PECO Energy Company
Limerick Generating Station

Unit 2

Startup Report

Cycle 4

Preparation Directed By:
J. A. Muntz, Director - Site Engineering

Prepared By:
P. A. Gardner, Reactor Engineer

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LIMERICK GENERATING STATION
POWER RERATE
STARTUP TEST PROGRAM PLAN

1.0 EXECUTIVE SUMMARY

This Startup Test Report is submitted to the Nuclear Regulatory Commission (NRC) in accordance with the requirements of Limerick Generating Station (LGS) Technical Specification 6.9.1.1. The report summarizes the startup testing performed on LGS Unit 2 following implementation of Power Rerate during the 2R03 Refueling Outage. Power Rerate was implemented in accordance with Amendment of the Facility Operating License No. NPF-85 and Operating License Change Request No. 93-24-0 (Unit 1 will be re-rated upon completion of the next refueling outage 1R06 currently scheduled for 1996).

The result of Power Rerate is an increase in reactor power equal to 5% of the original rated thermal power. All testing identified within the LGS Updated Final Safety Analysis Report (UFSAR) Chapter 14.2 was addressed and evaluated for applicability to this increased licensed power rating as required by Technical Specifications.

The Reactor Mode Switch was placed in the Startup position on February 17, 1995. The final synchronization to the grid was performed on February 19, 1995, marking the official end to the Unit 2 third refueling outage. The new 100% power (3458 MWth/1163 MWe) was first achieved on February 24, 1995. All required Rerate Startup Tests were completed by March 2, 1995.

There were 12 Special Procedures (SP's) written and performed in combination with various Surveillance Tests (ST's) described in this report, to successfully achieve the new rating. No adjustments were required to control systems for the following plant systems: EHC - Pressure Regulator, Feedwater, Recirculation, Reactor Core Isolating Cooling (RCIC), or High Pressure Coolant Injection (HPCI). All systems performed in a stable manner during the plant startup and during transient testing. The unit is operating very well at rerated conditions.

2.0 PURPOSE

This Startup Test Report summarizes the testing performed on Limerick Generating Station (LGS) Unit 2 following the implementation of Power Rerate. The result of Power Rerate is an increase in reactor power equal to 5% of the original rated thermal power. All testing identified within the LGS Updated Final Safety Analysis Report (UFSAR) Chapter 14.2 was addressed and evaluated for applicability to this increased licensed power rating as required by Technical Specification 6.9.1.1. The Rerate Startup Test Program Plan documents these evaluations and describes in detail the tests performed for Power Rerate. Each test performed for Power Rerate is described herein, including the test purpose, description, acceptance criteria and results. This report is submitted in accordance with the requirements of Technical Specification 6.9.1.1.

3.0 PROGRAM DESCRIPTION

The power rerate startup testing requirements were developed primarily from the review of Chapter 14.2 of the LGS UFSAR, Section 10.3 of the GE Power Rerate Safety Analysis Report for Limerick 1 & 2, and the GE Power Rerate Project Rerate Confirmation Test Program. The results of this testing determined the unit's ability to operate at the rerated power level. The testing was conducted following the third refueling outage for Unit 2.

The majority of testing can be summarized into the following categories:

1) Verifying control systems (Feedwater, EHC - Pressure Regulator, and Recirculation) are stable at rerate conditions.

2) Verifying high pressure injection systems (Reactor Core Isolation Cooling, High Pressure Coolant Injection) operate acceptably at rerated pressures.

3) Data collection for comparison to original plant rated conditions (Radiation Surveys, Thermal Performance and Plant Steady State Data).

4) Turbine Control and Stop Valve Testing to determine adequate and safe power levels for future surveillance performances.

Test conditions at which the testing was performed are defined below. All testing with a Test Condition (TC) must be completed prior to proceeding to the subsequent test condition. Reactor core flow can be any flow within the safe operating region of the power/flow map (Figure 1) that will produce the required power level.

Test Condition	Rerate Power Level	Rerate Mwt
1	<85%	<2939
2	85-86%	2939-2974
3	90-91%	3112-3147
4	95-96%	3285-3320
5	97-98%	3354-3388
6	99-100%	3423-3458

All testing within a Test Plateau must be completed and approved by the Startup Test Director, prior to increasing power to the subsequent Test Plateau. Rerate Startup Test Plateaus are defined below.

Test Plateau A (≤91%) - Includes TC-1,2&3. Reactor Thermal Power cannot exceed 91%.

Test Plateau B (≤96%) - Includes TC-4. Reactor Thermal Power cannot exceed 96%.

Test Plateau C (≤98%) - Includes TC-5. Reactor Thermal Power cannot exceed 98%.

Test Plateau D (≤100%) - Includes TC-6. Reactor Thermal Power cannot exceed 100%.

4.0 ACCEPTANCE CRITERIA

Level 1 acceptance criteria normally relates to the value of a process variable assigned in the design of the plant, component systems or associated equipment. If a Level 1 criteria is not satisfied, the plant will be put in a suitable hold condition until resolution is obtained. Tests compatible with this hold condition may be continued. Following resolution, applicable tests must be repeated to verify that the requirements of the Level 1 criteria are now satisfied.

Level 2 criterion is associated with expectations relating to the performance of systems. If a Level 2 criterion is not satisfied, operating and testing plans would not necessarily be altered. Investigation of the measurements and the analytical techniques used for the predictions would be started.

Any acceptance criteria failure must be documented on a Test Exception Report (TER).

5.0 RERATE STARTUP TEST PROGRAM SUMMARY

The test program began when the Mode Switch was placed in startup on February 17, 1995 and ended with all required Rerate Startup Tests complete on March 2, 1995. The unit was synchronized to the grid on February 19, 1995, marking the official end to the Unit 2 third refueling outage. The new rerated 100% power (3458 Mwt) was first achieved on February 24, 1995.

In general, the unit operates very well at the rerated conditions. No adjustments were required to control systems for the following: EHC - Pressure Regulator, Feedwater, Recirculation, Reactor Core Isolation Cooling (RCIC), or High Pressure Coolant Injection (HPCI). All systems performed in a stable manner.

Data collected at rerated conditions showed that the 5% increase in reactor power has little, if any, effect on reactor water chemistry and radiological conditions throughout the plant.

All Rerate Startup Tests were performed satisfactorily during the startup from 2R03 Refueling Outage. Table 3 identifies all of the required Rerate Startup Tests and the Test Condition in which each test was performed. There were no Test Exceptions throughout the test program, no Level 1 or Level 2 test failures.

Through startup testing, it has been determined that the Turbine Stop Valve test can be performed at 100% Rerated Power. In addition, it has been determined that Turbine Control Valve testing can be performed at 90% Rerated Power. These numbers have been revised into the appropriate Surveillance Tests.

NOTE: One February 21, 1995 at 0308 hours, while waiting for Thermal Performance Test to start, a full scram was received for both Limerick units. No testing was in progress at the time and the cause was determined to be from an instability on the grid. The unit was kept hot and was restarted shortly thereafter. Since the cause was unrelated to the startup test program on Limerick Unit 2, the unit was brought back to 95% thermal power (TC-4) at 0400 hours on February 24, 1995 and testing recommenced at this time.

6.0 TESTING REQUIREMENTS

Each of the tests listed in LGS UFSAR Chapter 14.2 were evaluated for applicability to power rerate. Section 6.1 lists the tests (numbered as designated in the UFSAR) not required to be performed for power rerate and the reasons for each determination. Section 6.2 lists the tests (again numbered as designated in the UFSAR) which are required for power rerate. A description of the specific testing to be performed is included. Table 1 identifies the UFSAR tests and their applicability to power rerate. Testing required to be performed for power rerate will be identified with the same numbering as used in the Initial Startup Program. Table 3 summarizes the testing to be performed and the test conditions for each test performance.

6.1 UFSAR Chapter 14.2 Tests Not Required For Power Rerate

6.1.1 Test 3 - Fuel Loading

The purpose of this test is to load fuel safely and efficiently to the full core size. Fuel loading is performed in accordance with FH-605, Core Component Transfer Authorization, during every refueling outage. During the 2R03 outage, fuel will be loaded in accordance with FH-605. Power rerate has no impact on this evolution; therefore, no additional testing is required.

6.1.2 Test 6 - SRM Performance and Control Rod Sequence

This test demonstrated that the operational sources, source range monitoring (SRM) instrumentation, and rod withdrawal sequences provide adequate information to the operator during startup. Technical Specifications and plant procedures ensure proper SRM response during startup. This test does not need to be repeated for rerate.

This test demonstrated the ability to achieve criticality in a safe and efficient manner for each of the two withdrawal sequences and determined the effect of rod motion on reactor power at various operating conditions. The manner in which criticality is achieved is not changed by power rerate. The methods in place do not use 2 sequences. The current withdraw sequence is performed in accordance with Banked Position Withdraw Sequence. The rod patterns for intermediate power levels up to rerated power will be evaluated using a three dimensional simulator code. Performance of this test is not required.

6.1.3 Test 9 - Water Level Reference Leg Temperature

For LGS the difference in length between the reference legs and the variable legs of water level instrumentation is very small, making correction for the small increase in drywell temperatures negligible, therefore this test is not required to be repeated for power rerate.

6.1.4 Test 10 - IRM Performance

The purpose of this test was to adjust the intermediate range monitors (IRMs) to obtain optimum overlap with the SRMs and average power range monitors (APRMs). Technical Specifications and plant procedures ensure proper IRM response during startup. This test does not need to be repeated for rerate.

6.1.5 Test 13 - Process Computer

The purpose of this test was to verify the performance of the process computer under plant operating conditions. The process computer was fully tested at plant operating conditions during the Initial Startup Test Program. The functions of the process computer are not changed due to power rerate so no additional testing is required.

6.1.6 Test 16 - Selected Process Temperatures

This test established the minimum recirculation pump speed to maintain water temperature in the bottom head of the reactor vessel within 145°F of reactor coolant saturation temperature as determined by reactor pressure. This test also provided assurance that the measured bottom head drain line thermocouple was adequate to measure bottom head coolant temperature during normal operations. Temperature stratification limits are defined within Technical Specifications. This testing is not required for power rerate.

6.1.7 Test 17 - System Expansion

This test verified that reactor drywell piping and major equipment were unrestrained with regard to thermal expansion. Analysis was performed for rerate conditions with results showing that the piping systems are acceptable for power rerate. No further testing is required.

6.1.8 Test 20 - Steam Production

The objective of this test was to operate continuously at rated reactor conditions to demonstrate that the NSSS provided steam at a sufficient rate and quality. This was the initial warranty run which is not applicable to power rerate.

6.1.9 Test 23 - Feedwater

Test 23 had five objectives. The first was to demonstrate reactor water level control. The second was to evaluate and adjust feedwater controls. The third objective demonstrated the capability of automatic flow runback feature to prevent a low water level scram following a single feedwater pump trip. The fourth objective demonstrated adequate response to feedwater heater loss. The final objective demonstrated general reactor response to inlet subcooling changes.

These objectives were demonstrated through the performance of three different tests during the initial startup. The tests that will be performed as part of power rerate are included in Section 6.2.12. The tests that are not required for power rerate are described below.

The loss of feedwater heating test demonstrates adequate response to loss of feedwater heating. This event is caused by isolation of the steam extraction line to the feedwater heater. During this transient, the maximum feedwater temperature decrease is required to be ≤ 100°F, and the resultant MCPR shall be greater than the fuel thermal safety limit. Analysis has been performed for rerate conditions assuming the maximum allowed feedwater temperature decrease of 100°F. The results showed the thermal and mechanical overpowers for this event meet the fuel design criteria at rerate conditions. Based on the rerate heat balance, a loss of feedwater heating would not result in a greater than 100°F decrease in final feedwater temperature; therefore, this test is not required to be performed for power rerate.

6.1.9 TEST 23 - Feedwater (Continued)

The feedwater pump trip test demonstrates the capability of the automatic core flow runback feature to prevent low water level scram following the trip of one feedwater pump. One feedwater pump is tripped and the automatic recirculation runback circuit acts to drop power within the capacity of the remaining feedpumps. This has already been demonstrated at Limerick at MELLLA conditions from full power on Unit 1. Data from this evolution was reviewed and it has been determined that adequate margin exists for rerate conditions. G.E. has evaluated one feedwater pump trip and determined that it will not cause a reactor scram with the recirculation runback pump speed set at 42%. Therefore, this test will not be reperformed.

6.1.10 Test 25 - Main Steam Isolation Valves

Test 25 had three objectives. The first was to functionally check the MSIVs for proper operation at selected power levels. The second objective determined the reactor transient behavior during and following simultaneous full closure of all MSIVs. The third was to determine the isolation valve closure times. Large transient testing performed at high power during the Initial Startup demonstrated the adequacy for protection for these large transients. Analysis has shown that for these transients at rerate conditions the change in unit performance is small, thus testing the unit's response to full closure of the MSIVs at rerate power level is not required. MSIV functional checks will be performed. See Section 6.2.13 for details.

6.1.11 Test 26 - Main Steam Relief Valves

This test verified proper operation of the dual purpose relief/safety valves including determination of their capacity and verification of their leaktightness following operation. The valve capacity is not affected by rerate. The setpoints for these valves are being increased for rerate. The new setpoints will be set and tested. This test does not need to be performed for power rerate.

6.1.12 Test 27 - Turbine Trip and Generator Load Rejection Demonstration

This test demonstrated the response of the reactor and its control systems to protective trips in the turbine and generator. Large transient testing performed at high power during the Initial Startup demonstrated the adequacy for protection for these large transients. Analysis has shown that for these transients at rerate conditions the change in unit performance is small, thus testing the unit's response to turbine and generator trips at rerate conditions is not required.

6.1.13 Test 28 - Shutdown From Outside the Control Room

This test demonstrated the ability to shut down the reactor from normal steady state operating conditions to the point where cooldown is initiated and under control with reactor pressure and water level controlled from outside the control room. Power rerate does not change the capability of the reactor to be shut down from outside the control room; therefore, a repeat of this test is not required.

6.1.14 Test - 30 Recirculation System

The first objective of this testing was to determine the transient responses and steady state conditions following recirculation pump trips and to obtain jet pump performance data. The second objective was to calibrate the jet pump flow instrumentation. The recirculation system calibration was performed as Startup Test #35 which will be performed as part of rerate testing (see Section 6.4.2).

6.1.14 Test - 30 Recirculation System (Continued)

Test 30 determined the transient response during recirculation pump trips, flow coastdown, and pump restarts. Power rerate does not affect the ability of the recirculation system to respond acceptably to these transients as demonstrated during the initial Startup Test Program so no further testing is required.

6.1.15 Test 31 - Loss of Turbine-Generator and Off-Site Power

The objectives of this test were to demonstrate proper performance of the reactor and the plant electrical equipment and systems and to verify that safety systems initiate and function properly without manual assistance during the loss of auxiliary power transient. Power rerate will not change the ability of the electrical systems to function properly during a loss of main turbine-generator and offsite power. The ability of HPCI and RCIC to function properly at rerate conditions will be demonstrated (see Sections 6.2.7 and 6.2.8) during the power ascension to rerate conditions; therefore, this test is not required.

6.1.16 Test 33 - Piping Steady-State Vibration Measurements

This test determined the vibration characteristics of reactor internals and recirculation loops induced by hot two-phase forces. Analysis performed shows that the net impact from power rerate is small and considered negligible. This test is not required to be repeated for power rerate.

6.1.17 Test 34 - Offgas System Performance Verification

The purpose of this test during initial startup was to demonstrate that the Offgas System operates within Technical Specifications. Power Rerate has been determined to be a minimal impact on this system and therefore no additional testing outside of normal Technical Specifications is required.

6.1.18 Test 36 - Piping Dynamic Transient

The objective of the original test was to show that piping vibrations in the Main Steam Inside Containment, Reactor Recirculation and various other systems were acceptable during selected dynamic transients. The small increase in initial power level from power rerate will not significantly change the response of this piping to dynamic transients, thus this test is not required for power rerate.

6.2 UFSAR Chapter 14.2 Tests Recommended For Power Rerate

6.2.1 Test 1 - Chemical and Radiochemical

Purpose: The primary objective of this test is to maintain control and knowledge about the quality of the reactor coolant chemistry.

Description: Chemical and radiochemical samples will be taken in accordance with plant procedures at the original 100 % power level and at the rerate 100% power level.

Level 1 Criteria

Per ST-5-041-800-2 and ST-5-041-885-2

Level 2 Criteria

None

Results:

Rerate Chemistry Results

PARAMETER	ACTUAL DATA (95%)	ACTUAL DATA (100%)	ACCEPTANCE CRITERIA
Primary Rx Coolant Iodine	1.26×10^{-3}	1.86×10^{-3}	≤0.2 uCi/gm
Primary Rx Coolant Conductivity	0.134	0.117	≤1.0
Primary Rx Coolant Ph	6.82	6.87	≥5.6 to ≤8.6
Primary Rx Coolant Chloride	0.24	0.29	≤200

ST-5-041-800-2 and ST-5-041-855-2 Reactor Coolant Chemistry and Dose Equivalent Iodine -131 respectively were both performed satisfactorily at 95 and 100% rerated power. All acceptance criteria were satisfied.

6.2.2 Test 2 - Radiation Measurements

Purpose: This test measures radiation levels at selected locations and power conditions to assure the protection of plant personnel and continuous compliance with guideline standards of 10CFR20 during plant operation.

6.2.2 Test 2 - Radiation Measurements (Continued)

Description: Radiation levels will be measured at various locations in the plant at rerated power levels of 90% and 100% in accordance with GP-2 App. 6.

Level 1 Criteria

Radiation doses of plant origin and occupancy times of personnel in radiation zones shall be controlled consistent with the guidelines of the standards for protection against radiation outlined in 10CFR20 NRC General Design Criteria.

Level 2 Criteria

None

Results: Radiation Surveys were conducted at rerated power levels of 90 and 100% in accordance with GP-2 Appendix 6, Normal Plant Startup - Health Physics. Essentially, the dose rates are the same as those experienced at the original power levels. No postings were changed as a result of achieving the rerate 100% power level. Radiation dose rates remain within the standards for protection against radiation outlined in 10CFR20 NRC General Design Criteria thus meeting the test criteria.

6.2.3 Test 4 - Full Core Shutdown Margin

Purpose: This test demonstrates that the reactor will be subcritical throughout the fuel cycle with any single control rod fully withdrawn.

Description: Shutdown margin demonstrations shall be performed in accordance with ST-6-107-875-2 Shutdown Margin Determination.

Level 1 Criteria

Shutdown margin is ≥0.38% (delta K)/K + R.

6.2.3 Test 4 - Full Core Shutdown Margin (Continued)

Level 2 Criteria

None

Results: For Unit 2 Cycle 4, the required shutdown margin must be greater than 0.38% (delta K)/K + R, where R is equal to 0.26% (delta K)/K. Therefore, the calculated shutdown margin for Cycle 4 must be greater than 0.640% (delta K)/K.

As Unit 2 reached criticality, data was collected to calculate Shutdown Margin in accordance with ST-6-107-875-2, Shutdown Margin Determination. Cycle 4 shutdown margin was determined to be 1.58% (delta K)/K. This satisfies the Level 1 Acceptance Criteria.

6.2.4 Test 5 - Control Rod Drives

Purpose: This testing demonstrates that the control rods meet Technical Specification requirements for scram times.

Description: Scram timing of control rods shall be performed in accordance with ST-3-107-790-2, CRD Scram Timing.

Level 1 Criteria

Per ST-3-107-790-2

Level 2 Criteria

None

6.2.4 Test 5 - Control Rod Drives (Continued)

Results: Scram Time Testing was performed for all control rods during the Operational Hydrostatic Test (Ops Hydro) at rerated pressure. All Level 1 Acceptance Criteria per ST-3-107-790-2, CRD Scram Timing, were satisfied and are shown below.

Scram Timing Results

Position Inserted from Fully Withdrawn	Acceptance Criteria 1	Acceptance Criteria 2	Test Results (seconds)
45	0.43	0.45	0.299
39	0.86	0.92	0.588
25	1.93	2.05	1.287
05	3.49	3.70	2.319

Acceptance Criteria 1: Avg. scram insertion time from fully withdrawn position for all control rods.

Acceptance Criteria 2: Avg. scram insertion time from fully withdrawn position for the 3 fastest control rods in each group of 4 control rods in a 2 by 2 array.

6.2.5 Test 11 - LPRM Calibration

Purpose: The purpose of this test is to calibrate the local power range monitors (LPRMs).

Description: The LPRM channels will be calibrated to make the LPRM readings proportional to the neutron flux in the narrow-narrow water gap at the chamber elevation. This calibration will be performed in accordance with ST-3-074-505-2, TIP Calibration of LPRMS.

<u>Level 1 Criteria</u>

Per ST-3-074-505-2

<u>Level 2 Criteria</u>

None

6.2.5 Test 11 - LPRM Calibration (Continued)

Results: Using ST-3-074-505-2, TIP Calibration of LPRMs, all operable LPRMs were successfully calibrated. LPRM Gain Adjustment Factor values for all operable LPRM channels were greater than or equal to 0.90 and less than or equal to 1.10, as required.

6.2.6 Test 12 - APRM Calibration

Purpose: The purpose of this test is to calibrate the average power range monitors (APRMs).

Description: Each APRM channel reading will be adjusted to be consistent with the core thermal power as determined from the heat balance. This calibration will be performed in accordance with ST-6-107-887-2, APRM Gain Determination and Adjustment.

<u>Level 1 Criteria</u>

APRMs are correctly set to calculated APRM setting.

<u>Level 2 Criteria</u>

None

Results: APRM Calibrations or Gain Adjustments were performed during each Test Condition (1 through 6) during the Rerate Startup Test Program. Each performance of ST-6-107-887-2 APRM Gain Determination and Adjustment, was completed satisfactorily. No problems were encountered during these tests.

6.2.7 Test 14 - Reactor Core Isolation Cooling System

Purpose: This testing will verify proper operation of the Reactor Core Isolation Cooling (RCIC) System at the rerate operating pressure and provide baseline data for future surveillance testing. Data obtained during the rated pressure quick start test will be analyzed to verify the margin to trip on RCIC Turbine Speed following a quick start to satisfy SIL 377 commitment.

6.2.7 Test 14 - RCIC System (Continued)

Description: At 150 psig, as part of the normal plant startup, ST-6-049-320-2, RCIC Operability Verification (or the appropriate Special Procedure), will be performed to demonstrate adequate control of the turbine and rated flow capability.

Using the current controller settings, a condensate storage tank (CST) injection is performed at ≥ 920 psig to demonstrate acceptable operation at the lower end of the operating pressure range for power rerate and to provide a benchmark to which future surveillance tests are compared. This demonstration will be performed using ST-6-049-230-2, RCIC Pump, Valve and Flow Test" (or the appropriate Special Procedure). A stability check of the RCIC system will be performed in accordance with station procedures or the appropriate Special Procedure.

At rerate operating pressure, a cold quick start is performed in accordance with S49.1.D, RCIC System Full Flow Functional Test (or the appropriate Special Procedure). Following the quick start, system stability shall be demonstrated by introducing small step disturbances in flow demand in accordance with station procedures or the appropriate Special Procedure. As part of the analysis of the RCIC quick start at rated conditions, the margin to trip on RCIC turbine speed will be measured to determine if the recommended modification of SIL 377 is needed.

Level 1 Criteria

1. The system shall deliver rated flow (600 gpm) in less than or equal to 30 seconds from the automatic initiation at any reactor pressure between 150 psig and rated pressure at rerate conditions.

2. The RCIC turbine shall not trip or isolate during auto or manual starts.

NOTE: If any Level 1 criteria are not met, the reactor will only be allowed to operate up to a restricted power level defined by Figure 2 until the Level 1 criteria are met. Consult Technical Specifications for other actions to be taken.

Level 2 Criteria

1. To provide an overspeed and isolation trip avoidance margin, the transient start first and subsequent speed peaks shall not be more than 5% faster than rated RCIC turbine speed.

2. The speed and flow control loops shall be adjusted so that the decay ratio of any RCIC system related variable is not greater than 0.25.

Results: At 150 psig, SP-146, Unit 2 RCIC Operability Verification for Power Rerate, was performed satisfactorily. The purpose of this test was to verify RCIC Operability at 150 psig and verify time to rated flow falls within 30 seconds. Tech Spec minimum for rated flow is 600 gpm and actual was 680 gpm. Time to rated flow was 24 seconds thus satisfying all criteria.

With reactor pressure at approximately 940 psig, the RCIC Pump, Valve and Flow Test, ST-6-049-230-2, was performed satisfactorily. The RCIC turbine did not trip, greater than 600 gpm was achieved with discharge pressure greater than 80 psig above reactor pressure in less than 30 seconds, thus satisfying all Level 1 acceptance criteria. All speed peaks were less than 4803.75 rpm satisfying the Level 2 criterion.

Section 7.3 of SP-146, Unit 2 RCIC Operability Verification for Power Rerate, was performed satisfactorily at 100% Rerated Power Level. A cold quick start was performed and stability was checked. RCIC pump flow was 600 gpm at a pressure of 1220 psig and time to rated flow was 18 seconds with an initial speed spike of 2000 rpm. No tuning was needed and the system ran smoothly. Decay ratios were zero. All Level 1 and 2 acceptance criteria was satisfied.

6.2.8 Test 15 - High Pressure Coolant Injection System

Purpose: This test will verify proper operation of the High Pressure Coolant Injection (HPCI) System at the rerate operating pressure and provide baseline data for future surveillance testing.

Description: At 200 psig, as part of the normal plant startup, ST-1-055-800-2, HPCI Response Time (or the appropriate Special Procedure), will be performed to demonstrate adequate control of the turbine and rated flow capability.

Using the current controller settings, a condensate storage tank (CST) injection is performed at 920 psig to demonstrate acceptable operation at the lower end of the operating pressure range for power rerate and to provide a benchmark to which future surveillance tests are compared. This demonstration will be performed using ST-6-055-230-2, HPCI Pump, Valve and Flow (or the appropriate Special Procedure). A stability check of the HPCI system will be performed in accordance with station procedures or the appropriate Special Procedure.

At rerate operating pressure, a cold quick start is performed in accordance with S55.1.D, Full Flow Functional Operating Procedure (or the appropriate Special Procedure). Following the quick start, system stability shall be demonstrated by introducing small step disturbances in flow demand in accordance with station procedures or the appropriate Special Procedure.

<u>Level 1 Criteria</u>

1. The system shall deliver rated flow (5600 gpm) in less than or equal to 30 seconds from the automatic initiation at any reactor pressure between 200 psig and rated pressure at rerate conditions.

2. The HPCI turbine shall not trip or isolate during auto or manual starts.

6.2.8 Test 15 - HPCI System (Continued)

Level 2 Criteria

1. To provide an overspeed and isolation trip avoidance margin, the transient start first speed peak shall not be within 15% (of rated turbine speed) of the overspeed trip, and subsequent speed peaks shall not be more than 5% faster than rated HPCI turbine speed.

2. The speed and flow control loops shall be adjusted so that the decay ratio of any HPCI system related variable is not greater than 0.25.

Results: At 200 psig, SP-145, Unit 2 HPCI Operability Verification for Power Rerate, was performed satisfactorily. The purpose of this test was to verify HPCI operability at 200 psig and verify time to rated flow falls within 29.5 seconds. Tech Spec minimum flow is 5600 gpm and actual was 5600 gpm at a discharge pressure of 410 psig. Turbine speed was 4000 rpm and the turbine did not trip. Time to rated flow was 23.5 seconds thus satisfying all Level 1 and Level 2 criterion.

At 960 psig, ST-6-055-230-2, HPCI Pump, Valve and Flow, was completed satisfactorily. The following acceptance criteria were met:

Rated Flow	5600	Actual 5600 gpm
Rated Pressure	1040 psig	Actual 1300 psig
Response Time	29.5 sec	Actual 19 sec

No speed requirements were exceeded. The speed and flow control loops did not need any adjustment and decay ratio was less than 0.25 thus satisfying all test criterion.

SP-145, Unit 2 HPCI Operability Verification for Power Rerate, was performed satisfactorily at 100% Rerated Power. A cold quick start was performed in conjunction with a stability (tuning) check. No turbine trip or isolation were received and the following test acceptance criteria was met:

Rated Flow	5600	Actual 5600
Rated Pressure	1040	Actual 1150
Decay Ratio	≤.25	Actual ≤.25
Response Time	≤29.5 sec	Actual 27.5 sec

6.2.8 Test 15 - HPCI System (Continued)

The transient start peak speed did not exceed the limit of 4609 rpm and subsequent peaks were less than maximum allowable 4400 rpm. All Level 1 and 2 acceptance criteria were met.

6.2.9 Test 18 - TIP Uncertainty

Purpose: This test confirms the reproducibility of the traversing incore probe system (TIPS) readings, determines the core power distribution in three dimensions, and determines core symmetry.

Description: This test is performed in accordance with RT-3-074-850-0, Core Power Symmetry and TIP Reproducibility.

Level 1 Criteria

None

Level 2 Criteria

Per RT-3-074-850-0

Results: RT-3-074-850-0, Core Power Symmetry and TIP Reproducibility, was performed satisfactorily at full power. Reactor Power distribution data was collected by repeatedly traversing the core axially with gamma tips. This data was collected and forwarded to the Fuel and Services Division for analysis. The results are below:

Random Noise Component (%)	Geometric Component (%)	Total Tip Uncertainty (%)
0.58%	0.96%	1.12%

Thus the requirement of total tip uncertainty to be ≤7.1% was satisfied.

6.2.10 Test 19 - Core Performance

Purpose: This test evaluates the core performance parameters to assure plant thermal limits are maintained during the ascension to rerate conditions.

Description: As power is increased along a constant rod pattern line, core thermal power will be measured near 90% rerated power and at each 3% increment up to 100% rerate power, using the current plant methods of monitoring reactor power.

6.2.10 Test 19 - Core Performance (Continued)

Demonstration of fuel thermal margin will be performed prior to and during power ascension at each 3% increment up to the rerated power level. Fuel thermal margin will be projected to the next test point to show expected acceptable margin, and will be satisfactorily confirmed by the measurements taken at each test point before advancing to the next increment.

This demonstration and on-going monitoring of core and fuel conditions will be performed in accordance with ST-6-107-885-2, Thermal Limits (or the appropriate Special Procedure).

Level 1 Criteria

The following thermal limits are ≤ 1.000:

1. CMFLPD (Core Maximum Fraction of Limiting Power Density)
2. CMFCP (Core Maximum Fraction of Critical Power)
3. CMAPR (Core Maximum Average Planar Ratio)

Level 2 Criteria

None

Results: While thermal limits are continuously monitored during power ascension ST-6-107-885-2, Thermal Limits, was performed at each test condition satisfactorily thus meeting all acceptance criteria.

	Rerate Power Level			
Thermal Limit	89%	95%	98%	100%
MFLCPR	.824	.870	.862	.907
MFLPD	.773	.879	.888	.910
MAPRAT	.804	.900	.883	.908

6.2.11 Test 22 - Pressure Regulator

Purpose: This test has three objectives.

1. To confirm the adequacy of the settings for the pressure control loop by analysis of the transients induced in the reactor pressure control system by means of the pressure regulators.

2. To demonstrate the backup capability of the pressure regulators via simulated failure of the controlling pressure regulator.

3. To demonstrate that other affected parameters are within acceptable limits during pressure induced transient maneuvers.

Description: During TC-1 and TC-2, the following step inputs will be made to the pressure regulator:

1. -3 psi
2. +3 psi
3. -5 psi
4. +5 psi
5. -10 psi
6. +10 psi

When this testing is complete for one pressure regulator, transfer is made to the other pressure regulator, and the steps shall be repeated. Transfer back to the original pressure regulator is accomplished through simulated failure of the controlling pressure regulator. Transfer between pressure regulators by normal transfer and by simulated failure demonstrate that these events are survivable and well-behaved.

Average main steam line flow versus pressure regulator output is taken in increments of 2% power during the power ascension to 100% rerate power. The variation in the slope of the curve plotted on linear graph paper must show that the incremental regulation is within the criteria. If the requirements are not met, the control valve function generator break points will have to be adjusted.

6.2.11 Test 22 - Pressure Regulator (Continued)

Level 1 Criteria

The transient response of any pressure control system related variable to any test input must not diverge.

Level 2 Criteria

1. Pressure control system related variables may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response must be less than or equal to 0.25. (This criterion does not apply to tests involving simulated failure of one regulator with the backup regulator taking over.)

2. The pressure response time from initiation of pressure setpoint change to the turbine inlet pressure peak shall be ≤ 10 seconds.

3. Pressure control system deadband, delay, etc., shall be small enough that steady state limit cycles (if any) shall produce steam flow variations no larger than +0.5% of rated steam flow.

4. The peak neutron flux and/or peak vessel pressure shall remain below the scram settings by 7.5% and 10 psi respectively for all pressure regulator transients.

5. The variation in 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) shall meet the following:

% of Steam Flow Obtained With Valves Wide Open	Variation
0 to 85%	≤ 4:1
85% to 97%	≤ 2:1
85% to 99%	≤ 5:1

6. Turbine control valves 1, 2, and 3 must be full open when the fourth valve is about 10% open and has full control of reactor pressure.

6.2.11 Test 22 - Pressure Regulator (Continued)

Results: Pressure regulator stability testing was performed at rerate power levels of 30% and 95%. The data obtained during each test condition is summarized below. The system response to all size step changes at each power level was excellent. There were no signs of divergence or oscillations. Decay ratios were zero for all step changes. Pressure response time and margins to scram setpoints were satisfactory in all cases. No limit cycles were observed. All Level 1 and Level 2 acceptance criteria were satisfied.

"A" PRESSURE REGULATOR STEP CHANGE DATA

Power Level	Step (+/-)	Step Size	Peak Pressure (psig)	Pressure Response Time (sec)	Peak Power (%)	Steady State Cycles
30%	3	2.5	968	3	31	0
	5	5	968	5	33	0
	10	7.5	971	5	33	0
95%	3	3.75	1031	3	95	0
	5	6.25	1031	4	98	0
	10	10	1033	5	99	0

"B" PRESSURE REGULATOR STEP CHANGE DATA

Power Level	Step (+/-)	Step Size	Peak Pressure (psig)	Pressure Response Time (sec)	Peak Power (%)	Steady State Cycles
30%	3	2.5	968.5	4	31	0
	5	3.8	968	4	33	0
	10	7.5	971	4	34	0
95%	3	2.75	1031	3	97	0
	5	5	1031	4	98	0
	10	10	1033	4	99	0

6.2.11 Test 22 - Pressure Regulator (Continued)

Pressure Regulator failovers were performed at rerate power levels of 30% and 95%. The data obtained is summarized below. In all cases, the backup pressure regulator took control when the controlling regulator was failed. All acceptance criteria were satisfied.

Pressure Regulator A

PRESSURE REGULATOR FAILOVER DATA					
Power Level	Step Size	Peak Pressure (psig)	Pressure Response Time (sec)	Peak Power (%)	Steady State Cycles
30%	12	980	2.5	43	0
95%	16	1044	5.0	99	0

Pressure Regulator B

PRESSURE REGULATOR FAILOVER DATA					
Power Level	Step Size	Peak Pressure (psig)	Pressure Response Time (sec)	Peak Power (%)	Steady State Cycles
30%	12	979	2	44	0
95%	16	1043	5.5	99	0

Pressure Regulator Incremental Regulation Determination, SP-142, was performed in 2% power increments from main generator synchronization to full power. This data was used to calculate the pressure regulator incremented regulation. All test criteria were satisfied and are summarized below. Turbine control valves 1, 2, and 3 were full open when the fourth valve was approximately 10% open and had full control of reactor pressure.

Steam Flow Range	Incremental Regulation		Variation Max/Min	Level 2 Criteria
	Maximum	Minimum		
0% to 85%	1.64	0.66	2.48	≤4:1
85% to 97%	0.81	0.42	1.93	≤2:1
85% to 99%	0.81	0.42	1.93	≤5:1

6.2.12 Test 23 - Feedwater System

Purpose: To verify that the feedwater system has been adjusted to provide acceptable reactor water level control at rerated conditions.

Description: Reactor water level setpoint changes of approximately 3 to 6 inches will be used to evaluate and acceptably adjust, if necessary, the feedwater control system settings for power and feedwater pump modes tested. The level setpoint changes will be performed in accordance with the appropriate Special Procedure.

Level setpoint changes shall be performed at three (3) power levels: 85%, 95%, and 98%.

Total feedwater flow and Master level controller output data is taken in 3% to 5% increments to 100% rerate power. The variation in the slope of the curve plotted on linear graph paper (feedwater controller output versus total feedwater flow) must show that the incremental regulation is within the criteria.

<u>Level 1 Criteria</u>

The transient response of any level control system related variable to any test input shall not diverge.

<u>Level 2 Criteria</u>

1. Level control system related variables may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response shall be less than or equal to 0.25.

2. At steady state generation for the 3/1 element systems, the input scaling to the mismatch gain shall be adjusted such that level error due to biased mismatch gain output shall be within ± 1 inch.

3. The variation in incremental regulation (feedwater flow demand change divided by actual feedwater flow change for small disturbances) does not exceed a factor of 2 to 1 between feedwater flow demand and feedwater flow.

6.2.12 Test 23 - Feedwater System (Continued)

4. The turbine speed regulation variation between the three feedpumps must match within ± 6% of rated speed.

Results: Feedwater Stability Testing was performed at rerated power levels of 86, 95, and 98%. Two inch and five inch positive and negative level setpoint changes were input and system response was monitored. These step changes were performed in both single element and three element control. System response was not oscillatory and showed no signs of divergence. No system adjustments were required. All acceptance criteria related to system stability was satisfied.

Speed regulation tests were performed during the 2R03 outage on all three reactor feed pumps. The results are tabulated below and the turbine speed regulation variation between the three feed pumps matched within ±6% of rated speed.

	RT-1-006-331-2 OR Equivalent	RT-1-006-332-2 OR Equivalent	RT-1-006-333-2 OR Equivalent
RFPT	A RFPT	B RFPT	C RFPT
%	5.9	5.6	6.1
RPM/In.	128	120.5	133.2

The level error between single and three element level control was verified following the stability testing at 86, 95 and 98% power levels. The level never changed by more than ±1 inch on each transfer. All test acceptance criteria was satisfactory.

Feedwater controller output and feedwater flow data was collected approximately every 3-5% power during power ascension in accordance with SP-144, Feedwater Incremental Regulation Determination. Data was taken and plotted for both 2 pump and 3 pump configurations and the variation in incremental regulation was ≤2:1 for both conditions.

6.2.13 Test 24 - Main Turbine Valves Surveillance Test

Purpose: This test determines the highest power level at which surveillance testing can be performed on the Turbine Stop and Control valves without causing a reactor scram.

Description: Individual main turbine valves are tested routinely during plant operation as required for turbine surveillance testing. Turbine Stop and Control Valves shall be individually stroked at various power levels in accordance with the appropriate Special procedure to determine the highest power at which the normal surveillance testing can be performed.

Level 1 Criteria

None

Level 2 Criteria

1. Peak neutron flux must be at least 7.5% below the scram trip setting.

2. Peak vessel pressure must remain at least 10 psi below the high pressure scram setting.

3. Peak steam flow in each line must remain 10% below the high flow isolation trip setting.

Results: In order to have data from which to extrapolate, Turbine Stop Valve testing was initially performed at 85% power. APRM peaks, Main Steam line flow peaks, and Reactor High Pressure peaks were collected, graphed, and extrapolated up at power levels of 85, 88, 90, 95 and 98%. The data evaluated at 98% resulted in performing the final test at 100% rerate power, however, at slightly lower pressure (approximately 1038 psig). Under these conditions, all test criteria were satisfied and future performances will be performed by adjusting pressure set to 960 psig at a nominal 100% power. Data is summarized below.

6.2.13 Test 24 - Main Turbine Valves Surveillance Test (Continued)

Reactor High Pressure Peak

	Test Power Levels (%)				
	85	88	90	95	100
SV Test	Reactor Pressure Peak (psig)				
SV1	1024	1029	1032	1040	1047.5
SV2	1026	1032	1034	1043	1049
SV3	1025	1030	1033	1042	1048
SV4	1025	1030	1033	1042.5	1048

MSL Flow Peaks

		MSL FLOW Peak (Mlb/hr)			
SV TEST	Test Pwr	MSL A	MSL B	MSL C	MSL D
SV1	85	3.25	3.27	3.0	3.5
SV2		3.375	3.4	3.41	3.2
SV3		3.0	3.33	3.33	3.33
SV4		3.30	3.0	3.38	3.41
SV1	88	3.4	3.4	3.08	3.66
SV2		3.51	3.54	3.50	3.20
SV3		3.08	3.50	3.48	3.58
SV4		3.45	3.16	3.5	3.58
SV1	90	3.45	3.5	3.2	3.75
SV2		3.58	3.625	3.58	3.25
SV3		3.125	3.54	3.50	3.66
SV4		3.5	3.25	3.55	3.75
SV1	95	3.69	3.81	3.38	4.0
SV2		3.8	3.9	3.8	3.5
SV3		3.4	3.9	3.7	3.9
SV4		3.8	3.35	3.83	4.0
SV1	100	3.9	4.025	3.52	4.15
SV2		4.05	4.18	4.0	3.65
SV3		3.55	4.05	3.95	4.1
SV4		4.0	3.63	4.0	4.15

6.2.13 Test 24 - Main Turbine Valves Surveillance Test (Continued)

Flux Peaks

SV TEST	Test Pwr	APRM Peak (%)					
		A	B	C	D	E	F
SV1	85	87	87	87	88	87	87
SV2		87	86	86	87	85	86
SV3		86	87	87	88	87	88
SV4		86	87	87	88	86	87
SV1	88	88	87	88	88	87	88
SV2		90	88	89	90	88	89
SV3		90	88	89	90	89	89
SV4		89	88	89	89	88	89
SV1	90	90	90	90	90	90	90
SV2		91	90	91	92	90	91
SV3		92	90	92	92	90	92
SV4		90	90	90	91	90	91
SV1	95	97.7	98.6	97.7	98.2	97.3	98.2
SV2		97.7	98.2	98.2	98.2	98.8	98.6
SV3		97.3	97.7	98.6	98.5	98.5	98.5
SV4		98.2	98.6	99.5	98.7	99.5	99
SV1	100	101.8	101.3	101.6	102	101.2	101.2
SV2		101.8	101.4	101.4	101.8	100.9	101.8
SV3		101.8	100.9	101.1	101.8	100.5	100.5
SV4		102.7	102	102.7	102.7	101.8	102

6.2.13 Test 24 - Main Turbine Valves Surveillance Test (Continued)

In order to have data from which to extrapolate, Turbine Control Valve testing was initially performed at 85% power. APRM peaks, Main Steam Line flow peaks, and Reactor High Pressure peaks were collected, graphed and extrapolated up at power levels of 85, 88, and 90% power. The extrapolated values from 90% appeared marginal to perform the scheduled 95% performance, therefore, it was decided to try to run the next performance at 92% power. The 92% power test run was aborted after multiple Bypass Valves opened. A decision was made that this would not be acceptable on a monthly basis. Therefore, future performances of the Turbine Control Valve test will be performed at 90% Rerate Power where all test criteria were found acceptable. Data is summarized below.

Reactor High Pressure Peak

	Test Power Levels (%)				
	85	88	90	95	100
CV Test	Reactor Pressure Peak (psig)				
CV1	1022	1027	1032		
CV2	1024	1027	1032		
CV3	1023	1026	1032		
CV4	1017	1022	1028		

6.2.13 Test 24 - Main Turbine Valves Surveillance Test (Continued)

MSL Flow Peaks

		MSL FLOW Peal (Mlb/hr)			
CV TEST	Test Pwr	MSL A	MSL B	MSL C	MSL D
CV1	85	3.08	3.16	3.08	3.08
CV2		3.125	3.16	3.08	3.08
CV3		3.125	3.16	3.08	3.08
CV4		3.0	3.0	3.0	3.0
CV1	88	3.17	3.25	3.17	3.25
CV2		3.17	3.25	3.20	3.25
CV3		3.17	3.25	3.20	3.27
CV4		3.08	3.125	3.08	3.13
CV1	90	3.41	3.50	3.42	3.50
CV2		3.45	3.50	3.40	3.50
CV3		3.41	3.50	3.40	3.50
CV4		3.3	3.4	3.25	3.4
CV1	95				
CV2					
CV3					
CV4					
CV1	100				
CV2					
CV3					
CV4					

6.2.13 Test 24 - Main Turbine Valves Surveillance Test (Continued)

Flux Peaks

CV TEST	Test Pwr	APRM Peak (%) A	B	C	D	E	F
CV1	85	87	87	88	88	87	88
CV2		87	87	87	88	87	87
CV3		87	87	87	88	87	88
CV4		85	85	85	85	85	85
CV1	88	88	87	88	88	87	88
CV2		88	87	87	88	87	88
CV3		88	87	87	88	87	87
CV4		88	87	87	88	87	88
CV1	90	95	94	95	95	95	95
CV2		95	95	95	95	95	95
CV3		95	95	95	95	95	95
CV4		91	90	90	90	90	90
CV1	95						
CV2							
CV3							
CV4							
CV1	100						
CV2							
CV3							
CV4							

6.2.14 Test 29 - Recirculation Flow Control Demonstration

Purpose: This test demonstrates the Recirculation system flow control capability of the plant for individual local manual control operation and determines that controllers are set for desired system performance and stability.

Description: When the plant is tested along the 100% rerate power load line, the recirculation system will be tested by inserting small positive and negative steps (1% to 5% speed changes) in local manual mode to check speed loop stability at 100% rerate power.

6.2.14 Test 29 - Recirculation Flow Control Demonstration (Continued)

Level 1 Criteria

The transient response of any recirculation system related variable to any test input must not diverge.

Level 2 Criteria

1. A scram shall not occur due to Recirculation flow control maneuvers.

2. The decay ratio of any oscillatory controlled variable must be less than or equal to 0.25.

3. Steady state limit cycles (if any) shall not produce turbine steam flow variations greater than ± 0.5% of rated steam flow.

Results: The Recirculation System Flow Control was tested in accordance with the Modification Acceptance Test (MAT) 6090-2 for ARTS/MELLA. Since both tests were redundant in nature to introducing step changes in Recirc flow, they were combined. Two test conditions were established in the new operating domain of the Maximum Extended Load Line Limit (MELLA). The Recirc system was tested by introducing small positive and negative step changes (1% and 5%) in local manual mode to check loop stability. The two test conditions were approximately 97% core thermal power/88.4 mlb/hr core flow and 83% core thermal power/66 mlb/hr core flow. Plant parameter responses to the step changes were recorded and they were heavily damaged with no oscillations and no signs of divergence. All acceptance criteria were satisfied.

6.2.15 Test 35 - Recirculation and Jet Pump Instrumentation Calibration

Purpose: The purpose of this test is to perform a complete calibration of the installed recirculation system flow instrumentation including specific signals to the plant process computer.

6.2.15 Test 35 - Recirculation and Jet Pump Instrumentation Calibration (Continued)

Description: At operating conditions which allow the recirculation system to operate at the speeds required for rated flow at 100% rerate power, the jet pump flow instrumentation will be adjusted to provide correct flow indication based on the jet pump flow. The total core flow signal to the process computer will be calibrated to accurately read the total core flow. This recalibration of the recirculation system shall be performed in accordance with ST-2-043-500-2, Recirculation System Flow Calibration.

Level 1 Criteria

Per ST-2-043-500-2

Level 2 Criteria

None

Results: Core flow calibration was performed per ST-2-043-500-2, Recirculation System Flow Calibration. Data was collected and core flow calculations were performed and the M-ratio converged to ≤1.0%. Jet Pump Flow Summer Amplifier gain adjustment factors were calculated and were between 0.99 and 1.01 meeting the acceptance criteria without needing adjustments. In addition, the APRM/RBM flow unit gain adjustment factors were calculated and also did not need adjustment. All acceptance criteria were met.

6.2.16 Test 32 - Essential HVAC System Operation and Containment Hot Penetration Temperature Verification

Purpose: The purpose of this test as written for the Initial Startup Test program was to verify the ability of the Drywell Atmosphere Cooling System to maintain design conditions in the drywell during operating conditions.

Description: Drywell temperature is monitored to ensure design limits are not exceeded. There are no changes for rerate which will affect the air flow distribution inside the drywell. The calculated increase in drywell temperature resulting from rerate is 2°F. Drywell temperatures will be monitored in accordance with ST-6-107-590-2.

6.2.16 Test 32 - Essential HVAC System Operation and Containment Hot Penetration Temperature Verification (Continued)

Level 1 Criteria

Drywell temperature shall not exceed 135°F per Tech Spec 3.6.1.7.

Level 2 Criteria

None

Results: Drywell average air temperature is monitored per ST-6-107-590-2, Daily Log - Opcons 1, 2, 3. Drywell average air temperature remained ≤130° F thus meeting the acceptance criteria of ≤135° F.

6.2.17 Surveillance Testing

Surveillance testing shall be performed on all Tech Spec instrumentation requiring recalibration due to power rerate changes (i.e. setpoint change, range change, etc.). A Special Procedure will contain signoffs for all the required surveillance tests. Instrumentation required for monitoring during startup testing is addressed in Sections 7.2 and 7.3.

Results: All Surveillance Testing required for Tech Spec related instrumentation affected by power rerate changes were completed satisfactorily. A Special Procedure, SP-138, Surveillance Testing for Tech Spec Instrumentation, was written and performed to capture all of the applicable Surveillance Tests with the exception of the RBM Surveillance Tests which were performed prior to exceeding 30% power.

6.2.18 Steady State Data Collection

Steady state data of important plant parameters, as determined by the Performance and Reliability Group and Plant Engineering, shall be obtained following power rerate implementation at each incremental power increase between approximately 85.7% (90% original power) and 100% rerate power. The data taken at power levels less than 100% shall be extrapolated to predict conditions at 100% rerate power. This data collection shall be performed as a Special Procedure.

6.2.18 Steady State Data Collection (Continued)

Results: Data was collected for 156 plant parameters at Test Conditions 2 through 6. For the most part the data tracked very well. There were a few points that were generating bad data and after investigation had Equipment Trouble Tags (ETTs) filled out for them. These points were not critical and were documented with discrepancy forms in the governing data collection procedure SP-137, Steady State Data Collection. Extrapolations were made for various instruments recording Turbine first stage pressure, Total Reactor Steam flow, Reactor Feedwater temperatures and Turbine Control Valve positions. During the startup EHC pressure set was set at 960 psig, this setting achieved only 1038 psig in the Reactor Vessel during the initial rise to 100% reactor power. Subsequently, pressure set was adjusted to approximately 967 psig in order to achieve the 100% rated pressure of 1045 psig.

6.2.19 Thermal Performance

Steady state data on thermal performance parameters, as determined by the Performance and Reliability Group and Plant Engineering, will be obtained when the unit reaches original 100% power, 3293 MWt. The same data shall be collected at steady state conditions at the rerate power level of 100%, 3458 MWt.

Results: The Thermal Performance data was collected per SP-135, Thermal Performance Data Collection and Baseline for Rerated Conditions. This test was designed to baseline the Thermal Performance of Unit 2 at rerated conditions and to determine the gross/net generator electrical output change which occurs as a result of implementing power rerate. There is no acceptance criteria for this test. In an attempt to obtain true delta data for power rerate and not confuse changes due to outage work (i.e., condenser cleaning) the test was run at 3293 Mwth 1005 psig and again at 3458 Mwth 1045 psig during the power ascension testing.

This concludes the LGS Unit 2 Rerate Startup Test Report.

Prepared By: ______________________________
Rerate Startup Test Director

Reviewed By: ______________________________
Manager - Reactor Engineering

Approved By: ______________________________
Director of Site Engineering

TABLE 1 - UFSAR Chapter 14.2 Tests

UFSAR STP #	Test	Required for Rerate
1	Chemical and Radiochemical	Yes
2	Radiation Measurements	Yes
3	Fuel Loading	No
4	Shutdown Margin	Yes
5	Control Rod Drives	Yes
6	SRM Performance	No
9	Water Level Ref Temp	No
10	IRM Performance	No
11	LPRM Calibration	Yes
12	APRM Calibration	Yes
13	Process Computer (PMS)	No
14	Reactor Core Isolation Cooling	Yes
15	High Pressure Coolant Injection	Yes
16	Selected Process Temps.	No
17	System Expansion	No
18	TIP Uncertainty	Yes
19	Core Performance	Yes
20	Steam Production	No
22	Pressure Regulator	Yes
23	Feedwater System	Yes
24	Main Turbine Vlv Surv. Test	Yes
25	Main Steam Isolation Valves	No
26	Main Steam Relief Valves	No
27	Turbine Trip and Generator Load Rejection Demo	No
28	Shutdown From Outside the Main Control Room	No
29	Recirc Flow Control Demo	Yes
30	Recirculation System	No
31	Loss of Turbine-Generator and Off-Site Power	No
32	Essential HVAC Sys Oper and Hot Temp Verification	No
33	Piping Steady-State Vibration Measurements	No
34	Offgas Sys Performance Verification	No
35	Recirculation Flow Cal	Yes
36	Piping Dynamic Transient	No
70	RWCU Perf. Verification	No
71	RHR Perf. Verification	No

TABLE 2
Test Conditions

TEST CONDITION	RERATE POWER LEVEL
1	<85%
2	85%-86% (Note 2)
3	90%-91%
4	95%-96% (Note 3)
5	97%-98%
6	99%-100% (Note 4)

NOTES:

1) Reactor core flow can be any flow within the safe operating region of the power/flow map (Figure 1) that will produce the required power level.

2) Original 90% power is equal to 85.7% rerate power.

3) Original 100% power is equal to 95.23% rerate power.

4) 100% rerate power is equal to 3458 MWt.

TABLE 3 - Tests to be Performed for Power Rerate

STP #	Test Description	Test Condition					
		1	2	3	4	5	6
1	Chemical & Radiochemical				X		X
2	Radiation Measurements			X			X
4	Shutdown Margin	X					
5	CRD Scram Timing	X					
11	LPRM Calibration						X
12	APRM Calibration	X	X	X	X	X	X
14	RCIC (150#)	X					
14	RCIC (≥ 920#)	X					
14	RCIC Stability (Rerated Pressure)						X
14	RCIC Cold Quick Start						X
15	HPCI (200#)	X					
15	HPCI (≥ 920#)	X					
15	HPCI Stability (Rerated Pressure)						X
15	HPCI Cold Quick Start						X
18	TIP Uncertainty						X
19	Core Performance			X	X	X	X
22	Pressure Regulator[4]	X			X		
23	Feedwater Level Control[1]		X		X	X	
24	Turbine Stop Valve ST		X	X	X		X
24	Turbine Control Valve ST		X	X	X		X
29	Recirc. Flow Control[2]						X
35	Recirc. System Flow Calibration						X
N/A	Thermal Performance Test				X		X
N/A	I&C Surveillance Tests[3]	X					
N/A	Steady State Data Collection		X	X	X	X	X
N/A	ARTS/MELLLA MAT 6090-2						X

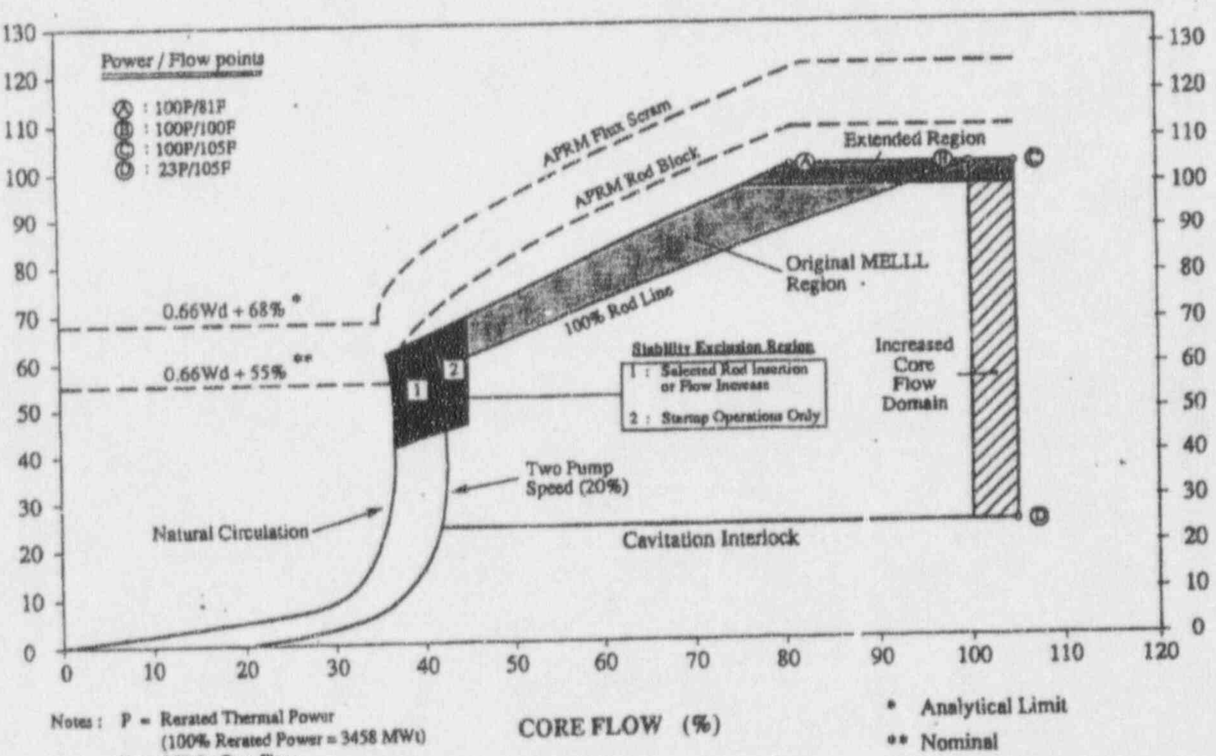
1 - Level setpoint changes will be performed three times, once each at approximate rerate power levels of 86%, 95%, and 98%.

2 - Negative speed steps only at TC 6 (100% power).

3 - These are to be performed prior to the plant condition for which the instrument is required to be operable.

4 - Pressure Regulator stability checks will be performed at approximate rerate power levels of 30% and 95%.

FIGURE 1
Rerate Power/Flow Map



Notes : P = Rerated Thermal Power
(100% Rerated Power = 3458 MWt)
F = Mlb/hr Core Flow
(100% Core Flow = 100.0 Mlb/hr)

FIGURE 2

RCIC Acceptance Criteria Curves for Capacity and Actuation