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U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Limerick Generating Station, Unit 1
Facility Operating License No. NPF-39
NRC Docket Nos. 50-352

Subject: LGS Unit 1 Startup Test Report (1R14)

This startup test report is being submitted in accordance with the requirements of the Limerick Generating Station Unit 1 Technical Specifications Section 6.9.1.1, 6.9.1.2, and 6.9.1.3. The report summarizes the startup testing performed on LGS Unit 1 following installation of fuel for Cycle 15 in the unit refueling outage (1R14).

If you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

F. A. Kearney
Vice President- LGS
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Attachment

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Limerick Generating Station

UNIT 1
CYCLE 15
STARTUP REPORT

SUBMITTED TO
THE U.S. NUCLEAR REGULATORY COMMISSION
PURSUANT TO
FACILITY OPERATING LICENSE NPF-39

May
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1.0 SUMMARY

This Startup Test Report is submitted to the Nuclear Regulator Commission (NRC) in accordance with the requirements of Limerick Generating Station (LGS) Technical Specifications (TS) 6.9.1.1 through 6.9.1.3. The report summarizes the startup testing performed on LGS Unit 1 following the installation of a fuel of different design during the fourteenth Unit 1 Refueling Outage (1R14). All testing identified within the LGS Updated Final Safety Analysis Report (UFSAR) Chapter 14.2 is addressed and evaluated for applicability as required by Technical Specifications.

The Reactor Mode Switch was placed in the startup position on March 20, 2012. The final synchronization to the grid was performed on March 23, 2012, marking the official end to the Unit 1 fourteenth refueling outage. The Unit reached full power operation (3515 MW_{th}) on March 25, 2012.

This is the first application of GNF2 fuel at LGS Unit 1. The GNF2 fuel was designed for mechanical, nuclear, and thermal-hydraulic compatibility with the currently-installed GE14 fuel. Like GE14, GNF2 has 92 fuel rods and two large central water rods in a 10x10 array. Fourteen of the fuel rods are part-length rods. Unlike GE14, the GNF2 part-length rods are two different lengths. These different lengths improve efficiency and reactivity margins. Other new design features include the improved spacer design and new fuel rod design. (The new features are proprietary information and have been submitted to the NRC by Global Nuclear Fuel – Americas (GNF-A) separately.) The Defender Debris Filter LTP is included in the design, and is consistent with the rest of the GE14 fuel already installed in the rest of the LGS1 core. This startup test report will address this core reload being the first application of the GNF2 fuel design on Unit 1.

1.1 Purpose

The Startup Test Report summarizes the testing performed on LGS Unit 1 following a change to the fuel design. All testing identified within the LGS UFSAR Chapter 14.2 is addressed and evaluated for applicability to the change to the fuel type as required by TS 6.9.1.1. Each test required for a change in fuel type is described in Section 3, including the test objective, acceptance criteria, and results. This report is submitted in accordance with the requirements of TS 6.9.1.1 through 6.9.1.3.

1.2 Acceptance Criteria

Level 1 Acceptance Criteria normally relate 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 Level 1 criteria are now satisfied.

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

1.3 Testing Requirements

Each of the tests listed in LGS UFSAR Chapter 14.2 were evaluated for applicability to change in fuel type. Section 2 lists the tests not required to be performed for a change in fuel type. All tests are numbered as designated in the UFSAR.

2.0 UFSAR Chapter 14.2 Tests Not Required

2.1 STP-9, Water Level Reference Leg Temperature

The objective of this test is to demonstrate the calibration and agreement of the installed reactor vessel water level instrumentation at normal operating pressure and temperature.

The new fuel design does not affect the performance of systems needed to satisfy the objectives of this test.

2.2 STP-13, Plant Monitoring System Performance Verification

The objective of this test is to demonstrate the ability of the Plant Monitoring System (PMS) to provide accurate information pertaining to plant process variables under operating conditions.

The PMS has been fully tested at plant operating conditions. The functions of the PMS are not changed due to change in fuel types. The process computer databank was prepared, reviewed by NF-AB-130-2540, and installed by performance of NF-AB-711-1001.

2.3 STP-14, RCIC System Performance Verification

The objectives of this test are (1) to verify the proper operation of the Reactor Core Isolation Cooling (RCIC) System over its expected operating pressure range, (2) to demonstrate reliability in automatic starting without the aid of ac power with the exception of the RCIC dc/ac inverters, and (3) to verify the operation of RCIC beyond its design basis of operation with extended loss of ac power.

The new fuel design does not affect the performance of systems needed to satisfy the objectives of this test.

2.4 STP-15, HPCI System Performance Verification

The objectives of this test are (1) to verify the proper operation of the High Pressure Coolant Injection (HPCI) System over its expected operating pressure and flow ranges, and (2) to demonstrate reliability in automatic starting from cold standby when the reactor is at rated pressure conditions.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.5 STP-16, Selected Process Temperatures Verification

The objective of this test is to assure that the measured bottom head drain temperature corresponds to bottom head coolant temperature during normal operation.

The new fuel design did not affect the performance of systems needed to satisfy the objective of this test.

2.6 STP-17, System Expansion

This test verifies that safety related piping systems and other piping systems as identified in the FSAR expand in an acceptable manner during plant heatup and power escalation. Specific objectives are to verify that: (1) piping thermal expansion is as predicted by design calculations; (2) snubbers and spring hangers remain within operating travel ranges at various piping temperatures; and (3) piping is free to expand without interference.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.7 STP-18, TIP Uncertainty

The objective of this test is to determine the reproducibility of the traversing in-core probe system readings.

The new fuel design did not affect the performance of systems needed to satisfy the objective of this test.

2.8 STP-20, Steam Production

The objective of this test is to demonstrate that the Nuclear Steam Supply System (NSSS) can provide steam sufficient to satisfy all appropriate warranties as defined in the NSSS contract.

The new fuel design did not affect the performance of systems needed to satisfy the objective of this test.

2.9 STP-22, Pressure Regulator Response

The objectives of this test are as follows:

To demonstrate optimized controller settings of the pressure control loop by analysis of the transients induced in the reactor pressure control system by means of pressure regulator setpoint changes.

To demonstrate the stability of the reactivity-void feedback loop to pressure perturbations.

To demonstrate smooth pressure control transition between the turbine control valves and the bypass valves when reactor steam generation exceeds the steam flow used by the turbine.

To demonstrate the take-over capability of the back-up pressure regulator upon failure of the controlling pressure regulator and to set spacing between the setpoints at an appropriate value.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.10 STP-23, Feedwater Control System Response

The objectives of this test are:

To evaluate and adjust feedwater controls

To demonstrate the capability of the automatic flow runback feature to prevent a low water level scram, following the trip of one feedwater pump

To demonstrate acceptable performance of feedwater pumps and turbine drivers within specifications

To demonstrate adequate response to feedwater heater loss

To demonstrate acceptable reactor water level control

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.11 STP-24, Main Turbine Valves Surveillance Test

The objectives of this test are to demonstrate acceptable procedures and maximum power levels of periodic surveillance testing of the main turbine control, stop and bypass valves without producing a reactor SCRAM.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.12 STP-25, Main Steam Isolation Valves Performance Verification

The objectives of this test are (1) to functionally check the Main Steam Isolation Valves (MSIVs) for proper operation at selected power levels, (2) to determine the MSIV closure times, and (3) to determine the maximum power level at which full closure of a single MSIV can be performed without causing a reactor SCRAM. The full isolation is performed to determine the reactor transient behavior that results from the simultaneous full closure of all MSIVs at high power level.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.13 STP-26, Main Steam Relief Valves Performance

The objectives of this test are (1) to verify that the relief valves function properly (can be manually opened and closed), (2) to verify that the relief valves reseat properly after actuation and are leak-tight, (3) to verify that there are no major blockages in the relief valve discharge piping and (4) to demonstrate system stability to relief valve operation.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.14 STP-27, Turbine Trip and Generator Load Rejection Demonstration

The objectives of this test are (1) to determine the response of the reactor system to a turbine trip or generator load rejection; and (2) to evaluate the response of the bypass, SRV, and the reactor protection systems.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.15 STP-28, Shutdown From Outside The Main Control Room Demonstration

The objectives of this test are to demonstrate that the Reactor (1) can be safely shutdown from outside the Main Control Room (MCR), (2) can be maintained in a Hot Standby condition from outside the MCR and (3) can be safely cooled from hot to cold shutdown from outside the MCR. In addition, it will provide an opportunity to demonstrate that the procedures of Remote Shutdown are clear and comprehensive and that the operational personnel are familiar with their application.

The change in fuel type does not change the capability of the reactor to be shutdown from outside the MCR. Therefore, a repeat of this test is not required.

2.16 STP-29, Recirculation Flow Control Demonstration

The objective of this test is to determine the plant response to a change in recirculation flow, to optimize the setting of the master flow controller, and to demonstrate the plant loading capability in master manual flow control mode.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.17 STP-30, Recirculation System

The objectives of this test are to:

Determine transient responses and steady-state conditions following recirculation pump trips at selected power levels.

Obtain jet pump performance data.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.18 STP-31, Loss Of Turbine-Generator and Offsite Power

This test objective is to demonstrate the performance of the reactor and plant electrical equipment and systems, during the loss of auxiliary power transient.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.19 STP-32, Essential HVAC System Operation and Containment Hot Penetration Temperature Verification

The objectives of this test are to demonstrate, under actual/normal operating conditions, that the various Heating Ventilation and Air Conditioning (HVAC) systems will be capable of maintianing specified ambient temperatures and relative humidity within the following areas:

Primary Containment (drywell suppression chamber)
Reactor Enclosure and Main Steam Tunnel
MCR
Control Enclosure
Radwaste Enclosure

In addition, this test shall verify that the concrete temperature surrounding Main Steam and Feedwater containment penetrations remains within specified limits.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.20 STP-33, Piping Steady-State Vibration Measurements

The objective of this test is to verify that the steady state vibration of NSSS, Main Steam, Reactor Recirculation and selected BOP piping systems is within acceptable limits.

The new fuel design did not affect the performance of systems needed to satisfy the objective of this test.

2.21 STP-34, Offgas System Performance Verification

The objective of this test is to verify that the Offgas System operates within the TS limits and expected operating conditions.

The new fuel design did not affect the performance of systems needed to satisfy the objective of this test.

2.22 STP-35, Recirculation Flow Calibration

The objective of this test is to perform a complete calibration of the recirculation system flow instrumentation, including specific signals to the plant monitoring system.

The new fuel design did not affect the performance of systems needed to satisfy the objective of this test.

2.23 STP-36, Piping Dynamic Transient

The objectives of this test are to verify that the following piping systems are adequately designed and restrained to withstand the following transient loading conditions:

Main Steam - Main Turbine Stop Valve/Control Valve closures at approximately 20-25%, 60-80%, and 95-100% of rated thermal power.

Main Steam and Relief Valve Discharge - Main Steam Relief Valve actuation.

Recirculation - Recirculation Pump trips and restarts.

HPCI steam supply - HPCI turbine trips.

Feedwater - Reactor feed pump trips/coastdowns.

The new fuel design did not affect the performance of systems needed to satisfy the objectives of this test.

2.24 STP-70, Reactor Water Cleanup System Performance Verification

The objective of this test is to demonstrate specific aspects of the mechanical operability of the Reactor Water Cleanup System.

The new fuel design did not affect the performance of systems needed to satisfy the objective of this test.

2.25 STP-71, Residual Heat Removal System Performance Verification

The objective of this test is to demonstrate the ability of the Residual Heat Removal (RHR) System to remove residual and decay heat from the nuclear system so that the refueling and nuclear servicing can be performed. Additionally, this test will demonstrate the ability of the RHR System to remove heat from the suppression pool.

The new fuel design did not affect the performance of systems needed to satisfy the objective of this test.

3.0 UFSAR Chapter 14.2 Tests Required

3.1 STP-1, Chemical and Radiochemical

Objectives

The principal objectives of this test are (1) to secure information on the chemistry and radiochemistry of the reactor coolant, and (2) to determine that the sampling equipment, procedures and analytical techniques are adequate to supply the data required to demonstrate that the chemistry of all parts of the entire reactor system meet specifications and process requirements, to include monitoring fuel integrity.

Discussion

There were no special chemical additions or testing completed during 1R14. Standard surveillance testing was completed as required per Technical Specifications.

Acceptance Criteria

Level 1

Chemical factors defined in the TS and fuel warranty must be maintained within specified limits. The activity of the gaseous and liquid effluents must conform to licensing limitations. Water quality must be known at all times and must remain within guidelines of water quality specifications.

Level 2

None

Results

During Startup of LGS Unit 1 reactor, following its fourteenth refueling outage, reactor coolant chemistry parameters as well as radioactive gaseous waste releases and radioactive liquid waste releases were maintained within the limits set forth in the LGS Unit 1 TS. The following is a list of chemistry related surveillance tests (ST) satisfactorily performed in support of unit startup activities:

ST-5-041-800-1, "Reactor Coolant Chemistry," ST-5-041-885-1, "Dose Equivalent I-131 Determination," ST-5-061-570-0, "RadWaste Discharge Permit," ST-5-070-885-1, "Isotopic OffGas Analysis," ST-5-076-810-1, "Unit 1 South Stack Monthly Noble Gas Sampling and Analysis," and ST-5-076-815-1, "Unit 1 South Stack Weekly Iodine and Particulate Analysis."

In addition to the surveillance tests, routine tests and normal analyses were performed. Results are as follows:

PARAMETER	ACTUAL DATA (100%) 3/36/12	ACCEPTANCE CRITERIA
Primary Rx Coolant Iodine	6.8973×10^{-6} μCi/gm	≤0.2 μCi/gm
Primary Rx Coolant Conductivity	.11 μmho/cm	≤1.0 μmho/cm
Primary Rx Coolant Chloride	.320 ppb	≤200 ppb

Fuel Warranty Appendix I - Water Quality Requirements were met during startup. On March 26, (first day past outage at approximately 100% power), Condensate demineralizer effluent conductivity was 0.057μmho/cm. The first feedwater sample taken after attaining 100% power was on March 26th, feedwater copper concentration was 0.048, insoluble iron was 0.381 ppb and total metals was 0.833 ppb (fuel warranty maximum limit 2.0 ppb, 20 ppb, and 30 ppb respectively).

Condensate and reactor water cleanup demineralizer performance was monitored closely during the startup. Demineralizers were regenerated as necessary to maintain reactor water conductivity less than 0.3 μmho/cm.

3.2 STP-2, Radiation Measurements

Objective

The objectives of this test are to (1) determine the background radiation levels in the plant environs prior to operation in order to provide base data on activity buildup and shielding adequacy, and (2) monitoring radiation at selected power levels to ensure the protection of personnel and continuous compliance with the guideline standards of 10CFR20 during plant operation.

Acceptance Criteria

Level 1

The 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 l0CFR20.

Level 2

None

Results

Radiation surveys were conducted during power ascension and at a power level of 100% in accordance with GP-2 Appendix 6, "Normal Plant Startup - Health Physics." Radiation shielding as described in the UFSAR was verified as adequate. Radiation dose rates remained within the standards for protection against radiation outlined in 10CFR20 thus meeting testing criteria.

3.3 STP-3, Fuel Loading

Objective

The objective of this test is to load fuel safely and efficiently to the full core size.

Acceptance Criteria

Level 1

The core is fully loaded in accordance with established procedures, and the partially loaded core must be subcritical by at least 0.38% $\Delta K/K$ with the analytically determined strongest rod fully withdrawn.

Level 2

None

Results

Core reload was conducted in accordance with Technical Specifications. Equipment required to be operable to ensure that shutdown margin was maintained was verified by various performances of ST-6-097-630-1, "Core Alteration Testing for Offloading, Shuffling and Reloading the Core," and ST-6-107-591-1, "Daily Surveillance Log – OPCONS 4, 5," between February 20, 2012 and March 20, 2012. Shutdown margin was calculated for every core configuration during core alteration in accordance with NF-AA-309 and NF-AB-725. Post-core alteration core verification was completed on March 7, 2012 after all refueling operations were completed by performance of the NF-AA-330-1001, "Core Verification Guideline." All fuel bundles were verified to be in their proper locations and properly oriented in the control cells.

3.4 STP-4, Full Core Shutdown Margin

Objective

The objective of this test is to demonstrate that the reactor will be sufficiently subcritical throughout the cycle with any single control rod withdrawn.

Acceptance Criteria

Level 1

The shutdown margin (SDM) of the fully loaded, cold (68°F), Xenon-free core occurring at the most reactive time during the cycle must be at least 0.38% ΔK/K with the analytically strongest rod withdrawn. If the SDM is measured at some time during the cycle other than the most reactive time, compliance with the above is shown by demonstrating that the SDM is 0.38% ΔK/K plus an exposure dependent correction factor (R) which corrects the SDM at that time to the minimum SDM.

Level 2

Criticality should occur within ± 1.0% ΔK/K of predicted critical.

Results

For Unit 1 Cycle 15, the required shutdown margin must be greater than 0.38% ΔK/K where R is equal to 0.20% ΔK/K. Therefore the calculated shutdown margin for Cycle 15 must be greater than 0.58% ΔK/K.

On March 21, 2012 as Unit 1 reached criticality, data was collected to calculate shutdown margin in accordance with ST-3-107-870-1, "Shutdown Margin Demonstration." Cycle 15 shutdown margin was determined to be 1.489% ΔK/K. This satisfies the Level 1 criteria.

The difference between the temperature-corrected eigenvalue at criticality and the predicted critical eigenvalue was determined to be 0.269% ΔK/K. This satisfies the Level 2 criteria.

3.5 STP-5, Control Rod Drive System

Objectives

The objectives to this test are (1) to demonstrate that the Control Rod Drive (CRD) System operates properly over the full range of primary coolant operating temperatures and pressures, from ambient to operating, and (2) to determine the initial operating characteristics of the entire CRD system.

Acceptance Criteria

Level 1

Each CRD must have a normal withdrawal speed less than or equal to 2.7 in/sec, indicated by a full 12 foot stroke greater than or equal to 53 seconds when in OPCON 3, 4, or 5. When in OPCON 1 or 2, each CRD must have a normal withdrawal speed less than or equal to 3.0 in/sec, indicated by a full 12 foot stroke greater than or equal to 48 seconds.

The mean SCRAM time of all operable CRDs must not exceed the following times:

Position Inserted to From Fully Withdrawn	SCRAM Time(secs)
45	0.43
39	0.86
25	1.93
05	3.49

The mean SCRAM time of the three fastest CRDs in a two by two array must not exceed the following times:

Position Inserted to From Fully Withdrawn	SCRAM Time(secs)
45	0.45
39	0.92
25	2.05
05	3.70

Level 2

Each CRD must have normal insert and withdrawal speeds of 3.0 ± 0.6 inches per second, indicated by a full 12 foot stroke in 40 to 60 seconds.

Results

Although the performance of the CRD system was not affected by the installation of the new fuel design, the SCRAM time limits are required by TS to ensure thermal limits, such as critical power ratio, are not exceeded. Therefore Level 1 tests were performed.

Level 1 stroke time acceptance criteria were fully satisfied by the performance of GP-13, "Control Rod Drive Control Rod Blade Outage Maintenance Coordination Procedure," from March 11, 2012 to March 12, 2012.

Level 1 SCRAM time acceptance criteria were fully satisfied by the performance of ST-6-107-790-1, "Control Rod Scram Timing," from March 13, 2012 to March 24, 2012 during the operational hydrostatic test and startup.

3.6 STP-6, Source Range Monitor Performance and Control Rod Sequence

Objective

The objective of this test is to determine that the operational neutron sources, Source Range Monitoring instrumentation, and control rod withdrawal sequences provide adequate information to achieve criticality and power increases in a safe and efficient manner.

Acceptance Criteria

Level 1

There must be a neutron signal to noise ratio of at least 2:1 on the required operable SRM. There must be a minimum count rate of 3 cps on the required operable SRM.

Level 2

None

Results

Minimum SRM count rate was determined to be greater than 3 cps by the performance of ST-6-107-590-1, "Daily Surveillance Log – OPCONS 1, 2, 3," prior to the withdrawal of the control rods on March 20, 2012. The signal to noise ratio verification is only required to be performed in accordance with TS if the SRM count rate is less then 3.0 cps.

Since at no time during the startup was the count rate less than 3.0 cps, this verification was not performed. SRM response and control rod withdrawal sequence were verified by performance of ST-3-107-870-1, "Shutdown Margin Determination," on March 21, 2012, until criticality was achieved.

3.7 STP-10, Intermediate Range Monitor Performance

Objective

The objective of this test is to adjust the Intermediate Range Monitoring (IRM) System to obtain an optimum overlap with SRM and Average Power Range Monitoring (APRM) Systems.

Acceptance Criteria

Level 1

Each IRM channel must be on scale before the SRMs exceed their Rod Block setpoint.

Each APRM channel must be on scale before the IRMs exceed their Rod Block setpoint.

Level 2

Each IRM channel must be adjusted so that one-half decade overlap with the SRMs is assured.

Each IRM channel must be adjusted so that one-half decade overlap with the APRMs is assured.

Results

TS SRM/IRM overlap was satisfied by the performance of ST-6-107-884-1, "Neutron Monitoring System Overlap Verification on Startup," on March 21, 2012. This test demonstrated at least a half decade SRM/IRM overlap.

During the startup, all required APRMs were verified to be on scale before any IRM exceeded their SCRAM setpoint of 120/125 of scale. This was documented on General Plant Procedure GP-2, "Normal Plant Startup" on March 21, 2012. One-half decade of IRM/APRM overlap is verified in accordance with TS during each controlled shutdown by performance of ST-6-107-886-1, "Neutron Monitoring System Overlap Verification on Shutdown." This test was completed on February 20, 2012.

3.8 STP-11, Local Power Range Monitoring Calibration

Objective

The objective of this test is to calibrate the Local Power Range Monitor (LPRM) system.

Acceptance Criteria

Level 1

None

Level 2

Each LPRM reading will be within 10% of its calculated value.

Results

LPRM Calibration was performed at 100% power per ST-2-074-505-1, "LPRM Gain Calibration." The LPRMs were calibrated within 10% of their calculated value.

3.9 STP-12, Average Power Range Monitoring Calibration

Objective

The objective of this test is to calibrate the APRM system

Acceptance Criteria

Level 1

The APRM channels must be calibrated to read equal to or greater than the actual core thermal power.

TS and fuel warranty limits on APRM scram and Rod Block shall not be exceeded.

In startup mode, all APRM channels must produce a scram at less than or equal to 15% of rated thermal power.

Level 2

If the above criteria are satisfied, then the APRM channels will be considered to be reading accurately if they agree with the heat balance

Results

By various performances of ST-6-107-887-1 "APRM Gain Determination and Auto Adjustment", Level 1 acceptance criteria were met by verifying APRM channels were indicating greater than or equal to actual core thermal power and below the Scram and Rod Block setpoints when thermal power was greater then 25%. Level 2 acceptance criteria were also met in ST-6-107-887-1, "APRM Gain Determination and Auto Adjustment," by adjusting indicated APRM readings to conform to the power values calculated by the plant heat balance.

The Level 1 acceptance criteria of APRM scram setpoint of 15% was met by channel functional tests ST-2-074-426-1 "Calibration/Functional Check of Average Power Range Monitor 1 (APRM 1)", ST-2-074-427-1 "Calibration/Functional Check of Average Power Range Monitor 2 (APRM 2)" , ST-2-074-428-1 "Calibration/Functional Check of Average Power Range Monitor 3 (APRM 3)", ST-2-074-429-1 "Calibration/Functional Check of Average Power Range Monitor 4 (APRM 4)" performed February 21, 2012 through February 26, 2012.

3.10 STP-19, Core Performance

Objectives

The objectives of this test are to (1) evaluate core thermal power and core flow rates and (2) evaluate whether the core performance parameters are within limits.

Acceptance Criteria

Level 1

The following thermal limits are ≤ 1.000:

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

Steady State Reactor power shall be limited to the rated core thermal power (3515 MW_{th})

Core Flow shall not exceed its rated value (110 Mlbm/hr)

Level 2

None

Results

With thermal power limited to 3515 MWth and core flow limited to 110 Mlbm/hr, Level 1 acceptance criteria of thermal limits were satisfied and documented throughout the startup by various performances of ST-6-107-885-1, "Thermal Limits Determination for Two Recirc Loop Operation" from March 24, 2012 to March 26, 2012.