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February 15, 1985
RBG- 20,150
File No. G9.5, G9.8.2.14

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

Dear Mr. Denton:

River Bend Station - Unit 1
Docket No. 50-458

Enclosed is a revision to the Initial Startup Test Phase of Section 14.2 - Initial Test Program - of the River Bend Station (RBS) Final Safety Analysis Report (FSAR). As Gulf States Utilities Company (GSU) nears completion, fuel loading, and startup of RBS, these changes are necessary to resolve the remaining discrepancies between the FSAR, General Electric's (GE) Startup Test Specification (STS 23A1917) and the as-built plant design. Attachment 1 provides justification and summary explanation of the revisions for clarity while Enclosure 1 contains the marked-up FSAR pages. These revisions will be included in a future FSAR amendment.

Sincerely,

Eddie R Grant

for J. E. Booker
Manager - Engineering
Nuclear Fuels & Licensing
River Bend Nuclear Group

JEB/WJR/JWL/je

Attachment (1)

Enclosure (1)

B001

1/36

Attachment 1

Reference	Justification/Explanation
14-vii 142-186,187	Change the test number to conform to GSU Startup numbering convention
14-viii 14.2-172 F14.2-8	Delete the figure for small recirculation flow step changes. The criteria for 0.2-0.5% step changes is not required by the GSU Startup Test Specification (STS 23A1917) since the input/responses are too small to adequately indicate controller setting.
14.2-2	Editorial
14.2-130,136	Change SRM count rate from 3 CPS to 0.7 CPS to comply with Technical Specifications 4.3.7.6(c) and 4.9.2(c)
14.2-131	Clarification that this information is not to be supplied as an FSAR update, but is determined at the time of the test
14.2-133	Change to conform to the STS which does not require a repeat of the friction testing for all rods at rated pressure if preoperational testing was satisfactorily completed within the previous 120 days
14.2-134	The original FSAR text is in error; the STS properly defines scram timing
14.2-136	The STS deletes the requirement to record rod patterns during power ascension. Rod patterns are recorded during initial criticality and are constrained by the Rod Pattern Controller (RPC) of the Rod Position and Information System (RPIS)
14.2-137,138	The STS does not require the determination of the effects of core flow subcooling and carryunder on level indication. The actual tests were performed at the Kuosheng facility to the satisfaction of General Electric
14.2-144	Discharge will be to the reactor vessel instead of CST since this is more conservative at 'cold' conditions. Cold injection to CST occurs in Action #1
14.2-146	Change as required by the RBS STS

14.2-148	The original FSAR text was based on Grand Gulf's STS. The RBS STS does not require relief valve discharge piping to be included in the System Expansion Test. The BOP vibration test and nuclear piping system tests (currently not included in the FSAR test) includes this procedure.
14.2-157	The incremental regulation currently stated is for partial arc admission. RBS has full arc admission and therefore the STS detailed the changes indicated.
14.2-158	This test will be conducted with three feedwater pumps running, not two
14.2-159	Original text pertains to turbine driven feedwater pumps. Change to refer to level control valves per as-built design.
14.2-160	Flow will not be measured from each valve, instead measurement will occur after a common header. Therefore, the affect of feedwater flow of one valve must be divided by three
14.2-162,173, 175	Remove all references to preconditioning and PCIOMR since they don't apply to low burn-up barrier fuel
14.2-163,164	Change definition and criteria of MSIV timing as detailed in the STS and the as-built design.
14.2-164a	Update to include newly available information
14.2-172	Move subitem 'a' since it is not test condition dependent. The other revisions are justified above
14.2-182,183	Delete acceleration as a method of displacement measurement since better and more accurate techniques exist
14.2-185	Deletion is to allow for adjustments and calibration; flow and temperature cannot be held constant simultaneously. The GE process diagram is descriptive of nominal, not design, conditions and is therefore generic. Finally, add a provision to perform the RHR system test at heatup if desired
14.2-187	Delete humidity acceptance criteria as it is not required by Tech Specs
14.2-187,188	Changes resulted from the RBS STS. Original text reflected Grand Gulf's STS not the RBS design
T14.2-1,2,3,4	Updated to include criteria

F14.2-1	Revised to reflect current organizational structure
F14.2-4	Changed to conform to actual conditions
F14.2-5	Changed to conform to RBS's test plan

CHAPTER 14

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CHAPTER 14

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14.2.1.2 Preoperational Test Phase

The preoperational test phase normally commences after preliminary testing on individual components and systems or subsystems is completed. This phase includes the tests required to demonstrate that structures, systems, and components perform satisfactorily in all modes of operation and that they are ready to support fuel loading and initial startup phase testing. The preoperational test phase ends at the commencement of fuel loading; however, the possibility exists that some ~~nonsafety-related~~ 5 preoperational tests may be conducted after fuel loading has occurred. For structures, systems, and components not 5 tested prior to fuel load, proper notification and justification will be provided before commencement of fuel load.

Preoperational tests are performed on any system that is safety related. At River Bend Station, acceptance tests are performed on all other systems. Plant operating personnel are to obtain hands-on experience during testing of these systems, thereby satisfying the training concerns of NUREG-0737, Item I.G.1. Many system tests are to be conducted as part of the preoperational and acceptance tests that lend themselves to operator training. Use of operating procedures is described in Section 14.2.9.

During the conduct of the preoperational test phase, two types of tests are performed: preoperational tests and acceptance tests. The preoperational test is a test in accordance with Section XI of Appendix B of 10CFR50. The acceptance test is a test performed on a structure, system, or component that is not classified as safety-related, but nevertheless can lead to loss or degradation of the plant's capability to produce electrical energy in a reliable manner.

14.2.1.3 Initial Startup Test Phase

The initial startup test phase of the test program commences 5 with the preparation for fuel load and extends through 100 percent rated power and warranty demonstrations. The initial startup phase of testing is divided into five areas: fuel load, open vessel, initial heatup, power ascension, and rated power warranty run. Testing performed during this phase of the program ensures that fuel loading is accomplished in a safe manner, confirms the plant design basis, demonstrates that the plant can withstand anticipated transients and postulated accidents, and ensures that the

e. Reactor vessel status is specified relative to internal component placement and this placement established to make the vessel ready to receive fuel.

f. Reactor vessel water level is established and minimum level prescribed.

5 3. Test Procedure

Fuel loading begins at the center of the core and proceeds radially to the fully loaded configuration.

Control rod functional tests, subcriticality checks, and shutdown margin demonstrations are performed periodically during the loading.

4. Acceptance Criteria

Level 1

The partially loaded core is subcritical by at least 0.38 percent Δk/k with the analytically strongest rod fully withdrawn.

5 14.2.12.3.4 Test Number 4 - Full Core Shutdown Margin

1. Test Objective

The purpose of this test is to demonstrate that the reactor is subcritical throughout the first fuel cycle with any single control rod fully withdrawn.

2. Prerequisites

The appropriate preoperational tests have been completed. Also, the following prerequisites are complete prior to performing the full core shutdown margin tests:

5 a. The predicted critical rod position is available.

b. The standby liquid control system is available.

13 c. Nuclear instrumentation is available with neutron count rate of ~~the~~ AT least ~~three~~ 0.7 counts per

second and a signal-to-noise ratio greater than two. 5

d. High flux scram trips are conservatively low.

The FRC has reviewed and approved test procedures and initiation of testing.

3. Test Procedure

This test is performed in the fully loaded core at ambient temperature in the xenon-free condition. The shutdown margin is measured by withdrawing the analytically strongest rod or the equivalent (another rod plus an added reactivity) and one or more additional rods which have been calibrated by calculation until criticality is reached. The difference between the measured k_{eff} and the calculated k_{eff} for the in-sequence criticality is applied to the calculated value to obtain the true shutdown margin. 5

4. Acceptance Criteria

Level 1

The shutdown margin of the fully loaded, cold (68°F), xenon-free core occurring at the most reactive time during the cycle is at least 0.38 percent $\Delta k/k$ with the analytically strongest rod (or its reactivity equivalent) withdrawn. If the shutdown margin is measured at some time during the cycle other than the most reactive time, compliance with the above criterion is shown by demonstrating that the shutdown margin is 0.38 percent $\Delta k/k$ plus an exposure-dependent increment which adjusts the shutdown margin at that time to the minimum shutdown margin. Chapter 4 of the FSAR, Fig. 4.3-25, defines the additional margin for exposure. 5

Level 2

Criticality occurs within 1.0 percent $\Delta k/k$ of the predicted critical. ~~(predicted critical to be determined later).~~

CONTROL ROD DRIVE SYSTEM TESTS

Action	Test Conditions Reactor Pressure With Core Loaded (psig) 0	600	800	Rated
Position indication	All			
Insert/withdraw				
A. Single CRD notch~~es~~ and continuous modes	All			
B. Gang groups notch~~es~~ and continuous modes	All			
Coupling	All			
Friction	All			All ****
~~Cooling water flow rates (Total)~~				~~1~~
Individual CRD scram TIMES	ALL***	4*	4*	All
INDIVIDUAL CRD SCRAM TIMES				4 *,**

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*Refers to four CRDs selected for continuous monitoring based on slow normal accumulator pressure scram times as determined from preoperational testing or unusual operating characteristics. The "four selected CRDs" must be compatible with the requirements of both the withdrawal sequence and the installed rod movement limitation system.

INSERT →

NOTE: Single CRD scrams should be performed with the charging valve closed (Do not ride the charging pump head).

Insert for page 14.2-133

** Scram times of the four selected CRD's will be determined at Test Conditions 1,3 and 6 before or during planned reactor scrams (see Tests 25B, 27 and 28.)

*** Credit can be taken for CRD scram times performed in conjunction with the CRD Hydraulic System Preoperational Test (14.2.12.1.11), provided that no modifications were done on the CRD after scram timing and the test was performed less than 120 days before fuel loadings.

**** Performing friction testing for 50% of the rods in a checkerboard pattern is acceptable to satisfy the rated pressure requirement.

4. Acceptance Criteria

Level 1

Each CRD has a normal withdraw speed less than or equal to 3.6 in per sec, indicated by a full 12-ft stroke in greater than or equal to 40 sec.

The maximum scram times, measured with vessel pressures between 950 and 1,050 psig, of individual CRDs comply with line 1 of the following table (Performance rated with charging headers at 1,750 psig):

Line	Pressure (psig)	Maximum Scram Time from OPENING OF MAIN SCRAM CONTACTOR ~~"Deenergizing" Scram Pilot Solenoid~~ to Notch Position* (sec)		
		43	29	13
1	950	0.31	0.81	1.44
	1,050	0.32	0.86	1.57
2	950	0.38	1.09	2.09
	1,050	0.39	1.14	2.22
3	950	0.30	0.78	1.40
	1,050	0.31	0.84	1.53

(*For intermediate vessel dome pressure, the scram time criteria is determined by linear interpolation at each notch position.)

In the event that any CRD scram time exceeds the criteria listed in line 1 of the above table, the following acceptance criteria are applicable:

1. The maximum scram time of any CRD which failed the criteria of line 1 does not exceed the criteria of line 2.
2. The average scram time of those rods which meet the criteria of line 1 does not exceed the criteria of line 3.
3. The total number of slower control rods which do not meet the criteria of line 1 do not exceed five and they do not occupy adjacent drive locations in any direction including the diagonal.

3. Test Procedure

The operational neutron sources are installed and source range monitor count-rate data is taken during rod withdrawals to critical and compared with stated criteria on signal and signal count-to-noise count ratio.

A withdrawal sequence has been calculated which completely specifies control rod withdrawals from all-rods-in condition to the rated power configuration. Critical rod patterns are recorded periodically as the reactor is heated to rated temperature.

Movement of rods in a prescribed sequence is monitored by the rod pattern control system which ← INSERT prevents out of sequence withdrawal. Also not more than two rods may be inserted out of sequence.

As the withdrawal of each rod group is completed during the power ascension, the electrical power, steam flow, control valve position, and APRM response will be recorded.

4. Acceptance Criteria

Level 1

There is a neutron signal count-to-noise count ratio of at least 2 to 1 on the minimum number of operable SRMs or fuel loading chambers as specified in the Technical Specifications.

5 There is a minimum count rate of 0.7 ~~3~~ counts/sec on the minimum number of operable SRMs or fuel loading chambers as specified in the Technical Specifications.

The IRMs are on scale before the SRMs exceed the rod block set point.

13 5

14.2.12.3.7 Test Number 16B - Water Level Reference Leg Temperatures

1. Test Objective

The purposes of this test are a) to check the calibration of the various level indicators and b) to measure the reference leg temperature and recalibrate the affected wide range level

Insert for page 14.2-136

enforces specific rules based on power level, rod sequence and rod group.

instruments if the measured temperature is different from the value assumed during the initial calibration.

2. Prerequisites

Required preoperational tests have been completed; the FRC has reviewed and approved the test procedure and the initiation of testing. All system controls and interlocks have been checked. All system instrumentation is installed and calibrated.

3. Test Procedure

To monitor the reactor vessel water level, five level instrument ranges are provided. These are:

a. Shutdown range

b. Narrow range

c. Wide range

d. Fuel zone range

e. Upset range.

These systems are used respectively as follows:

a. Water level measurement in cold, shutdown conditions (shutdown range)

b. Feedwater flow and water level control functions (narrow range)

c. Safety functions (wide range)

d. Post-LOCA monitoring (fuel zone range)

e. During and following abnormal water level increases (upset range).

The test is ~~divided into three parts. The first part is~~ done at rated temperature and pressure and under steady-state conditions. ~~and~~ IT verifies that the reference leg temperature of the wide range AND NARROW RANGE level instruments ~~is~~ ARE the value assumed during initial calibration. If not, the instruments are recalibrated using the measured value. ~~The second~~

part of the test consists of reading all the level indicators to verify they are responding properly. The Level 2 criteria determine whether recalibration is necessary. There should be reasonable agreement between indications at hot standby. The third part of the test collects data at various operating conditions to help define the effect of core flow velocity, subcooling, and carryunder on indicated wide range level.

4. Acceptance Criteria

Level 2

DELETE AND REPLACE WITH INSERT

The narrow range readings agree with each other within plus or minus 1.5 in of the average reading.

The wide range indicators agree with each other within plus or minus 6 in of the average reading.

5 14.2.12.3.8 Test Number 10 - Intermediate Range Monitor Performance

1. Test Objective

The purpose of this test is to adjust the IRM system to obtain an optimum overlap with the SRM and APRM systems.

2. Prerequisites

The preoperational tests have been completed. The FRC has reviewed and approved the test procedures and the initiation of testing. Instrumentation for calibration has been checked and installed.

3. Test Procedure

Initially the IRM system is set to maximum gain. After the APRM calibration, the IRM gains are adjusted to optimize the IRM overlap with the SRMs and APRMs.

4. Acceptance Criteria

Level 1

Each IRM channel is adjusted so that the overlap with the SRMs and APRMs is assured. The IRMs

Insert for page 14.2-138

The difference between the variable leg and the reference leg temperatures determined from the containment and drywell temperature measurements and the values assumed during initial calibration are less than the amount which will result in a scale endpoint error of 1% of the instrument span for each range.

	Action		Test Conditions
		b.	150 psig reactor pressure, RCIC discharge 100 psi above reactor pressure initial controller , settings, RCIC hot
		c.	Rated reactor pressure, RCIC discharge 100 psi above reactor pressure, RCIC hot
2.	Step changes in flow for controller adjustments	a.	Immediately after 1c with RCIC discharge to condensate storage tank
3.	Extended operation demonstration	a.	In conjunction with 2a
4.	CST injection, second phase. Hot quick start followed by stability demonstration	a.	Rated reactor pressure, RCIC discharge 100 psi above RPV
		b.	150-psig reactor pressure, RCIC discharge 100 psi above RPV
5.	Reactor vessel injection, manual start, step changes for controller adjustments	a.	Rated reactor pressure, manual and automatic modes
6.	Reactor vessel injection, hot quick start	a.	Rated reactor pressure, automatic mode
7.	Reactor vessel injection, hot or cold quick start followed by stability demonstration	a.	150-psig reactor pressure, automatic mode
8.	Confirmatory reactor vessel injection, cold quick start	a.	Rated reactor pressure, final RCIC controller settings

DELETE AND REPLACE WITH INSERT 5

Insert for page 14.2-144

4.	Reactor vessel injection, quick start	a.	150-psig reactor pressure

d. In order to provide an overspeed and isolation trip avoidance margin, the transient start first and subsequent speed peaks do not exceed 5% ABOVE the rated RCIC turbine speed.

14.2.12.3.13 Test Number 16A - Selected Process Temperatures

1. Test Objective

a. To assure that the measured bottom drain temperature corresponds to bottom head coolant temperature during normal operations.

b. To identify any reactor operating modes that cause temperature stratification.

c. To determine the proper setting of the low flow control limiter for the recirculation pumps to avoid coolant temperature stratification in the reactor vessel bottom head region.

d. To familiarize plant personnel with the temperature differential limitations of the reactor system.

2. Prerequisites

The preoperational tests have been completed and the FRC has reviewed and approved the test procedures, and initiation of testing. System and test instrumentation have been calibrated.

3. Test Procedure

The adequacy of bottom drain line temperature sensors is determined by comparing them with recirculation loop temperature when core flow is 100 percent of rated.

During initial heatup while in hot standby, the bottom drain line temperature and recirculation loop temperature are monitored as the recirculation flow is slowly lowered to either minimum stable flow or the low recirculation pump speed minimum valve position, whichever is greater. The effects of cleanup flow, CRD flow, and power level are investigated. Utilizing this data, it can be determined whether coolant temperature stratification occurs when the recirculation pumps

Thermal movement and temperature measurements are recorded at the following test points:

a. Reactor pressure vessel heatup and hold, at least at one intermediate temperature before reaching normal operating temperature; at this time the drywell piping and suspension are inspected for obstruction or inoperable supports.

b. Reactor pressure vessel heatup and hold at normal operating temperature.

c. Main steam and recirculation piping heatup and hold at normal operating temperature.

d. On three subsequent heatup cooldown cycles, measurements are recorded at the operating and shutdown temperatures to measure possible shakedown effects.

The piping considered to be within the boundary of this test is:

a. Main steam - Steam lines, including the RCIC piping on line A, are tested. Those portions within the scope of the test are bounded by the reactor pressure vessel nozzles and the penetration head fittings. 5

b. Relief valve discharge piping - The piping attached to the main steam lines and bounded by the relief valve discharge flange and the first downstream anchor is within the scope of the test.

b ~~c~~. Recirculation piping - The recirculation piping, bounded by the reactor pressure vessel nozzles, is within the scope of the test. The RHR suction line from the branch connection to the penetration head fitting is also monitored during the tests.

c ~~d~~. Small attached piping - All small branch piping attached to those portions of the preceding piping is within the scope of the test. The small attached piping is bounded by the large pipe branch connection and the first downstream guide or anchor. Small branch pipes that cannot be monitored because of

4. Acceptance Criteria

Level 1

The decay ratio is no greater than 1.0 for each pressure control system related process variable (neutron monitoring and RPV dome pressure) that exhibits oscillatory response to pressure controller changes.

Level 2 5

In all tests the decay ratio is expected to be less than or equal to 0.25 for each pressure control system process variable that exhibits oscillatory response to pressure controller changes.

Pressure control deadband, delay, etc, are small enough that steady-state limit cycles, if any, produce turbine steam flow variations no larger than plus or minus 0.5 percent of rated flow as measured by the gross generated electrical power.

When in the recirculation position command mode, the pressure response time from initiation of pressure set point change to the turbine inlet pressure peak is less than or equal to 10 sec. 5

During the various failures in the IPC, if the set point of the IPC is optimally set, the IPC controls the transient such that the peak neutron flux and/or peak vessel pressure remain below the scram settings by 7.5 percent and 10 psi, respectively.

The variation in the incremental regulation (ratio of the maximum to the minimum value of the quantity "incremental change in pressure control signal/incremental change in steam flow" for each flow range) meets the following: 5

Percent of Steam Flow Obtained with Valves Wide Open	Variation
0-85% → ~~0 - 95%~~	<4:1
85%-97% → ~~90% - 97%~~	<2:1
85%-99% → ~~90% - 99%~~	<5:1

14.2.12.3.20 Test Number 23 - Feedwater System

14.2.12.3.20.1 Test Number 23C - Feedwater Pump Trip 5

1. Test Objective

   The purpose of this test is to demonstrate the capability of the automatic core flow runback feature to prevent low water level scram following the trip of one feedwater pump.

2. Prerequisites

   The preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate. All feedwater controllers have been tuned to provide the dynamic response to as fast as possible with proper damping. 5

3. Test Procedure

   One of the ~~two~~ operating feedwater pumps is tripped and the automatic recirculation runback circuit acts to drop the power to within the capacity of the remaining feedwater pump. Prior to the test a simulation of the feedwater pump trip is done to verify the runback capability of the recirculation system.

4. Acceptance Criteria

   Level 1

   Not Applicable

   Level 2

   A scram does not occur from low water level following a trip of one of the operating feedwater pumps. There is greater than 3-in water level margin to scram for a feedwater pump trip initiated at 100 percent power conditions.

14.2.12.3.20.2 Test Number 23A - Water Level Set Point, Manual Feedwater Flow Changes 5

1. Test Objective

The purpose of this test is to verify that the feedwater system has been adjusted to provide acceptable reactor water level control.

2. Prerequisites

The preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

Reactor water level set point changes of approximately 3 to 6 in are used to evaluate (and adjust as necessary) the feedwater control system settings for all power and feedwater LEVEL CONTROL VALVE ~~pump~~ modes. The level set point changes also demonstrate core stability to subcooling changes. 5

4. Acceptance Criteria

Level 1

The transient response of any level control system-related variable (reactor water level) to any test input does not diverge. 5

Level 2

a. Level control system-related variable may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response is less than or equal to 0.25.

b. The open loop dynamic VALVE POSITION ~~flow~~ response of each feedwater LEVEL CONTROL valve to small ~~(10 percent)~~ < 10 PERCENT step disturbances is:

   (1) Maximum time to 10 percent of a step disturbance: ≤ 1.1 sec 5

5 (2) Maximum time from 10 percent to 90 percent of a step disturbance: ≤ 1.9 sec

5 (3) Peak overshoot (percent of step disturbance): ≤ 15 percent

13 c. The average rate of response of the TOTAL feedwater FLOW actuator to large (≥20 percent of pump flow) step disturbances is between 3.3 AND 8.3 ~~10 and 25~~ percent NUCLEAR BOILER RATED (NBR) ~~rated~~ feedwater flow/sec. This average response rate is assessed by determining the time required to pass linearly through the 10 and 90 percent response points.

13 d. At steady-state operation, input scaling to the mismatch gains is adjusted such that the mismatch gain output within ± 1 inch.

5 14.2.12.3.20.3 Test Number 23B - Loss of Feedwater Heating

1. Test Objective

The purpose of this test is to demonstrate adequate response to a feedwater temperature loss.

2. Prerequisites

The appropriate preoperational tests have been completed; the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

The condensate/feedwater system is studied to determine the single failure that causes the largest loss in feedwater heating. This event is then performed at between 80 and 90 percent power with the recirculation flow near its rated value.

4. Acceptance Criteria

<u>Level 1</u>

5 The increase in simulated heat flux does not exceed the Level 2 value by more than 2 percent. This value is based on the actual test values of feedwater temperature change and power level.

2. Prerequisites

The appropriate preoperational tests have been completed; the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

Individual main turbine control, stop and bypass valves are tested routinely during plant operation as required for turbine surveillance testing. At several test points the response of the reactor is observed, and although it is not required, it is recommended that the maximum possible power level for performance of these tests along the 100 percent load line be established. First actuation should be between 45 and 65 percent power, and used to extrapolate to the next test point between 70 and 90 percent power and ultimately to the maximum power test condition with ample margin to scram. Note proximity to APRM flow bias scram point. ~~and fuel preconditioning envelope.~~ 5 The turbine valves are tested manually. Rate of valve stroking and timing of the close-open sequence are such that the minimum practical disturbance is introduced and ANY FUEL-RELATED ~~the fuel preconditioning envelope~~ limits are not exceeded.

4. Acceptance Criteria

5 Level 2

a. 5 Peak neutron flux is at least 7.5 percent below the high flux scram trip setting specified in the Technical Specifications. Peak vessel pressure remains at least 10 psi below the high reactor pressure scram trip setting specified in the Technical Specifications.

b. Peak steam flow in each steam line remains 10 percent below the high steam flow MSIV isolation trip setting specified in the Technical Specifications.

14.2.12.3.22 Test Number 25 - Main Steam Isolation Valves 5

14.2.12.3.22.1 Test Number 25A - MSIV ~~Function~~ Functional Tests 13

1. Test Objective

The purposes of this test are: a) to functionally check the MSIVs for proper operation at selected power levels, b) to determine isolation valve closure time at rated conditions, and c) to determine maximum power at which a single valve closure can be made without scram. 13

2. Prerequisites

The preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

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At 5 percent and greater reactor power levels, individual fast closure of each MSIV is performed to verify its functional performance and to determine closure times. The MSIV closure times are determined from the MSL isolation data. MSIV closure time nominally equals the interval from deenergizing solenoids until the valve reaches 90 percent closed, plus the period from 10 percent closed to 90 percent closed times 1/8. 13

To determine the maximum power level at which full individual closures can be performed without a scram, first actuation is performed between 40 and 65 percent power and used to extrapolate to the next test point between 60 and 85 percent power, and ultimately to the maximum power test condition with ample margin to scram.

4. Acceptance Criteria

Level 1

DELETE AND REPLACE WITH INSERT 2

MSIV closure time is: a) no less than 3.0 sec exclusive of the electrical delay, (average of the fastest valve in each steam line), b) no more than

Insert 1 for page 14.2-163

At approximately 5% and greater power levels, individual fast closure of each MSIV will be performed to verify their functional performance and to determine closure times. The times to be determined are a) the time from de-energizing the solenoids until the valve is 100% closed (tsol) and b) the valve stroke time (ts). Time tsol equals the interval from de-energizing the solenoid until the valve reaches 90% closed plus 1/8 times the interval from 10% to 90% closure. Time ts equals the interval from when the valve starts to move until its is 100% closed, and is based on the interval from 10% to 90% closure and linear valve travel from 0% to 100% closure.

Insert 2 for page 14.2-163

The MSIV stroke time (ts) shall be no faster than 3 seconds (average of the fastest valve in each steam line), and for any individual valve 2.5 seconds $\leq$ ts $\leq$ 5 seconds. Total effective closure time for any individual MSIV shall be tsol plus the maximum instrumentation delay time as determined in the Nuclear Boiler System Preoperational Test (14.2.12.1.4) and shall be less than or equal to 5.5 seconds.

5.0 sec inclusive of electrical delay (not average).

The electrical time delay at 100 percent open is less than or equal to 0.5 second, and the fastest 13
valve closure time is ≥2.5 seconds.

Level 2

During full closure of the individual valve, peak pressure is 10 psi below scram, peak neutron flux
is 7.5 percent below scram, and steam flow in 5
individual lines is 10 percent below isolation valve trip setting. The peak heat flux is 5 percent less than its trip point.

14.2.12.3.22.2 Test Number 25B - Full Reactor Isolation

1. Test Objective

The purpose of this test is to determine the reactor transient behavior that results from the simultaneous full closure of all MSIVs.

2. Prerequisites

The preoperational tests have been completed; the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure 13

A test of the simultaneous full closure of all MSIVs is performed at 95 to 100 percent of rated thermal power. Correct performance of the RCIC and relief valves is shown. Reactor process variables are monitored to determine the transient behavior of the system during and following the main steam line isolation.

4. Acceptance Criteria

Level 1

The positive change in vessel dome pressure occurring within 30 seconds after closure of all MSIVs does not exceed the Level 2 criteria by more than 25 psi. The positive change in simulated heat flux does not exceed the Level 2 criteria by more than 2 percent of rated value.

Feedwater control system settings prevent flooding of the steam lines.

Level 2

The RCIC system adequately takes over water level protection. The relief valves reclose properly (without leakage) following the pressure transient.

For the full MSIV closure from full power, predicted analytical results based on beginning of cycle design-basis analysis, assuming no equipment failures and applying appropriate parametric corrections, are used as the basis to which the actual transient is compared. The following table specifies the upper limits of these criteria during the first 30 seconds following initiation of the indicated conditions.

Initial Conditions		Criteria	
Power (%)	Dome Pressure (psia)	Increase In Heat Flux (%)	Increase In Dome Pressure (psi)
100	1040	~~*~~ <4%NBR	~~*~~ <132.7 PSI

13

~~(*To be provided in a future amendment.)~~

Initial action of the RCIC and HPCS is automatic when water Level 2 is reached, and system performance is within specifications.

Recirculation runback occurs. Recirculation pump trip is initiated when Level 2 is reached.

14.2.12.3.22.3 Test Number 25C - Main Steam Line Flow Venturi Calibration

1. Test Objective

The purpose of this test is to calibrate the main steam flow venturis at selected power levels over the entire core flow range. The final calibration takes place with the data accumulated along the 100 percent rod line.

4. Acceptance Criteria

Level 1

The transient response of any recirculation system-related variables to any test input does not diverge.

Level 2

Recirculation system-related variables may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response is less than or equal to 0.25.

During test condition 3 and test condition 6, while operating on the high speed (60 Hz) source, gains and limiters are set to obtain the following responses:

5 ~~a.~~ Maximum rate of change of valve position is 10 ±1 percent/sec

a ~~b~~. Delay time for position demand step is:

DELETE AND REPLACE WITH INSERT

(1) For step inputs of 0.5 percent to 5 percent: ≤0.15 sec

(2) For step inputs of 0.2 percent to 0.5 percent: see Fig. 14.2-8

b ~~c~~. Response time for position demand step is:

(1) For step inputs of 0.5 percent to 5 percent: ≤0.45 sec

(2) For step inputs of 0.2 percent to 0.5 percent: see Fig. 14.2-8

c ~~d~~. Overshoot after a small position demand input (1 to 5 percent) step is less than 10 percent of the magnitude of input.

14.2.12.3.26.2 Test Number 29B - Recirculation Flow Loop Control

1. Test Objective

a. To demonstrate the core flow system's control capability over the entire flow control range,

Insert for page 14.2-172

a. Delay time for position demand step is less than or equal to 0.15 sec for step inputs of 0.5 percent to 5 percent.

b. Response time for position demand step is less than or equal to 0.45 sec for step inputs of 0.5 percent to 5 percent.

including both core flow neutron flux and load following modes of operation.

b. To determine that all electrical compensators and controllers are set for desired system performance and stability.

2. Prerequisites

The APPROPRIATE preoperational tests have been completed; the FRC has reviewed and approved the test procedures and initiation of testing. All controls are checked and instrumentation calibrated.

3. Test Procedure

Following the initial position mode tests of Test 29A, the final adjustment of the position loop gains, flow loop gains, and preliminary values of the flux loop adjustments are made on the mid-power line. This is the most extensive testing of the recirculation control system. The core power distribution is adjusted by control rods to permit broader range of maneuverability with respect to PCIOMR. In general, the controller dials and gains are raised to meet the maneuvering performance objectives. Thus, the system is set to be the slowest that performs satisfactorily, in order to maximize stability margins and to minimize equipment wear by avoiding controller overactivity. 5

~~Because of PCIOMR~~ DUE TO ANY FUEL-LIMITED power maneuvering rate restrictions, the fast-flow maneuvering adjustments are performed along a midpower rod line, and an extrapolation made to the expected results along the 100 percent rod line.

For commercial operation, the flux loop and automatic load following loop MAY BE ~~are~~ set slower, and the operator WILL limit~~s~~ USAGE OF THE manual mode. ~~If PCIOMRs are ever withdrawn,~~ FUEL LIMITATIONS PERMITTING, the tested faster auto settings can be inserted onto the controller with only a brief dynamic test, rather than a full startup test.

Load Following Loop Criteria

a. The decay ratio of the load following response is less than or equal to 0.25 percent.

b. The response to a step input of less than 10 percent in load demand is such that the load demand error is within 10 percent of the magnitude of the step within 10 sec.

c. When a load demand step of greater than 10 percent is applied (N percent), the load demand error must be within 10 percent of the magnitude of the step within N sec. If ~~PGIOMR~~ FUEL-RELATED restrictions apply, this test can be performed at a lower rod line and extrapolated to the rated rod line.

Scram Avoidance and General Criteria

For test maneuvers for any one of the above loops the trip avoidance margins ~~are~~ MUST BE at least the following:

a. For APRM ≥7.5 percent

b. For simulated heat flux ≥5.0 percent 5

c. The load following loop response produces steam flow variations no greater than 0.5 percent of rated steam flow.

Flux Estimator Test Criteria

a. Switching between estimated and actual flux does not exceed 5 times/5 min at steady state.

b. During flux step transient, there is no switching to actual flux; or, if switching does occur, it switches back to estimated flux within 20 sec of the start of the transient.

Flow Control Valve Duty Test Criteria

The flow control valve duty cycle in any operating mode does not exceed 0.2 percent Hz. Flow control valve duty cycle is defined as:

$$\frac{\text{Integrated Valve Movement in Percent (\% Hz)}}{\text{2 x Time Span in Seconds}}$$

e. RCIC turbine steam line at 100 percent of rated.

f. RHR suction piping at 100 percent of rated flow in shutdown cooling mode.

During the operating transient load testing, the amplitude of displacement and number of cycles per transient of the main steam and recirculation piping are measured, and the displacements compared with acceptance criteria. Remote vibration and deflection measurements are taken during the following transients:

a. Recirculation pump start.

b. Recirculation pump trip at 100 percent of rated flow.

c. Turbine stop valve closure at 100 percent power.

d. Manual discharge of each SRV valve at 1,000 psig and at planned transient tests that result in SRV discharge. 5

For the locations to be monitored, predicted displacements and actual measurements are compared.

4. Acceptance Criteria

<u>Level 1</u>

Operating Transients - Level 1 limits on piping displacements are prescribed in Table 14.2-3 and in the startup test procedure. These limits are based on keeping the loads on piping and suspension components within safe limits. If any one of the transducers indicates that these movements have been exceeded, the test is placed on hold.

Operating Vibration - Level 1 limits on piping ~~acceleration and~~ displacement are prescribed in Table 14.2-4 and in the startup test procedure. These limits are based upon keeping piping stresses and pipe-mounted equipment ~~(accelerations)~~ DISPLACEMENTS within safe limits. If any one of the transducers indicates that the prescribed limits are exceeded, the test is placed on hold.

Level 2

Operating Transients - Transducers have been placed near points of maximum anticipated movement. Where movement values have been predicted, tolerances are prescribed for differences between measurements and predictions. Tolerances are based on instrument accuracy and suspension free play. Where no movements have been predicted, limits on displacement have been prescribed. Allowable movements or movement tolerances for each transducer are prescribed in Table 14.2-3 and in the startup test procedure. 5

Operating Vibration - Acceptable levels of operating vibration are prescribed in Table 14.2-4 and in the startup test procedure. The evaluation criteria CONSISTS OF ~~take two forms:~~ limits on vibratory displacement. ~~and limits on acceleration.~~ The limits have been set, based on consideration of analysis, operating experience, and protection of pipe-mounted components.

14.2.12.3.30 Test Number 35 - Recirculation System Flow Calibration 5

1. Test Objective

The purpose of this test is to perform complete calibration of the installed recirculation system flow instrumentation.

2. Prerequisites

The appropriate preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

During the testing program at operating conditions which allow the recirculation system to be operated at rated flow at power, the loop and core flow instrumentation are adjusted to provide correct flow indication based on jet pump flow and other parameters. After the relationship between drive flow and core flow is established, the flow biased

4. Acceptance Criteria

Level 1

Not applicable.

Level 2

The temperature at the tube side of the nonregenerative heat exchangers does not exceed 130°F in any mode.

The pump available NPSH during the hot standby mode is equal to or greater than that defined in the process diagrams.

The cooling water supplied to the nonregenerative heat exchangers is within the flow and outlet temperature limits indicated in the GE process diagrams. (This is applicable to normal and blowdown modes.)

14.2.12.3.32 Test Number 71 - Residual Heat Removal System 5

1. Test Objective

The purpose of this test is to demonstrate the ability of the RHR system to a) remove heat from the reactor system so that the refueling and nuclear system servicing can be performed, and b) condense steam while the reactor is isolated from the main condenser.

2. Prerequisites

The appropriate preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

With the reactor at HEAT UP OR Test Condition 1, the condensing mode of the RHR system is tuned and demonstrated. Condensing heat exchanger performance characteristics are demonstrated. Final demonstration of the condensing mode is done from an isolated condition. During the first suitable reactor cooldown, the shutdown cooling mode of the RHR system is demonstrated. 13

13

4. Acceptance Criteria

Level 1

Not applicable.

Level 2

5 The RHR system is capable of operating in the suppression pool cooling mode and shutdown cooling mode at the flow rates and temperature differentials specified by the GE process diagrams.

The RHR system is capable of operating in the steam condensing mode (with both one and two heat exchangers) at the flow rates indicated on the GE process diagrams.

5 14.2.12.3.33 Test Number ~~72~~ 103 - Drywell Atmosphere Cooling System

1. Test Objective

The purpose of this test is to verify the ability of the drywell atmosphere cooling system to maintain test conditions in the drywell during operating conditions and post-scram conditions.

2. Prerequisites

The appropriate preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

During heatup and power operation, data is taken to ascertain that the drywell ~~atmospheric conditions~~ TEMPERATURE ~~are~~ IS within test limits.

4. Acceptance Criteria

Level 1

Not applicable.

Level 2

The drywell cooling system maintains drywell air temperature ~~and humidity~~ at or below the values specified by the Technical Specifications.

14.2.12.3.34 Test Number ~~75~~ 105 - Penetration Temperatures Test

1. Test Objective

The purpose of this test is to demonstrate the ability of the concrete to remain cool around selected high temperature pipe penetrations in the containment wall. 5

2. Prerequisites

The APPROPRIATE preoperational tests are complete; the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been installed and calibrated.

3. Test Procedure

The penetration temperature test consists of measuring ~~sleeved or guard pipe~~ COLLAR penetration temperatures surrounding selected main steam and reactor water cleanup piping penetrations in the ~~auxiliary building.~~ SHIELD BUILDING WALL. Measurements from temperature sensors are taken at rated reactor temperatures. ~~at several power levels.~~

4. Acceptance Criteria

Level 2

5 ~~The guard pipe temperature adjacent to selected containment penetrations~~ do~~es~~ not exceed the predicted value for normal plant operation which corresponds to a maximum concrete temperature of 200°F.

THE PENETRATION COLLAR TEMPERATURES ADJACENT TO THE SHIELD BUILDING CONCRETE

TABLE 14.2-1

THERMAL EXPANSION EVALUATION CRITERIA

Transducer	Level 2 Tolerance (in)	Level 1 Tolerance (in)	Transducer	Level 2 Tolerance (in)	Level 1 Tolerance (in)	LOCATION ~~Alignment~~ 2
SAM & SDM-1			SBM & SCM-1			Along axis of main steam pipe near MSIVs
-2			-2			Perpendicular to SRV discharge pipe
-3			-3			Vertical
-4			-4			Aligned along axis of SRV discharge
SAM-5 only			N/A			Vertical near safe end
SAM-6 only			N/A			Vertical RCIC line
SAM-7 only	Later*	Later*	N/A	Later*	Later*	Normal to shield wall near RCIC isolation
RAM-1			RBM-1			Along recirc. pipe axis
-2			-2			Vertical
-3			-3			Normal to pipe axis horizontal plane
RAM-4			RBM-4			Tangent to shield wall
-5			-5			Normal to shield wall
-6			-6			Tangent to shield wall
-7			-7			Vertical
-8			-8			Normal to shield wall

DELETE AND REPLACE WITH REVISED TABLE

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*These data will be provided in the startup test procedure and in a later amendment. See the response to Question 210.62 on page Q&R 3.9-23.

13

TABLE 14.2-1

THERMAL EXPANSION EVALUATION CRITERIA

Transducer	Level 2 Tolerance (in)	Level 1 Tolerance (in)	Transducer	Level 2 Tolerance (in)	Level 1 Tolerance (in)	Location
SA2-MX	-2.035/-1.679	-2.561/-1.153	SD2-MX	-2.035/-1.679	-2.391/-1.323	Along axis of main steam pipe near MSIV's
SA6-MX	-2.100/-1.843	-2.525/-1.417	SD6-MX	-2.089/-1.832	-2.264/-1.657	Perpendicular to SRV discharge pipe
SA6-MY	0.655/0.279	0.786/0.159	SD6-MY	0.666/0.281	0.957/-0.010	Vertical
SA6-MZ	1.030/0.799	1.488/0.341	SD6-MZ	-1.041/-0.810	-1.479/-0.372	Aligned along axis of SRV discharge
SA7-MY	2.142/1.954	2.312/1.784	NA	NA	NA	Vertical near shield wall
SA8-MY	1.145/0.888	3.310/-1.277	NA	NA	NA	Vertical RCIC line
SA9-MZ	-1.906/-1.613	-3.683/0.164	NA	NA	NA	Normal to shield wall RCIC line
SB2-MX	-2.046/-1.646	-3.440/-0.252	SC2-MX	-2.046/-1.646	-3.440/-0.52	Along axis of main steam pipe near MSIV's
SB6-MX	-2.301/-2.085	-3.077/-1.310	SC6-MX	-2.301/-2.085	-3.077/-1.310	Perpendicular to SRV discharge pipe
SB6-MY	1.058/0.673	1.679/0.052	SC6-MY	1.058/0.673	1.679/0.052	Vertical
SB6-MZ	-1.722/-1.423	-2.866/-0.279	SC6-MZ	1.722/1.423	2.866/0.279	Aligned along axis of SRV discharge
RA1-MY	0.417/0.230	0.703/-0.056	RB1-MY	0.417/0.230	0.703/-0.056	Recirc. vertical
RA2-MZ	0.877/0.630	1.954/-0.446	RB2-MZ	-0.877/-0.630	-1.954/-.446	Recirc. normal to shield wall
RA3-MX	0.509/0.322	3.262/-2.431	RB3-MX	-0.509/-0.322	-3.262/2.431	Discharge Valve
RA3-MZ	0.566/0.309	3.171/-2.306	RB3-MZ	-0.566/-0.309	-3.171/2.306	Discharge Valve
RA5-MX	-0.306/-0.556	4.000/-4.000	RB5-MX	0.306/0.556	-4.000/4.000	Pump Discharge
RA5-MY	-1.454/-1.850	4.000/-4.000	RB5-MY	-1.454/-1.850	4.000/-4.000	Vertical Pump
RA5-MZ	0.008/-0.314	1.267/-1.573	RB5-MZ	-0.008/0.314	-1.267/1.573	Pump Discharge
RA6-MZ	-1.006/-0.818	-1.761/-0.063	RB6-MZ	1.006/0.818	1.761/0.063	Tangent to shield wall (Suction)

TABLE 14.2-2

TEMPERATURE TRANSDUCERS

Transducer				Test Temperature
A	B	C	D	Range (°F)
SAT-1	SBT-1	SCT-1	SDT-1	70-561
SAT-2	SBT-2	SCT-2	SDT-2	70-561
SAT-3	-	-	-	70-561
RAT-1	RBT-1	-	-	70-528
-	RBT-2	-	-	70-125

DELETE
AND
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WITH
REVISED
TABLE

NOTE: Actual transducer locations to be determined at site prior to fuel loading.

TABLE 14.2-2

TEMPERATURE TRANSDUCERS

Transducer				Test Temperature Range (°F)
A	B	C	D	
SA1-T	SB1-T	SC1-T	SD1-T	50-550
SA5-T	SB5-T	SC5-T	SD5-T	50-550
SA10-T	-	-	-	50-550
RA4-T	RB4-T	-	-	50-550
-	RB7-T	-	-	50-550

NOTE: ACTUAL TRANSDUCER LOCATIONS TO BE DETERMINED AT SITE PRIOR TO FUEL LOADING.

TABLE 14.2-3

PIPING VIBRATION
OPERATING TRANSIENTS

Transducer	Displacement Level 2 Tolerance	Displacement Level 1 Tolerance	Transducer	Displacement Level 2 Tolerance	Displacement Level 1 Tolerance	LOCATION ~~Alignment~~

DELETE AND REPLACE WITH REVISED TABLE

These data will be provided in the startup test procedure and in a later amendment.

See the response to Question 210.62 on page Q&R 3.9-23. 13

TABLE 14.2-3

PIPING VIBRATION OPERATING ~~VIBRATION~~ TRANSIENTS

Transducer	Displacement Level 2 Tolerance (in)	Displacement Level 1 Tolerance (in)	Transducer	Displacement Level 2 Tolerance (in)	Displacement Level 1 Tolerance (in)	Location
SA3-S	$101x10^{-6}\frac{in}{in}$	$903x10^{-6}\frac{in}{in}$	SA4-S	$101x10^{-6}\frac{in}{in}$	$903x10^{-6}\frac{in}{in}$	Loop A SRV Sweepolet
SA11-S	$25x10^{-6}\frac{in}{in}$	$1122x10^{-6}\frac{in}{in}$	SA12-S	$25x10^{-6}\frac{in}{in}$	$1122x10^{-in}\frac{}{in}$	Loop A Main Steam Pipe
SB3-S	$101x10^{-6}\frac{in}{in}$	$935x10^{-6}\frac{in}{in}$	SB4-S	$101x10^{-6}\frac{in}{in}$	$935x10^{-6}\frac{in}{in}$	Loop B SRV Sweepolet
SC3-S	$101x10^{-6}\frac{in}{in}$	$935x10^{-6}\frac{in}{in}$	SC4-S	$101x10^{-6}\frac{in}{in}$	$935x10^{-6}\frac{in}{in}$	Loop C SRV Sweepolet
SD3-S	$104x10^{-6}\frac{in}{in}$	$933x10^{-6}\frac{in}{in}$	SD4-S	$104x10^{-6}\frac{in}{in}$	$933x10^{-6}\frac{in}{in}$	Loop D SRV Sweepolet
SA6-DX	±.033 in	±.961 in	SD6-DX	±.037 in	±1.017 in	Loop A/D Main Steam Line
SA6-DY	±.032 in	±.848 in	SD6-DY	±.034 in	±.889 in	Loop A/D Main Steam Line
SA6-DZ	±.030 in	± 848 in	SD6-DZ	±.031 in	±.889 in	Loop A/D Main Steam Line
SA8-DY	±.057 in	±1.871 in	N/A	N/A	N/A	RC1C Vertical
SA9-DX	±.030 in	±1.116 in	N/A	N/A	N/A	RC1C Normal to shield wall
SB6-DX	±.041 in	±2.048	SC6-DX	±.041 in	±2.048 in	Loop B/C Main Steam Line
SB6-DY	±.036 in	±1.736	SC6-DY	±.036 in	±1.736 in	Loop B/C Main Steam Line
SB6-DZ	±.044 in	±2.071	SC6-DZ	±.044 in	±2.071 in	Loop B/C Main Steam Line
RA3-DX	±.030 in	±.476 in	RB3-DX	±.030 in	±.476 in	Loop A/B RECIRC
RA3-DZ	±.030 in	±.406 in	RB3-DZ	±.030 in	±.406 in	Loop A/B RECIRC
RA5-DX	±.030 in	±.240 in	RB5-DX	±.030 in	±.240 in	Loop A/B RECIRC
RA5-DY	±.030 in	±.348 in	RB5-DY	±.030 in	±.348 in	Loop A/B RECIRC
RA5-DZ	±.030 in	±.296 in	~~RB5-MZ~~ RB5-DZ	±.030 in	±.296 in	Loop A/B RECIRC
RA7-S	$\pm14x10^{-6}\frac{in}{in}$	$889x10^{-6}\frac{in}{in}$	RA8-S	$14x10^{-6}\frac{in}{in}$	$889x10^{-6}\frac{in}{in}$	Loop A RECIRC Strain Gages
RA9-S	$23x10^{-6}\frac{in}{in}$	$1116x10^{-6}\frac{in}{in}$	RA10-S	$23x10^{-6}\frac{in}{in}$	$1116x10^{-6}\frac{in}{in}$	Loop A RECIRC Strain Gages

TABLE 14.2-4

PIPING VIBRATION
OPERATING VIBRATION

Transducer	Acceleration Level 2 Tolerance	Acceleration Level 1 Tolerance	Displacement Level 2 Tolerance	Displacement Level 1 Tolerance	LOCATION ~~Alignment~~

DELETE AND REPLACE
WITH REVISED TABLE

These data will be provided in the startup test procedure and in a later amendment. See the response to Question 210.62 on page Q&R 3.9-23. | 13

TABLE 14.2-4

PIPING VIBRATION OPERATING ~~VIBRATION~~ TRANSIENTS

Transducer	Displacement Level 2 Tolerance (in)	Displacement Level 1 Tolerance (in)	Transducer	Displacement Level 2 Tolerance (in)	Displacement Level 1 Tolerance (in)	Location
SA3-S	$82x10^{-6}\frac{in}{in}$	$164x10^{-6}\frac{in}{in}$	SA4-S	$82x10^{-6}\frac{in}{in}$	$164x10^{-6}\frac{in}{in}$	Loop A SRV Sweepolet
SA11-S	$47x10^{-6}\frac{in}{in}$	$95x10^{-6}\frac{in}{in}$	SA12-S	$47x10^{-6}\frac{in}{in}$	$95x10^{-6}\frac{in}{in}$	Loop A Main Steam Pipe
SB3-S	$81x10^{-6}\frac{in}{in}$	$162x10^{-6}\frac{in}{in}$	SB4-S	$81x10^{-6}\frac{in}{in}$	$162x10^{-6}\frac{in}{in}$	Loop B SRV Sweepolet
SC3-S	$81x10^{-6}\frac{in}{in}$	$162x10^{-6}\frac{in}{in}$	SC4-S	$81x10^{-6}\frac{in}{in}$	$162x10^{-6}\frac{in}{in}$	Loop C SRV Sweepolet
SD3-S	$82x10^{-6}\frac{in}{in}$	$164x10^{-6}\frac{in}{in}$	SD4-S	$82x10^{-6}\frac{in}{in}$	$164x10^{-6}\frac{in}{in}$	Loop D SRV Sweepolet
SA6-DX	±.050 in	±.100 in	SD6-DX	±.033 in	±.065 in	Loop A/D Main Steam Line
SA6-DY	±.040 in	±.080 in	SD6-DY	±.028 in	±.055 in	Loop A/D Main Steam Line
SA6-DZ	±.050 in	±.100 in	SD6-DZ	±.020 in	±.040 in	Loop A/D Main Steam Line
SA8-DY	±.070 in	±.140 in	N/A	N/A	N/A	RCIC Vertical
SA9-DX	±.020 in	±.040 in	N/A	N/A	N/A	RCIC Normal to shield wall
SB6-DX	±.065 in	±.130 in	SC6-DX	±.065 in	±.130 in	Loop B/C Main Steam Line
SB6-DY	±.063 in	±.125 in	SC6-DY	±.063 in	±.125 in	Loop B/C Main Steam Line
SB6-DZ	±.018 in	±.180 in	SC6-DZ	±.018 in	±.180 in	Loop B/C Main Steam Line
RA3-DX	±.032 in	±.065 in	RB3-DX	±.032 in	±.065 in	Loop A/B RECIRC
RA3-DZ	±.033 in	±.065 in	RB3-DZ	±.033 in	±.065 in	Loop A/B RECIRC
RA5-DX	±.030 in	±.060 in	RB5-DX	±.030 in	±.060 in	Loop A/B RECIRC
RA5-DY	±.039 in	±.078 in	RB5-DY	±.039 in	±.078 in	Loop A/B RECIRC
RA5-DZ	±.044 in	±.088 in	RB5-DZ	±.044 in	±.088 in	Loop A/B RECIRC
RA7-S	$163x10^{-6}\frac{in}{in}$	$326x10^{-6}\frac{in}{in}$	RA8-S	$163x10^{-6}\frac{in}{in}$	$326x10^{-6}\frac{in}{in}$	Loop A RECIRC Strain Gages
RA9-S	$163x10^{-6}\frac{in}{in}$	$326x10^{-6}\frac{in}{in}$	RA10-S	$163x10^{-6}\frac{in}{in}$	$326x10^{-6}\frac{in}{in}$	Loop A RECIRC Strain Gages

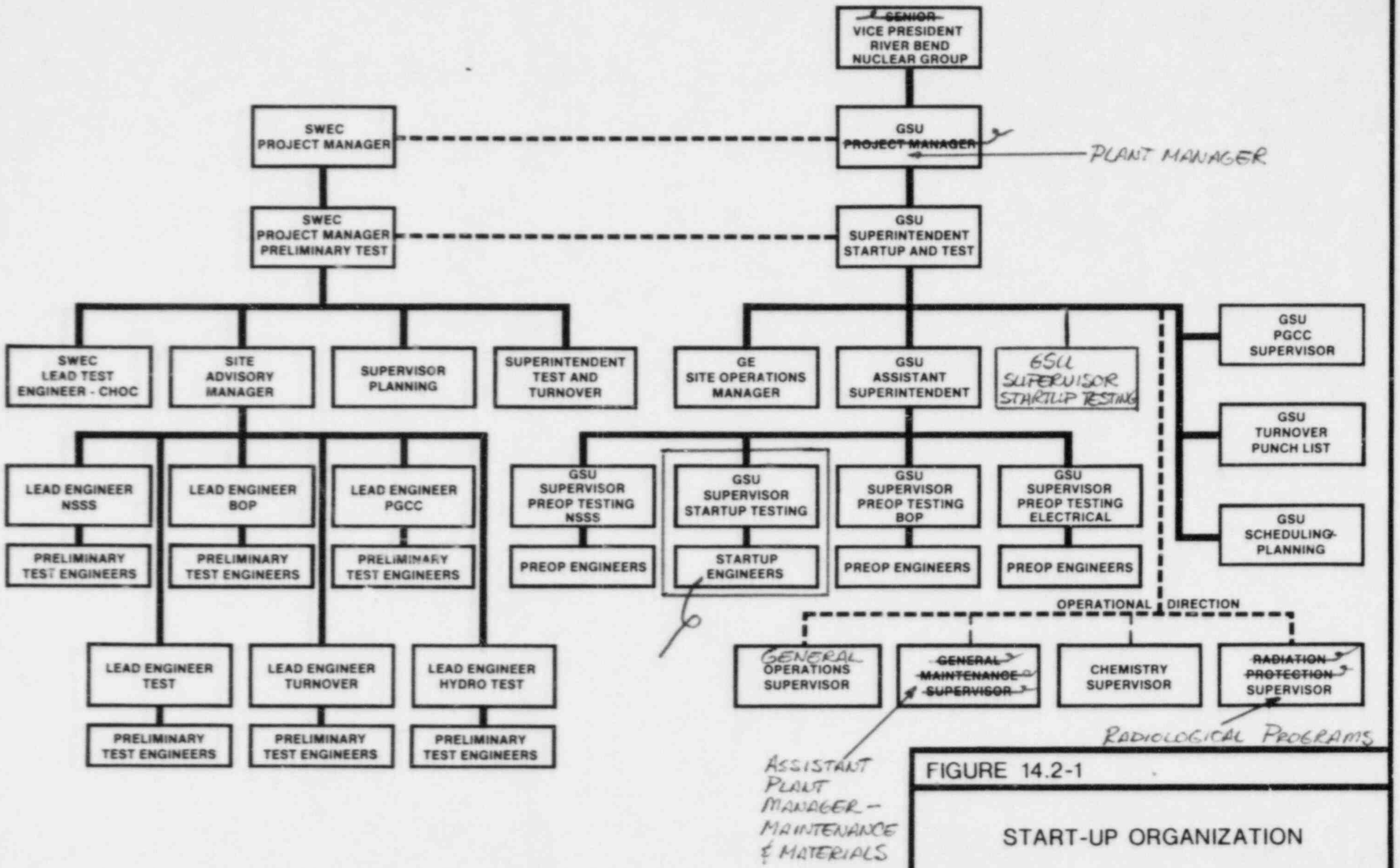

FIGURE 14.2-1

START-UP ORGANIZATION

RIVER BEND STATION
FINAL SAFETY ANALYSIS REPORT

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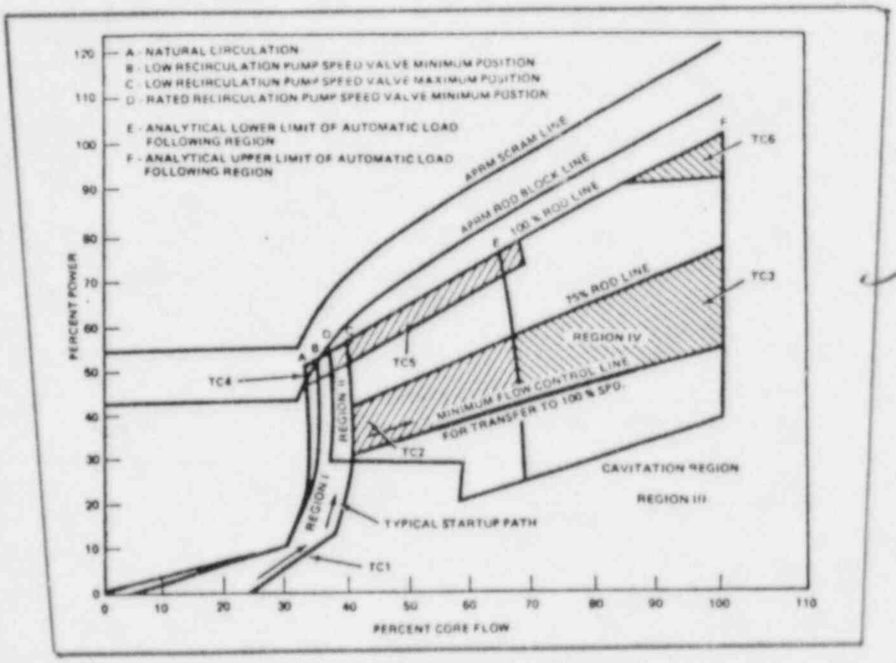


TEST CONDITION (TC) REGION DEFINITIONS

TEST CONDITION (TC)	POWER FLOW MAP REGION AND NOTES
1	From 5 to 20 percent thermal power and operating on recirculation pump low frequency power supply.
2	After main generator synchronization from ~~50~~ 45 percent to 75 percent control rod lines. At or below the analytical lower limit of master flow control mode.
3	From ~~50~~ 45 to 75 percent control rod lines above 80 percent core flow, and within maximum allowed recirculation control valve position.
4	On the natural circulation core flow line with +5 percent of the intersection with the 100 percent power rod line.
5	From the 100 percent loadline to 5 percent below the 100 percent loadline and between maximum flow at rated recirculation pump speed (minimum vlave position) to 5 percent above the analvtical lower limit of the automatic flow control range.
6	Within 0 to 5 percent rated 100 percent thermal power, and within ~~[illegible]~~ 0 TO +5 % percent of rated 100 percent core flow rate.

FIGURE 14.2-4

START-UP & TEST
CONDITION FLOW MAP

RIVER BEND STATION
FINAL SAFETY ANALYSIS REPORT

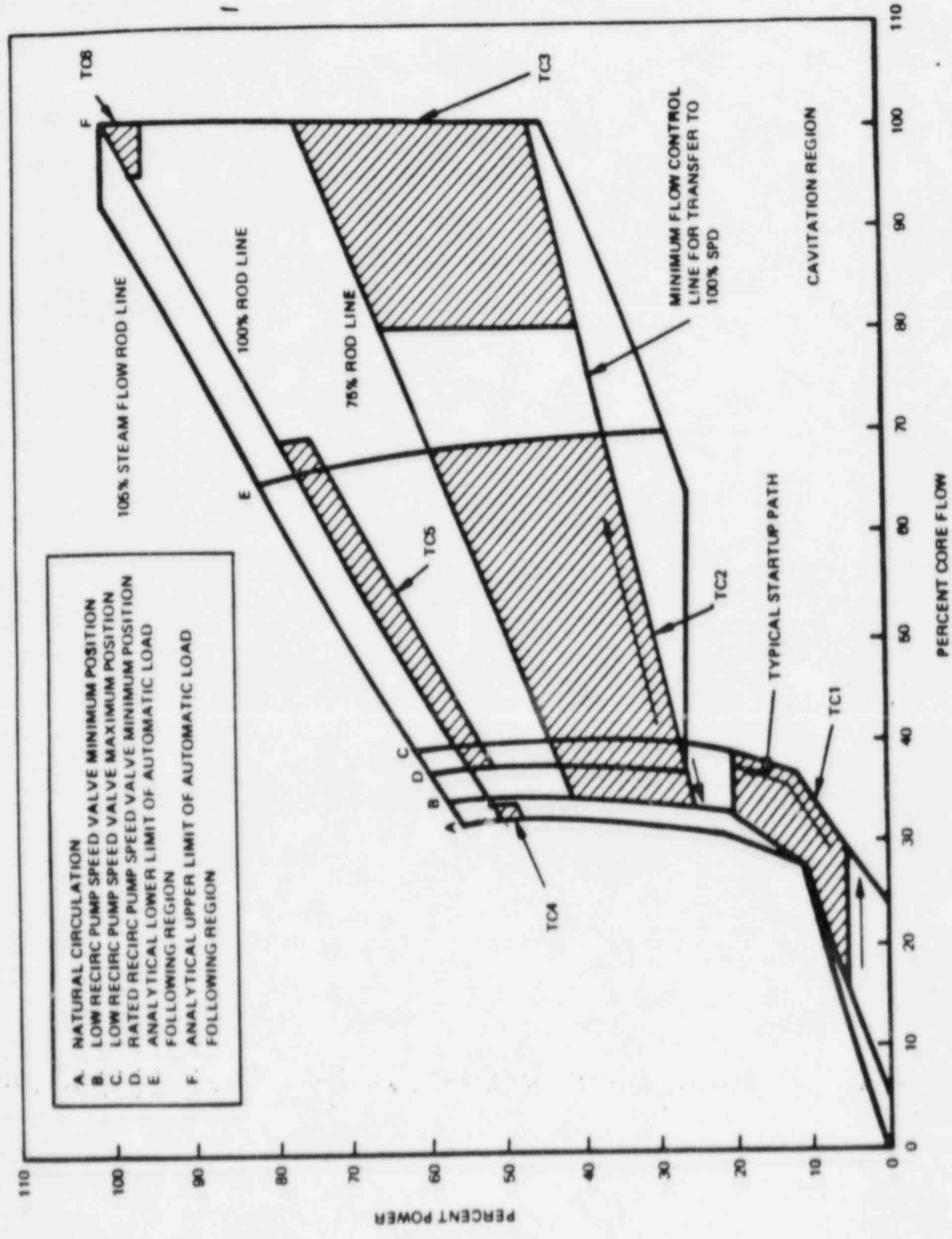


Figure 1. Power Flow Operating Map

SRM PERFORMANCE

WATER LEVEL

FUNCTIONAL

TEST(2) NO	TEST NAME	OPEN VESSEL	HEAT UP	TEST CONDITIONS 1	2	3	4	5	6	WARRANTY
1	CHEMICAL AND RADIOCHEMICAL	X	X	X	~~X~~	X		~~X~~	X(24)	
2	RADIATION MEASUREMENT	X	X	X	~~X~~	X		~~X~~	X	X
3	FUEL LOADING	X								
4	FULL CORE SHUTDOWN MARGIN	X								
5	CONTROL ROD DRIVE SYSTEM	X	X	X(3)	~~$X^{(3)}$~~	$X^{(3)}$			$X^{(3)}$	
6	~~SRM PERF AND CONTROL ROD SEQUENCE~~	X	~~X~~	~~X~~						
10	IRM PERFORMANCE		X	X						
11	LPRM CALIBRATION		X(24)	X(25) ←		X			X	
12	APRM CALIBRATION		X	X	X	X		X	X	~~X~~
13	PROCESS COMPUTER	X	X	$X^{(4)}$				~~X~~	~~X~~	
14	RCIC SYSTEM		X	X(26)	X(26)					
16A	SELECTED PROCESS TEMPERATURES		X	~~X~~	~~X~~	X(5)	~~$X^{(5)}$~~		X(5)	
16B	WATER LEVEL REF. LEG TEMPS		X	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	X	
17	SYSTEM EXPANSION		X	X(27) ←		X(27)				
18	~~CORE POWER DISTRIBUTION~~ TIP UNCERTAINTY					X			X	~~X~~
19	CORE PERFORMANCE			X	X	X	X	X	X	~~X~~
20	STEAM PRODUCTION									X
21	CORE POWER-VOID MODE RESPONSE				~~X~~		X	X		
22	PRESSURE REGULATOR ~~SETPOINT CHANGES~~			X	X	$X^{(7)}$	X	X	$X^{(6)}$	
~~22~~	~~PRESSURE REGULATOR BACKUP REGULATOR~~			~~X~~	~~X~~	~~$X^{(7)}$~~	~~X~~	~~$X^{(7)}$~~	~~$X^{(6)}$~~	
23A	~~FEEDWATER SYS~~/SETPOINT CHANGES		~~X~~		X	X	X	X	X	
23B	FEEDWATER SYS-LOSS OF FW HEATING								$X^{(9)}$	
23C	FEEDWATER SYS-PUMP TRIP								X	
23D	FEEDWATER SYS-MAX RUNOUT CAPABILITY					~~X~~			X(12)	
24	TURBINE VALVE SURVEILLANCE					X		$X^{(10)}$	$X^{(11)}$	
25A	MSIV ~~FUNCTION~~ TEST		X	X(4)	$X^{(23)}$(15)			X(28)	X(11)	
25B	~~FULL REACTOR ISOLATION~~ MSIV FULL CLOSURE								X	
25C	MAIN STEAM LINE FLOW VENTURI CALIB					X		~~X~~	X(12)	
25D	MAIN STEAM LINE ELBOW TAP CALIB.					X		~~X~~	X(12)	
26	RELIEF VALVES		X		$X^{(15)}$				~~$X^{(16)}$~~	
27	TURBINE TRIP AND GENERATOR LOAD REJECTION			←	$\boxed{X^{(17)}}$	$X^{(18)}$			$X^{(19)}$	
28	SHUTDOWN FROM OUTSIDE CONTROL ROOM			X						
29	RECIRCULATION FLOW CONTROL	X		X	$X^{(15)}$	X		$X^{(10)}$	~~X~~	
30A	RECIRCULATION SYSTEM-ONE PUMP TRIP					X			X	
30B	RECIRCULATION SYSTEM-TWO PUMP TRIP					X				
30C	RECIRCULATION SYSTEM PERFORMANCE				~~X~~	X(15)	~~X~~		X(12)	
30D	RECIRCULATION SYTEM-PUMP RUNBACK					~~X~~				
30E	RECIRCULATION SYSTEM CAVITATION				X	X				
31	LOSS OF TURB. GENERATOR & OFFSITE PWR				X					
33	DRYWELL PIPING VIBRATION		X	X	~~$X^{(20)}$~~	$X^{(20)}$			$X^{(20)}$	
35	RECIRCULATION SYSTEM FLOW CALIBRATION					X			X	
70	REACTOR WATER CLEANUP SYSTEM		X							
71	RESIDUAL HEAT REMOVAL SYSTEM		~~X~~ ←	$X^{(21)}$		~~X~~			$X^{(22)}$	
103 ~~72~~	DRYWELL ATMOSPHERE COOLING SYSTEM		X		~~X~~	~~X~~			X	
105 ~~76~~	PENETRATION TEMPERATURE		X	~~X~~		~~X~~			~~X~~	

NOTES

(1) TEST CONDITIONS REFER TO CONDITIONS STATED ON FIGURE 14.2-4 OF THE FSAR

(2) TEST NUMBER INFERS THE SECTIONS NUMBERS OF SECTION 14.2.12.3 OF THE FSAR

(3) PERFORM TEST 5, TIMING OF 4 SLOWEST CONTROL RODS IN CONJUNCTION WITH EXPECTED SCRAMS

(4) TO BE COMPLETED BETWEEN TEST CONDITIONS 1 AND 3

(5) AFTER RECIRC PUMP TRIPS

(6) DOWN SETPOINT ONLY

(7) NU BYPASS VALVE RESPONSE

(8) ~~DEMONSTRATE RECIRC SYSTEM RUNBACK SCRAM AVOIDANCE~~ NO CONTROL VALVE RESPONSE

(9) BETWEEN 80 AND 90 POWER

(10) BETWEEN TEST CONDITIONS 5 AND 6, BETWEEN 70 AND 90 POWER

(11) AT MAXIMUM POWER THAT WILL NOT CAUSE SCRAM

(12) ~~BETWEEN TEST CONDITIONS 1 AND 3~~ ON ASCENSION TO TEST CONDITION

(13) BETWEEN 40 AND 55 POWER

(14) BETWEEN 60 AND 85 POWER

(15) BETWEEN TEST CONDITIONS 2 AND 3

(16) GREATER THAN 75 POWER, FULL ISOLATION

(17) GENERATOR LOAD REJECTION, WITHIN BYPASS SYSTEM CAPACITY

(18) TURBINE TRIP SCRAM, 60 TO 80 POWER AT > 95 CORE FLOW

(19) TURBINE TRIP OR GENERATOR LOAD REJECT

(20) AT STEADY STATE AND IN CONJUNCTION WITH ~~TEST NUMBERS 24 AND 27~~ NOTE

(21) DEMONSTRATION OF STEAM CONDENSING

(22) AFTER TRIP OR COOLDOWN FROM TEST CONDITION 6

(23) SINGLE VALVE

~~(24) LOW LOW SET LOGIC FUNCTION TEST~~

(24) MAY BE DIFFERRED UNTIL WARRANTY

(25) RESPONSE CHECK ONLY

(26) REFERS TO RCIC COLD QUICK STARTS ONLY

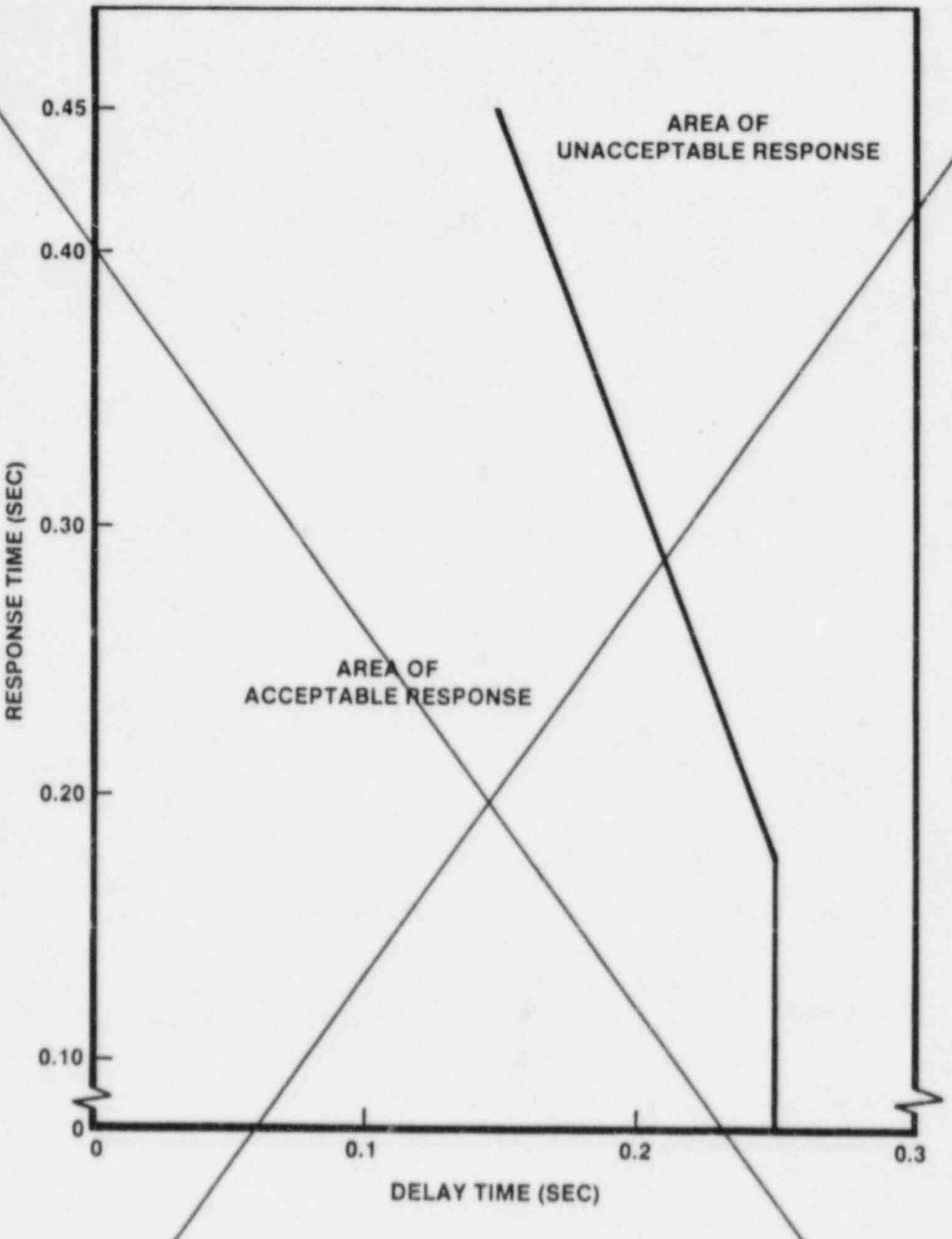
(27) INSPECTION AFTER 2ND AND 3RD THERMAL CYCLE

(28) MAY BE DONE AT TEST CONDITION 3 INSTEAD

FIGURE 14.2-5

STARTUP TEST PROGRAM

RIVER BEND STATION
FINAL SAFETY ANALYSIS REPORT



DELETE
THIS
FIGURE

FIGURE 14.2-8

RECIRCULATION FLOW STEP
CHANGE - ACCEPTANCE CRITERIA

RIVER BEND STATION
FINAL SAFETY ANALYSIS REPORT