SNUPPS

Standardized Nuclear Unit Power Plant System

5 Choke Cherry Road
Rockville, Maryland 20850
(301) 869-8010

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SLNRC 84-0081 FILE: 0541
SUBJ: SNUPPS FSAR Chapter 14 Changes Applicable to Callaway

Mr. H. R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Docket Nos.: STN 50-482 and STN 50-483

Dear Mr. Denton:

The SNUPPS utilities have proposed and approved several changes to Chapter 14 of the Standardized Nuclear Unit Power Plant System FSAR. Because these changes affect the preoperational and startup test programs at the Callaway Plant Unit #1, they are transmitted at this time for your review. The basis for each change is documented in attachment 1 and the affected FSAR pages are provided in attachment 2. Several of the changes result from the development of test methodology since the FSAR was originally submitted. Most of the remaining changes correct minor inconsistencies between the FSAR test outlines and the appropriate test, given the as-built plant design.

Very truly yours,

Nicholas A. Petrick for

SLA/mjd/1a6
Attachments:

cc: J. Neisler/B. Little, USNRC/CAL
W. Schum/A. Smith, USNRC/WC
B. L. Forney, USNRC Region III
E. H. Johnson, USNRC Region IV
G. L. Koester, KGE
D. T. McPhee, KCPL
D. F. Schnell, UE

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Attachment 1: Bases for Changes to Preoperational and Startup Test Program Abstracts (FSAR Chapter 14)

Preoperational Tests:

1. S-03AE02 (p. 14.2-21) The abstract is updated to reflect a previously implemented design change to the steam generator level control system. The SNUPPS plants now employ a constant 50% level setpoint, rather than the load following design on which the original abstract was based.

2. S-03BB09 (p. 14.2-32) The abstract is changed to apply the acceptance criteria to total reactor coolant system flow rate rather than individual loop flow, making the pre-operational test consistent with the startup test. In fact, both total flow and individual loop flows satisfied the acceptance criteria in the Callaway test. This test will not be performed at Wolf Creek (SLNRC 84-0075).

3. S-03GN02 (p. 14.2-71) The abstract is changed to apply the acceptance criteria to only the "appropriate" CRDM fan breakers. Only two of four installed supply breakers are designed to open on receipt of a safety injection signal; these are the "appropriate" ones.

4. S-04BL01 (pp. 14.2-119g and 122) This abstract was changed from non-safety related to safety related in FSAR revision 13 because the test included response of the reactor makeup water system containment supply valve to a CIS signal. The change was not appropriate, however, and the abstract is being changed back to non-safety related; the safety related test of this CIS valve is performed separately (abstract S-03SA01).

5. S-04HC01 (p. 14.2-130) This non-safety related abstract is revised to apply acceptance criterion a to only two of the pumps being tested. Excluded by this change are the variable capacity positive displacement pumps for which baseline data are collected; the acceptance criterion on operating characteristics is not applicable to these pumps.

6. S-04HC03 (p. 14.2-132, 133) This non-safety related abstract is revised to refer to only one chemical drain tank pump (vs. "pumps") in accord with the SNUPPS design.

7. S-04AC02 (p. 14.2-151a) This non-safety related abstract is revised to correct a typo. A turbine trip signal is initiated on loss of EHC 125 V dc power with turbine speed below 75 (not 25) percent.

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Startup Test Program:

1. S-070008 (p. 14.2-160) This abstract is revised to reflect the power coefficient test methodology now recommended by Westinghouse; the superseded methodology had been in use at the time the FSAR was originally submitted.

2. S-07BB04 (p. 14.2-170) This abstract is revised to delete reference to testing from "various operating configurations". All testing will be initiated from the four loop operating configuration; the three loop configuration has been deleted since a three loop license will not be issued.

3. S-07SF04 (p. 14.2-180) This abstract is revised to reflect the rod position indication system test methodology now recommended by Westinghouse.

4. S-070018 (p. 14.2-196) The acceptance criteria for this abstract are revised to account for decreased instrument accuracy at lower reactor power levels, consistent with Westinghouse recommendations. In addition, steam generator level control testing (abstract S-07AB01) does not require more accurate calibration than that which will prevent spurious flow mismatch alarms.

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Attachment 2: Affected FSAR Pages

	Page	Abstract
Preoperational		
	14.2-21	S-03AE02
	14.2-32	S-03BB09
	14.2-71	S-03GN02
	14.2-119g, 122	S-04BL01
	14.2-130	S-04HC01
	14.2-132, 133	S-04HC03
	14.2-151a	S-04AC02
Startup		
	14.2-160	S-070008
	14.2-170	S-07BB04
	14.2-180	S-07SF04
	14.2-196	S-070018

14.2.12.1.6 Steam Generator Level Control Test (S-03AE02)

14.2.12.1.6.1 Objectives

a. To demonstrate the operability of the feedwater control valves (FWCVs).

b. To demonstrate the operability of the FWCV bypass valves.

c. To demonstrate the response of the FWCVs and bypass valves to signals generated by the steam generator level control system.

14.2.12.1.6.2 Prerequisites

a. Required component testing and instrument calibration are complete.

b. Required electrical power supplies and control circuits are operational.

14.2.12.1.6.3 Test Method

a. The FWCVs are operated from their respective controllers, and the FWCVs' response to feedwater flow, steamline flow, and steam generator level~~, and low turbine impulse chamber pressure~~ is verified.

b. The FWCV bypass valves are operated from their respective controllers, and their response to steam generator level and ~~turbine impulse chamber pressure~~ neutron flux signal is verified.

14.2.12.1.6.4 Acceptance Criteria

a. The response of the FWCVs to feedwater flow, steamline flow, and steam generator level~~, and low turbine impulse chamber pressure~~ is in accordance with system design.

b. The response of the FWCV bypass valves to steam generator level and ~~turbine impulse chamber pressure~~ neutron flux signal is in accordance with system design.

14.2.12.1.17 Reactor Coolant System Flow Measurement (S-03BB09)

14.2.12.1.17.1 Objectives

To confirm during hot functional testing that reactor coolant system (RCS) ~~loop~~ flow rate as measured by loop elbow differential pressure readings is equal to or greater than 90 percent of the core-not-installed calculated ~~loop~~ flow rate.

14.2.12.1.17.2 Prerequisites

a. Required component testing and instrument calibration are complete.

b. Required electrical power supplies and control circuits are operational.

c. The plant is at normal operating temperature and pressure with all reactor coolant pumps available, and hot functional testing is in progress.

14.2.12.1.17.3 Test Method

Loop elbow differential pressure readings are taken with all reactor coolant pumps operating, and RCS ~~loop~~ flow rate is calculated.

14.2.12.1.17.4 Acceptance Criteria

Reactor coolant system flow rate ~~in each loop~~ is greater than or equal to 90 percent of the flow rate calculated under the assumption that the core is not installed.

14.2.12.1.49 CRDM Cooling Preoperational Test (S-03GN02)

14.2.12.1.49.1 Objectives

To demonstrate the operating characteristics of the cavity cooling, control rod drive mechanism (CRDM), and the elevator machine room exhaust fans and verify their associated instrumentation and controls, including their response to safety signals.

14.2.12.1.49.2 Prerequisites

a. Required component testing and instrument calibration are complete.

b. Required electrical power supplies and control circuits are operational.

c. The CRDM and cavity cooling portions of the containment cooling system are air balanced.

14.2.12.1.49.3 Test Method

a. The cavity cooling, elevator machine room exhaust, and CRDM fans are operated, flow data recorded, and fan capacities calculated.

b. The response of the CRDM fans to a safety injection signal is verified.

14.2.12.1.49.4 Acceptance Criteria

a. The capacities of the cavity cooling, elevator machine room exhaust, and CRDM fans are within design specifications.

b. The appropriate CRDM fans supply breakers open on receipt of a safety injection signal.

14.2.12.1.90 Deleted

14.2.12.2.2 Reactor Makeup Water System Preoperational Test (S-04BL01)

14.2.12.2.2.1 Objectives

a. To demonstrate the operating characteristics of the reactor makeup water transfer pumps and verify that the associated control circuits are functioning properly.

b. To demonstrate the operation of the system automatic valves, including the response of the reactor makeup water system containment supply valve to a CIS.

14.2.12.2.2.2 Prerequisites

a. Required component testing, instrument calibration, and system flushing/cleaning are complete.

b. Required electrical power supplies and control circuits are operational.

c. The demineralized water storage and transfer system is available to provide a source of water to the reactor makeup water storage tank.

14.2.12.2.2.3 Test Method

a. The reactor makeup water transfer pumps are operated, and pump operating data are recorded.

b. Reactor makeup water transfer pumps and system automatic valves control logics are verified, including their response to safety signals.

c. The reactor makeup water containment supply valve is operated under flow conditions and operating times recorded.

14.2.12.2.2.4 Acceptance Criteria

a. The operating characteristics of the reactor makeup water transfer pumps are within design specifications.

b. Each reactor makeup water transfer pump trips on receipt of a reactor makeup water storage tank low level signal.

c. Each reactor makeup water transfer pump starts, after a time delay, with the other pump running and the receipt of a low header pressure signal.

d. The reactor makeup water containment supply valve closure time is within design specifications.

e. The reactor makeup containment supply valve closes on receipt of a CIS.

14.2.12.2.8 Solid Waste System Preoperational Test (S-04HC01)

14.2.12.2.8.1 Objectives

a. To demonstrate the operating characteristics of the solid waste system pumps and to verify the operation of their associated control circuits.

b. To demonstrate the ability of the decant station, drumming station, cement filling station, and the solid radwaste bridge crane to process, solidify, and handle waste and to verify the operation of their associated control circuits.

c. To demonstrate the ability of the dry waste compactors to process compressible wastes and to verify the operation of their associated control circuits.

14.2.12.2.8.2 Prerequisites

a. Required component testing, instrument calibration, and system flushing/cleaning are complete.

b. Required electrical power supplies and control circuits are operable.

c. Reactor makeup water is available to provide a source of water to the decanting station.

14.2.12.2.8.3 Test Method

a. The solid waste system pumps are operated, and the pump operating data are recorded.

b. The system component control circuits are verified, and the ability of the solid radwaste system to process, solidify, and handle waste is verified.

14.2.12.2.8.4 Acceptance Criteria

a. The operating characteristics of the ~~solid waste system pumps~~ pumps (primary and secondary) are within design specifications.

b. There are no free liquids present in the packaged waste.

c. The evaporator bottoms tank pumps (primary and secondary) trip on their respective tank low level signal.

14.2.12.2.10 Resin Transfer Preoperational Test (S-04HC03)

14.2.12.2.10.1 Objectives

a. To demonstrate the ability to charge resins and activated charcoal to those systems containing potentially contaminated demineralizers or adsorbers. The ability of the spent resin sluice pumps to transfer resins and charcoal from each of the demineralizers and adsorbers is also verified.

b. To demonstrate the operating characteristics of the spent resin sluice pumps, chemical addition metering pumps, and chemical drain tank pumps.

c. To demonstrate the operability of system valve and pump control circuits.

14.2.12.2.10.2 Prerequisites

a. Required component testing, instrument calibration, and system flushing/cleaning are complete.

b. Required electrical power supplies and control circuits are operational.

c. Those systems containing potentially contaminated demineralizers and adsorbers are available to support this test.

d. The reactor makeup water system is available to provide a source of water for resin charging.

e. A means of bulk disposal is available to receive waste at the bulk disposal station.

14.2.12.2.10.3 Test Method

a. Resins and charcoal are charged and transferred from each of the potentially contaminated demineralizers and adsorbers.

b. The spent resin sluice pumps, chemical addition metering pumps, and chemical drain tank pumps are operated, and performance characteristics are obtained.

c. The response of the spent resin sluice pumps, chemical addition metering pumps, and the chemical drain tank pumps to a low-level trip signal from their respective tanks is verified.

14.2.12.2.10.4 Acceptance Criteria

a. The operating characteristics of the spent resin sluice pumps, chemical addition metering pumps, and the chemical drain tank pumps, are within design specifications.

b. The spent resin sluice pumps, chemical addition metering pumps, and the chemical drain tank pumps trip on receipt of a low-level trip signal from their respective tanks.

14.2.12.2.28 Turbine Trip Test (S-04AC02)

14.2.12.2.28.1 Objectives

a. To demonstrate the ability of the turbine trip and monitoring system to initiate a turbine trip on input of the associated input signals.

b. To demonstrate the response of the moisture separator reheater drain valves, feedwater heater extraction check valves, turbine main stop valves, turbine main stop valve above seat drain valves, turbine control valves, turbine control valve above seat drain valves, intermediate stop valves, main steamline drain valves, startup drain valves, and intercept valves to a turbine trip signal.

c. To demonstrate that a turbine trip signal initiates a reactor trip signal.

d. To demonstrate that the turbine main stop valves operating times are within design specifications.

14.2.12.2.28.2 Prerequisites

a. Required component testing and instrument calibration is complete.

b. Required electrical power supplies and control circuits are operational.

c. The main turbine control oil and lube oil systems are available to provide oil to the turbine auxiliaries.

d. The compressed air system is available to provide air to system air-operated valves.

14.2.12.2.28.3 Test Method

a. The ability of the turbine trip and monitoring system to initiate a turbine trip signal on receipt of each of the following input signals is verified:

- Manual trip pushbutton depressed
- Manual trip handle pulled
- Generator trip (EHC vital trip)
- Generator trip (unit trip)
- Reactor trip
- Loss of stator coolant
- Low lube oil pressure
- Loss of EHC 125 V dc power with turbine speed below ~~25~~ 75 percent
- High turbine vibration

14.2.12.3.8 Power Coefficient Determination (S-070008)

14.2.12.3.8.1 Objectives

To verify the power coefficient of reactivity.

14.2.12.3.8.2 Prerequisites

a. Reactor power level, reactor coolant temperature and pressures, and RCCA and RCC bank configuration are as follows:

   1. RCS pressure - nominal 2235 psig

   2. RCCA, RCC bank configuration - nominally all rods out, D at bite position

   3. Reactor power level - nominally 30, 50, 75, and 90 percent RTP

   4. T_{avg} - consistent with the nominal value corresponding to the T_{avg} program at the identified nominal power levels

b. All subsystems which affect overall plant transient response should be in automatic mode of operation with the exception of the rod control system and automatic makeup. The CVCS demineralizer shall be bypassed.

14.2.12.3.8.3 Test Method

a. As generator electrical load is changed, the primary side is permitted to freely respond without any control rod motion.

b. The power coefficient verification factor is calculated by measuring the change in RCS temperature and the corresponding change in core power.

14.2.12.3.8.4 Acceptance Criteria

The average value of the measured verification factor agrees with that obtained from design predictions of the isothermal temperature coefficient and doppler power coefficient. This agreement is within limits given in the test instructions.

14.2.12.3.18 Reactor Coolant System Flow Coastdown Test (S-07BB04)

14.2.12.3.18.1 Objectives

a. To measure the rate at which reactor coolant flow changes, subsequent to various reactor coolant pump trips.

b. To determine that the reactor coolant system low-flow delay times are less than or equal to the total low-flow delay times assumed in the safety analysis for loss of flow.

c. To determine that the undervoltage trip and underfrequency trip delay times are within design specifications.

14.2.12.3.18.2 Prerequisites

a. Required component testing and instrument calibration are complete.

b. Required electrical power supplies and control circuits are operational.

c. The reactor core is installed, and the plant is at normal operating temperature and pressure with all reactor coolant pumps running.

14.2.12.3.18.3 Test Method

Flow coastdown stabilization and loss of coolant delay-time data are recorded while tripping reactor coolant pumps. ~~from various operating configurations.~~

14.2.12.3.18.4 Acceptance Criteria

a. The rate of change of reactor coolant flow ~~for the various pump configurations~~ tested is within design specifications.

b. The reactor coolant system low-flow delay times are less than or equal to the total low-flow delay times assumed in the safety analysis for loss of flow.

c. The undervoltage trip and underfrequency trip delay times are within design specifications.

14.2.12.3.28 Rod Position Indication System (S-07SF04)

14.2.12.3.28.1 Objectives

To verify that the rod position indication system satisfactorily performs required indication and alarm functions for each individual rod and that each rod operates satisfactorily over its entire range of travel.

14.2.12.3.28.2 Prerequisites

a. Plant system conditions are established as follows:

   1. Test performed at $T_{avg} \leq 200$ F, $K_{eff} \leq 0.95$, nominal RCS pressure for T_{avg} noted

   2. Test results verified at T_{avg} nominally 557 F, $K_{eff} \leq 0.95$, RCS pressure nominally 2235 psig

b. At least one reactor coolant pump in service.

14.2.12.3.28.3 Test Method

a. All shutdown rod banks will be fully withdrawn by bank stopping at 18,210 and 228 steps to record the rod position as indicated by the plant computer, the control room board position readout and the group step position indication.

b. All control rod banks will be fully withdrawn by bank in 24 step increments while recording rod position as indicated by the plant computer, the control room board position readout, and the group step position indication.

c. In addition, the pulse-to-analog converter chassis bank position digital readout will be recorded for all control rod banks.

14.2.12.3.28.4 Acceptance Criteria

The rod position indication system performs the required indication alarm functions, and each rod operates over its entire range of travel within the limits of the rod position indication instruction manual and the plant precautions, limitations, and setpoints manual.

14.2.12.3.43 Calibration of Steam and Feedwater Flow Instrumentation at Power Test (S-070018)

14.2.12.3.43.1 Objectives

a. To calibrate the steam flow transmitters against feedwater flow. ~~at power ranges of 30 to 100 percent.~~

b. To perform a cross-check verification of all signals indicating feedwater and steam flow. ~~at power ranges of 30 to 100 percent.~~

14.2.12.3.43.2 Prerequisites

a. Test equipment, including transmitters, has been calibrated for expected ranges of plant conditions.

b. The plant shall be at steady state conditions for each power level at which testing is performed.

14.2.12.3.43.3 Test Method

At 30 and 50% power perform step a if the steam flow/feedwater flow mismatch alarm actuates. At 75 and 100% power perform steps a and b.

~~At 30, 50, 70, and 100 percent power, perform the following:~~

a. Verify calibration of ~~Calibrate~~ the steam flow by comparing steam flow signal to referenced feedwater flow.

b. Compare, using plots, the steam and feedwater flow values to determine if recalibration is necessary prior to the next power escalation.

14.2.12.3.43.4 Acceptance Criteria

a. Steam flow/feedwater flow mismatch alarm does not actuate at 30%, 50%, 75% and 100% power.

b. Steam flow indication should be within ±4 percent of feedwater flow panel indicator at 75% and 100% power.

c. The test feedwater flow instrument versus plant feedwater flow instrument and plant steam flow instrument curves should be within ±2.5 percent and ±3.0 percent of their respective ideal curves at 75% and 100% power.