guidelines to Follow When Troubleshooting or Performing Investigative Actions into the Root Causes Surrounding the June 9, 1985, Reactor Trip, Revision 4."

### SUMMARY OF DATA

- A. Known information and operational data for conditions prior to, during, and after the transient.

#### PRIOR TO THE TRANSIENT:

Both AFWS trains were in their normal standby condition with the associated AFPT controllers (in the Control Room) in the "auto essential" position and the trip throttle valve aligned open. This is established by the absence of alarms from computer points Z012 and Z013 (AFPI and 2 Auto-Essen Level Control Transfer Switch Alarm) prior to the transient. Also the trip throttle valve must be open for AFPT's to start. Surveillance testing and maintenance history prior to the transient is included in Section B.

#### DURING THE TRANSIENT:

The following chronology is listed to facilitate cross-referencing with the alarm printout and to identify the development of events relating to SFRCS actuation, AFP/AFPT initiation, and subsequent operation and control of AFWS.

<u>TIME</u>	<u>COMPUTER POINT ID</u>	<u>DESCRIPTION</u>
1:41:04	Q963	A full trip of SFRCS occurred on steam generator low level.
1:41:08	P680/P681	SFRCS main steam line low pressure trip on Channels 1 and 2 (manual trip).

<u>TIME</u>	<u>COMPUTER POINT ID</u>	<u>DESCRIPTION</u>
*1:41:31	S007/Z001	AFPT-1 tripped on overspeed and its stop valve started to close.
1:41:44	S017/Z002	AFPT-2 tripped on overspeed and its stop valve started to close.
1:42:00	P680/P681	SFRCS main steam line low pressure trip on Channels 1 and 2 manually reset.
1:45:50	S017	AFPT-2 overspeed trip reset.
1:46:12	Z013	AFPT-2 control switch in Control Room placed in manual, indicating manual control of AFPT-2 from Control Room.
*1:46:50	Z012	AFPT-1 control switch in Control Room placed in manual, indicating (attempted) manual control of AFPT-1.
*1:47:02	Z012	AFPT-1 control switch placed in auto.
*1:47:26	Z012	Manual control of AFPT-1 re-attempted.
*1:50:47	Z012	AFPT-1 control switch placed in auto.
*1:50:51	Z012	Manual control of AFPT-1 (re-attempted).
1:52:53	Z002	AFPT-2 stop valve fully open.
1:53:51	Z002	AFPT-2 stop valve not fully open.
1:56:08	Z001	AFPT-1 stop valve fully open.
1:56:56	S008	AFPT-1 speed high.
1:57:22	L885	SG-1 start up range level normal.
1:57:37	L895	SG-2 start up range level normal.
1:58:39	Z001	AFPT-1 stop valve started to close.
1:58:55	S008	AFPT-1 speed normal.
1:58:57	S007	AFPT-1 overspeed trip reset.

From a review of the above, it is evident that soon after the SFRCS actuation, both AFPT's tripped on overspeed (also see Action Plans 1A and 1B). The turbine overspeed trip device is connected to the overspeed trip linkage and ultimately to the

trip throttle valve as indicated in Figure 1. The trip throttle valve serves to provide the only steam path to the AFPT's. Note that with an overspeed trip, the trip throttle valve will be closed.

#### AFTER THE TRANSIENT:

At approximately 2 p.m. on June 9, 1985, ST 5071.02 AFWS Refueling Test was conducted which demonstrated successful control of AFPT's in manual mode from the Control Room.

#### B. MAINTENANCE AND SURVEILLANCE/TESTING HISTORY

A review of maintenance history for the AFPT level control mechanism revealed no pertinent maintenance being performed on either the Control Room switches or the speed control mechanisms.

The surveillance test of significance to this action plan is ST 5071.04 AFWS monthly functional test. This test ensures Control Room capability and operation of level control mechanism in both the manual as well as auto essential control modes. The test is conducted monthly on a staggered test basis on each AFPT. This test was last conducted on June 7, 1985, for AFPT-1 and on May 21, 1985, for AFPT-2 with all acceptance criteria being met.

Control of AFPTs in manual mode from the Control Room is also demonstrated on a monthly basis by ST 5071.01, AFWS monthly test. This test was last conducted on May 23, 1985, for AFP 1-1 and on June 6, 1985, for AFP 1-2. Although no specific acceptance criteria are associated in this procedure regarding manual control, demonstration of this capability is integral with successful completion of the surveillance test.

#### III. CHANGE ANALYSIS

A review of the modification and maintenance history from 1983 to date does not reveal any Facility Change Request and/or Maintenance Work Order (preventive or corrective) directly related to Control Room operation of the AFPT's in manual or auto essential mode.

#### IV. HYPOTHESIS

Following a detailed review of the digital data obtained from the data acquisition and display system and the alarm log, as correlated with operator interviews, it became clear that the perceived inability to take control from the Control Room was directly attributable to the inability to re-latch the trip throttle valve linkage and the difficulty and delay in opening the trip throttle valve following the AFPT trip on overspeed. Following evidence and evaluation is offered to support this hypothesis:

- A. The equipment operators that were dispatched to investigate and restore the AFPT's after overspeed trip, identified their difficulty in re-latching the trip linkage to the trip throttle valve in the normal fashion. The operators reported that even though they followed the procedural steps for engaging the trip hook with the latch-up lever, they were unable to open the trip throttle valve for "several" minutes.
- B. The problem of interest to this action plan appears to have occurred for approximately 4 minutes (from 1:46:50 - 1:50:51) for AFPT-1 as shown by events highlighted with an asterisk on page 2. This corresponds very well with the overspeed trip, operator dispatch to AFP rooms, attempted opening (with delay) of the trip throttle valve, and inability to completely open this valve.
- C. Since the trip throttle valve provides the only path of steam to the AFPT, AFPT motion and speed control cannot be completely established until this valve is latched and fully open. The placement of Control Room switch in manual and speed control switch in raise or lower will only have controlled the governor valve.
- D. The Control Room operator believing that the equipment operator in AFP-1 room had fully opened and latched the trip throttle valve realized that turbine was still not up to full speed. In order to improvise, several transfers to manual and auto-essential control were attempted with no appreciable benefits gained in AFPT performance because the trip throttle valve was indeed not fully open.
- E. Lack of unavailability of enough steam for AFPT-1 for the above timeframe is substantiated by the digital data on AFPT-1 speed.

It is emphasized that later in the transient, because of initial difficulty in re-latching and fully opening the trip throttle valve as mentioned above, both AFPT's were controlled locally by controlling the trip throttle valve. Auto essential control was never attempted. This is substantiated by absence of associated computer points Z012 and Z013 in the alarm log for the time period of interest.

V. ACTION PLAN

From the above evaluation, it is evident that the root cause of the subject inability to assume control of AFPT-1 from Control Room is the difficulty and delay in opening the trip throttle valve. Since the latter is an integral part of Action Plan 1D, an independent action plan is not necessary and, therefore, is not developed. Further, since the resolution of trip throttle valve issue is being controlled and tracked by that action plan, it is recommended that the AFPT-1 control inability issue be hereby closed.

## EO 6408

**TITLE**

AFPT MANUAL/AUTO ESSENTIAL CONTROL PROBLEM (Rev. 0)

### SPECIFIC OBJECTIVE

PLAN NUMBER

1C

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DATE PREPARED
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June 25, 1985

PREPARED BY

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To Verify Operability of Manual and Auto-Essential Control of Both AFPT's from the Control Room

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