GE Nuclear Energy

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REVISION STATUS SHEET

DOCUMENT TITLE: PANDA Steady State Tests(S1-S6) Non-Proprietary Apparent Test Results

LEGEND OR DESCRIPTION OF GROUPS

TYPE: Test Report

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THIS ITEM IS OR CONTAINS A SAFETY-RELATED ITEM YES ☒NO ☐ EQUIP CLASS CODE P

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PRINTS TO

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1. GENERAL DESCRIPTION

1.1 Scope

This Apparent Test Results(ATR) report provides a non-proprietary version of testing conducted at the Paul Sherrer Institut(PSI). This report covers the PANDA steady-state PCC performance tests S1 through S6.

1.2 Report Objectives

This ATR summarizes the apparent results and includes: test number, test objective, test date and time, data recording period, data analysis period, name of data file, list of failed or unavailable instruments considered to be required for the test, deviations from test procedure and problems occurring during test. Statements are made as to whether or not the test objectives have been reached and the data were recorded correctly. A table of representative instruments and the variables measured are provided.

1.3 The tests described in this report were performed according to the PANDA Steady State Tests-PCC Performance Test Plan & Procedure, PSI Doc.TM-42-94-11/ALPHA-410.

2. TEST RESULTS

2.1 Steady State Test S1

TEST OBJECTIVE:

Measure the PCC condenser heat removal capability at nominal inlet conditions of 0.195 kg/s steam flow rate and nominal PCC pool level of 4.5 m. The inlet pressure will be found by having the system float to the pressure for which the condenser performance matches the given steam flow.

TEST DATE/TIME:

[illegible], 1995 / 20:41:55 to 20:59:55

DATA RECORDING PERIOD:

Start:0 sec Stop:1080 sec

DATA ANALYSIS PERIOD:

Start:100 sec Stop:700 sec

RAW DATA FILE NAME:

panda_S1.dat

LIST OF FAILED OR UNAVAILABLE INSTRUMENTS REQUIRED FOR TEST PER TABLE 5.5 OF ALPHA-410:

MV.GRT (An evaluation determined that it was acceptable for this flow measurement to not meet the accuracy requirements for tests S1 through S6, because it was redundant with flowmeter MV.P3C.)

DEVIATIONS FROM TEST PROCEDURE:

Basically no deviations from the test procedure with the exception of adding the steps No. 93.2 and No. 235A for zero check of flowmeters for MV.P3C and MV.GRT.

PROBLEMs:

None

HAS THE TEST OBJECTIVE BEEN [illegible]:

Yes

HAVE THE DATA BEEN CORRECTLY RECORDED :

Yes

2.2 Steady State Test S2

TEST OBJECTIVE:

Measure the PCC condenser heat removal capability at nominal inlet conditions of 0.195 kg/s steam flow rate, 0.003 kg/s air flow, and 300 kPa inlet pressure and nominal PCC pool level of 4.5 m.

TEST DATE/TIME:

May 10, 1995 / 12:50:31 to 13:13:55

DATA RECORDING PERIOD:

Start:0 sec Stop:1404 sec

DATA ANALYSIS PERIOD:

Start:600 sec Stop:1200 sec

RAW DATA FILE NAME:

panda_S2.dat

LIST OF FAILED OR UNAVAILABLE INSTRUMENTS REQUIRED FOR TEST PER TABLE 5.5 OF ALPHA-410:

MV.GRT (An evaluation determined that it was acceptable for this flow measurement to not meet the accuracy requirements for tests S1 through S6, because it was redundant with flowmeter MV.P3C.)

DEVIATIONS FROM TEST PROCEDURE:

Basically no deviations from the test procedure with the exception of adding the steps No. 93.2 and No. 235A for zero check of flowmeters MV.P3C and MV.GRT.

PROBLEMS:

None

HAS THE TEST OBJECTIVE BEEN REACHED:

Yes

HAVE THE DATA BEEN CORRECTLY RECORDED :

Yes

2.3 Steady State Test S3

TEST OBJECTIVE:

Measure the PCC condenser heat removal capability at nominal inlet conditions of 0.195 kg/s steam flow rate, 0.006 kg/s air flow, and 300 kPa inlet pressure and nominal PCC pool level of 4.5 m.

TEST DATE/TIME:

May 10, 1995 / 14:17:42 to 14:41:44

DATA RECORDING PERIOD:

Start:0 sec Stop: 1442 sec

DATA ANALYSIS PERIOD:

Start: 400 sec Stop: 1000 sec

RAW DATA FILE NAME:

panda_S3.dat

LIST OF FAILED OR UNAVAILABLE INSTRUMENTS REQUIRED FOR TEST PER TABLE 5.5 OF ALPHA-410:

MV.GRT (An evaluation determined that it was acceptable for this flow measurement to not meet the accuracy requirements for tests S1 through S6, because it was redundant with flowmeter MV.P3C.)

DEVIATIONS FROM TEST PROCEDURE:

Basically no deviations from the test procedure with the exception of adding the steps No. 93.2 and No. 235A for zero check of flowmeters MV.P3C and MV.GRT.

PROBLEMS:

None

HAS THE TEST OBJECTIVE BEEN REACHED:

Yes

HAVE THE DATA BEEN CORRECTLY RECORDED :

Yes

2.4 Steady State Test S4

TEST OBJECTIVE:

Measure the PCC condenser heat removal capability at nominal inlet conditions of 0.195 kg/s steam flow rate, 0.016 kg/s air flow, and 300 kPa inlet pressure and nominal PCC pool level of 4.5 m.

TEST DATE/TIME:

May 10, 1995 / 15:32:26 to 15:54:08

DATA RECORDING PERIOD:

Start:0 sec Stop: 1302 sec

DATA ANALYSIS PERIOD:

Start: 100 sec Stop: 700 sec

RAW DATA FILE NAME:

panda_S4.dat

LIST OF FAILED OR UNAVAILABLE INSTRUMENTS REQUIRED FOR TEST PER TABLE 5.5 OF ALPHA-410:

MV.GRT (An evaluation determined that it was acceptable for this flow measurement to not meet the accuracy requirements for tests S1 through S6, because it was redundant with flowmeter MV.P3C.)

DEVIATIONS FROM TEST PROCEDURE:

PCC pool level MI..U3 is 0.07m too high(NCR P-006). The steps No. 93.2 and No. 235A for zero check of flowmeters MV.P3C and MV.GRT were added to the test procedure.

PROBLEMS:

None

HAS THE TEST OBJECTIVE BEEN REACHED:

Yes

HAVE THE DATA BEEN CORRECTLY RECORDED :

Yes

2.5 Steady State Test S5

TEST OBJECTIVE:

Measure the PCC condenser heat removal capability at nominal inlet conditions of 0.195 kg/s steam flow rate, 0.034* kg/s air flow, and 300 kPa inlet pressure and nominal PCC pool level of 4.5 m.

TEST DATE/TIME:

May 10, 1995 / 16:44:22 to 17:03:40

DATA RECORDING PERIOD:

Start:0 sec Stop: 1158 sec

DATA ANALYSIS PERIOD:

Start: 300 sec Stop: 900 sec

RAW DATA FILE NAME:

panda_S5.dat

LIST OF FAILED OR UNAVAILABLE INSTRUMENTS REQUIRED FOR TEST PER TABLE 5.5 OF ALPHA-410:

MV.GRT (An evaluation determined that it was acceptable for this flow measurement to not meet the accuracy requirements for tests S1 through S6, because it was redundant with flowmeter MV.P3C.)

DEVIATIONS FROM TEST PROCEDURE:

Basically no deviations from the test procedure with the exception of adding the steps No. 93.2 and No. 235A for zero check of flowmeters MV.P3C and MV.GRT.

PROBLEMS:

None

HAS THE TEST OBJECTIVE BEEN REACHED:

Yes

HAVE THE DATA BEEN CORRECTLY RECORDED :

Yes

* The test was actually performed at 0.027 kg/s, which was acceptable per ALPHA 410.

2.6 Steady State Test S6

TEST OBJECTIVE:

Measure the PCC condenser heat removal capability at nominal inlet conditions of 0.260 kg/s steam flow rate and nominal PCC pool level of 4.5 m. The inlet pressure will be found by having the system float to the pressure for which the condenser performance matches the given steam flow.

TEST DATE/TIME:

May 10, 1995 / 19:12:29 to 19:30:39

DATA RECORDING PERIOD:

Start:0 sec Stop:1090 sec

DATA ANALYSIS PERIOD:

Start:300 sec Stop:900 sec

RAW DATA FILE NAME:

panda_S6.dat

LIST OF FAILED OR UNAVAILABLE INSTRUMENTS REQUIRED FOR TEST PER TABLE 5.5 OF ALPHA-410:

MV.GRT (An evaluation determined that it was acceptable for this flow measurement to not meet the accuracy requirements for tests S1 through S6, because it was redundant with flowmeter MV.P3C.)

DEVIATIONS FROM TEST PROCEDURE:

Basically no deviations from the test procedure with the exception of adding the steps No. 93.2 and No. 235A for zero check of flowmeters for MV.P3C and MV.GRT.

PROBLEMS:

None

HAS THE TEST OBJECTIVE BEEN REACHED:

Yes

HAVE THE DATA BEEN CORRECTLY RECORDED :

Yes

PANDA STEADY STATE PCC PERFORMANCE TEST

(S series tests)

VARIABLE	PROCESS ID	UNIT
Steam flow to PCC3	MV.11F	g/s
Air flow to PCC3	MM.B0G	g/s
PCC3 upper header pressure	MP.11F	bar
PCC3 pool level	ML.U3	m
Condensate flow (PCC3 to GDCS)	MV.P3C	g/s
Condensate temperature at GDCS inlet	MTL.P3C.1	°C
Condensate temperature at PCC3 outlet	MTL.P3C.2	°C
Gas temperature in PCC3 vent line	MTG.P3V.1	°C
PCC3 vent line pressure	MP.P3V	bar
RPV level	ML.RP.1	m
RPV pressure	MP.RP.1	bar
Air/steam temp. in steady state supply line	MTG.P2F.1	°C
Steam temperature in steady state supply line	MTG.P3F.1	°C
PCC3 condensate temp. in GDCS drain	MTL.GRT.1	°C
PCC3 condensate temp. at RPV inlet	MTL.GRT.2	°C
PCC3 vent line outlet temperature	MTG.P3V.2	°C
PCC3 gas temp. in upper drum	MTG.P3.1	°C

PANDA STEADY STATE PCC PERFORMANCE TEST

(S series tests)

VARIABLE	PROCESS ID	UNIT
PCC3 gas temp. in lower drum	MTG.P3.2	°C
PCC3 condensate temp. in lower drum	MTL..P3	°C
PCC3 center line gas temperatures in center tube	MTG.P3.3	°C
	MTG.P3.4	°C
	MTG.P3.5	°C
	MTG.P3.6	°C
	MTG.P3.7	°C
	MTG.P3.8	°C
	MTG.P3.9	°C
PCC3 pool fluid temperatures in condenser vertical center axis	MTL..U3.2	°C
	MTL..U3.13	°C
	MTL..U3.19	°C
PCC3 pool fluid temperatures outside condenser	MTL..U3.1	°C
	MTL..U3.11	°C
	MTL..U3.18	°C