GULF STATES UTILITIES COMPANY

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U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Gentlemen:

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

Gulf States Utilities (GSU) hereby files an amendment to the River Bend Station Unit 1 Technical Specifications, Appendix A to Facility Operating License NPF-47, pursuant to 10CFR50.90. This application is filed to change the setpoints and limits associated with recirculation loop operations to allow single loop operation. The attachments include the proposed revisions and justifications to the River Bend Technical Specifications.

Pursuant to 10CFR170.12, GSU has enclosed a check in the amount of one-hundred and fifty dollars ($150.00) for the license amendment application fee. Your prompt attention to this application is appreciated.

Sincerely,

J. C. Deddens
Senior Vice President
River Bend Nuclear Group

JCD/LAE/RJK/BMB/es

Attachment

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w/check $150
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

STATE OF LOUISIANA	)	
PARISH OF WEST FELICIANA	)	
In the Matter of	)	Docket No. 50-458 50-459
GULF STATES UTILITIES COMPANY	)	

(River Bend Station,
Unit 1)

AFFIDAVIT

J. C. Deddens, being duly sworn, states that he is a Senior Vice President of Gulf States Utilities Company; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

J C Deddens

J. C. Deddens

Subscribed and sworn to : fore me, a Notary Public in and for the State and Parish above named, this 6th day of April, 1988.

Joan W. Middlebrooks

Joan W. Middlebrooks
Notary Public in and for
West Feliciana Parish,
Louisiana

My Commission is for Life.

GULF STATES UTILITIES COMPANY
RIVER BEND STATION
DOCKET 50-458/LICENSE NO. NPF-47

SINGLE RECIRCULATION LOOP OPERATION SUBMITTAL

LICENSING DOCUMENT INVOLVED: TECHNICAL SPECIFICATIONS (see Enclosure 1)

REASON FOR REQUEST:

A proposed change is being requested in accordance with 10CFR50.90 which revises the Safety Limit Minimum Critical Power Ratio (MCPR), the Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) for all bundles, Average Power Range Monitor (APRM) scram and rod block setpoints for single recirculation loop operation (single loop operation). In addition to the above revisions certain specific actions are identified which must be followed when single loop operation mode is entered such as imposing the revisions mentioned above, placing the active loop flow controller in the loop manual mode, and imposing certain power/flow restrictions for thermal-hydraulic stability, and thermal stress considerations. GSU requests to amend the River Bend Station Technical Specifications to permit the single loop operation mode.

Single loop operation is a highly desirable mode of operation in the event that a recirculation pump or other component maintenance renders a single loop inoperative. The current Technical Specifications call for power to be reduced within two hours below the value specified in Technical Specification Figure 3.4.1.1-1, and at least hot shutdown achieved within the following twelve hours. This change will allow the continued safe operation of River Bend Station while maintaining continued electrical generation.

DESCRIPTION

An analysis of single loop operation has been performed entitled "Single-Loop Operation Analysis For River Bend Station, Unit 1", May 1987 (NEDO-31441). This analysis forms the basis for Technical Specification changes listed in Enclosure 1. To justify single loop operation, accidents and abnormal operational transients associated with power operations, as presented in USAR sections 6.2 and 6.3, and Chapter 15 of the USAR, were reviewed. In addition, thermal-hydraulic stability

and thermal stress evaluations were performed based on generic analyses. The analyses performed in support of this Technical Specification change have been verified to be bounding for cycle 2. Future reload analyses will provide reverification that the limits in this specification apply.

Safety Limit MCPR For Single Loop Operation

The objective during normal operation and transient events is to maintain nucleate boiling and avoid boiling transition. This is accomplished by the establishment of operating limits which maintain an adequate margin to these boiling regions. The figure of merit used for these operating limits is the Critical Power Ratio (CPR). This ratio is defined as the ratio of the critical power (bundle power at which boiling transition occurs) to the operating bundle power. The critical power is evaluated at the same mass flux, inlet temperature, and pressure which exist for the specified reactor operating conditions. Thermal margin is the margin from the current operating state to boiling transition, and is stated in terms of Minimum Critical Power Ratio (MCPR). MCPR corresponds to the most limiting bundle in the core (i.e., lowest CPR).

Bounding statistical analyses have been performed which provide conservative safety limit MCPRs (also referred to as fuel cladding integrity safety limit) applicable to all GE BWR fuel designs. The plant-unique MCPR operating limit is established to ensure that no transient of moderate frequency will exceed the fuel cladding integrity safety limit. This operating limit is obtained by taking the fuel cladding integrity safety limit and adding to that the maximum change in CPR for the worst case operational transient at rated reactor conditions which is postulated to occur at the plant. The River Bend Station (BWR-6) safety limit MCPR for two recirculation loop operation (two loop operation) is currently set to 1.07.

During single loop operation the uncertainties in core flow and Traversing In-Core Probe (TIP) measurements are larger than during two loop operation. Because of the increase in these uncertainties (6% for single loop operation vs 2.5% for two loop operation for core flow measurement and 9.1% for single loop operation vs. 8.7% for two loop operation on TIP measurements) the safety limit MCPR must be increased by 0.01 to 1.08. By increasing the safety limit MCPR to account for the increased uncertainties, it can be shown that during a transient event initiated from single loop operation 99.9% of the rods will avoid boiling transition.

This change which specifically identifies the two loop operation safety limit MCPR of 1.07 and the single loop safety limit MCPR of 1.08 is included in Specifications 2.1.2, and Bases 2.0. The increase in safety limit MCPR for single loop operation does not require an increase in operating limit MCPR as analyses performed in support of this proposed

Technical Specification change indicate that the current operating MCPR limits are bounding. In Specification 3.4.1.1 the Limiting Conditions for Operation call out the requirements of Specification 2.1.2. The safety limit MCPR is given as a precondition in Bases 3/4.4.1. The value of 1.07 in Bases 3/4.1.3 and 3/4.2.2 was replaced with "fuel cladding safety limit" to avoid repetition of the two loop and single loop values.

MAPLHGRs for Single Loop Operation

The linear heat generation rate (LHGR) is the heat generation per unit length of fuel rod. It is the integral of the heat flux over the heat transfer area for a unit length. The average planar linear heat generation rate (APLHGR) is applicable to a specific planar height for a specific bundle. APLHGR is calculated by summing the LHGR for that bundle at a specific bundle height and dividing by the total number of fueled rods in the fuel bundle. The maximum APLHGR (MAPLHGR) is the most limiting APLHGR for a given bundle. MAPLHGR limits are provided for each bundle type (Figures 3.2.1-1 through 3.2.1-6). These limits are such that if the bundle MAPLHGR does not exceed the MAPLHGR limit then the limits of 10CFR50.46 (i.e., 2200°F peak clad temperature, maximum cladding oxidation, and maximum hydrogen generation) will not be exceeded during a DBA-LOCA as described in Section 6.3 of the River Bend Station Updated Safety Analysis Report (USAR).

During single loop operation the MAPLHGR limits in Figures 3.2.1-1 through 3.2.1-6 are multiplied by a MAPLHGR reduction factor of 0.84. The analyses performed in support of this Technical Specification change have been verified to be bounding for cycle 2. Future reload analyses will provide reverification that this limit still applies. The reduction of MAPLHGR is a result of an earlier boiling transition following a LOCA in single loop operation than in two loop operation. This earlier boiling transition is due to loss of forced coolant flow resulting from the double ended rupture of the recirculation suction line break in the active loop (loss of nucleate boiling is assumed to occur at 0.01 seconds into the event irregardless of the initial MCPR).

The reduction factor of 0.84 for single loop operation is reflected into Specification 3.2.1 as well as Bases 3/4.2.1 and Table B 3.2.1-1, as well as Bases 3/4.4.1. In Specification 3.4.1.1 the Limiting Conditions for Operation and action statement d call out the requirements of Specification 3.2.1.

APRM Flow Biased Scram and Rodblock Setpoints

Both the reactor protection system (RPS) and the rod control and information system (RC&IS) use recirculation loop flow signal developed by summing the flow signal obtained via elbow taps for each loop. This flow signal is used to establish setpoints which increase as core flow

increases. When the neutron flux (which is lagged by approximately 6.0 seconds to simulate heat conduction through the fuel) exceeds the setpoint established by the recirculation loop flow a scram occurs (neutron flux is not lagged for rod blocks). Therefore high power operation is only attainable at high core flows.

The RPS APRM flow biased scram Technical Specification nominal trip setpoint is determined by the equation $S \leq 0.66W + 48\%$ where S is the setpoint and W is the total recirculation loop flow measured by the recirculation loop elbow taps. This setpoint is automatically adjusted to ensure that, in combination with the operating limit MCPR, adequate margin is provided in the event of a non-LOCA, such that the transient MCPR does not decrease below the fuel cladding integrity safety limit.

The RC&IS APRM flow biased rod block Technical Specification nominal trip setpoint is determined by the equation $S \leq 0.66W + 42\%$ where S and W are the same as described for the RPS. This setpoint also adjusts itself automatically based upon the total recirculation loop flow. The APRM flow biased rod block prevents rod withdrawal and thereby limits the ability to maneuver into power/flow regions where thermal margin maybe reduced, and limits the ability to maneuver to the RPS APRM scram setpoints and thereby avoiding unnecessary scrams.

The current Technical Specification Nominal Setpoints and Allowable Values for the RPS and RC&IS are:

	Nominal Value	Allowable Value
RPS Flow Biased Scram	$S \leq 0.66W + 48\%$	$S \leq 0.66W + 51\%$
RC&IS Flow Biased Rod Block	$S_{RB} \leq .66W + 42\%$	$S_{RB} \leq 0.66W + 45\%$

Where W is the total recirculation loop flow measured at the elbow taps in the recirculation loops.

During single loop operation, reverse flow through the inactive loop may be established. As a result the total of the loop flows may not reflect the flow through the core. Therefore, the RPS and RC&IS flow biased setpoints must be modified because more drive flow is required for single loop operation to produce the same core flow as in two loop operation. The difference between these loop flows is conservatively estimated to be approximately 8% of rated loop flow. This 8% value is is the basis for the APRM flow biased scram and rod block setpoints and was utilized to determine values for single loop operation. These values are:

	Nominal Value	Allowable Value
RPS Flow Biased Scram	$S \leq 0.66W + 42.7\%$	$S \leq 0.66W + 45.7\%$
RC&IS Flow Biased Rod Block	$S \leq 0.66W + 36.7\%$	$S \leq 0.66W + 39.7\%$

These values are reflected into Table 2.2.1-1, Specification 3.2.2, and Table 3.3.6-2. In Specification 3.4.1.1 the Limiting Conditions for

Operation call out the requirements of Specification 2.2.1, 3.2.2 and 3.2.6.

Recirculation Pump Drive Flow Limit

The proposed recirculation pump drive flow limit is required for single loop operation. The limit of 33,000 gpm for the active loop is based upon measured data from Kuo Sheng-1 (a prototype BWR-6 Mark III). The testing performed at Kuo Sheng indicated all internal components of the vessel were within acceptable vibration limits. Operation above the drive flow limit is not permitted as this represents unanalyzed region.

The 33,000 gpm drive flow limit is reflected into the Limiting Conditions for Operation for Specification 3.4.1.1 and action statement a, Surveillance 4.4.1.1.3(c) and Bases 3/4.4.1.

Thermal-Hydraulic Stability Limits

During normal operations at rated conditions the average APRM flux noise is of approximately 4-9%. As the power/flow conditions are changed, the thermal hydraulic/reactor kinetic feedback mechanism may be enhanced such that a random perturbation to the reactor system may lead to limit cycle oscillations potentially leading to unstable reactor operations. These conditions are most likely to occur in the high power/low core flow corner of the power/flow map.

The current Technical Specifications (Specification 3.4.1.1) direct the operator to observe the APRM and LPRM noise levels for indication of potential instabilities (noise level three times normal background) when core flow is less than 45% of rated core flow and thermal power greater than the limit shown in Figure 3.4.1.1-1. Should APRM or LPRM noise levels exceed limits the operator is directed to leave that region by either increasing core flow to greater than 45% of rated core or reduce thermal power to less than or equal to the limit in Figure 3.4.1.1-1. These actions are referred to as "detect and suppress".

The proposed Technical Specification continues to allow "detect and suppress" as before except that range of core flow is reduced (core flow less than 45% but greater than 39% of rated core flow versus less than 45% of rate core flow). Below 39% of rated core flow the operator is instructed to either increase core flow or reduce thermal power to exit that region. The guidance for the limits may be found in General Electric Service Information Letter SIL-380, "BWR Core Thermal Hydraulic Stability", February 10, 1984.

These limits are reflected into the Limiting Conditions for Operation for Specification 3.4.1.1-1 and actions g and h, Surveillance 4.4.1.1.5,

and a revised Figure 3.4.1.1-1 which identifies 3 regions where Region I is the unrestricted region with respect to thermal hydraulic stability, Region II is the "detect and suppress" region, and Region III is the less than 39% of rated core flow region where the operator is instructed to avoid.

Thermal Stress

During two loop operation the forced coolant flow is adequate to prevent thermal stratification in the bottom head of the reactor pressure vessel (RPV). Thermal stratification is the formation of a stagnant layer of relatively cold water. If the water was suddenly mixed with warm water such that the temperature in the region of the bottom head suddenly increases then penetrations in the bottom head may expand at a rate different than the bottom head, possibly resulting in the formation of cracks at these penetrations.

Single loop operation at low power or low flow conditions may allow thermal stratification to occur. Therefore limits of 30% Rated Thermal Power (RTP) and 50% rated recirculation loop flow in the operating loop are proposed such that operation in the region of the power flow map above this point would not lead to thermal stratification. Alternatively, operation below the 30% RTP or 50% rated recirculation loop flow in the operating loop is permitted if the ACTION and surveillances required in Specification 3/4.4.1.1.4 (proposed) are performed and the differential temperatures are demonstrated to be within the limits defined. Guidance for these limits is provided in General Electric Service Information Letter SIL-251, "Control of RPV Bottom Head Temperatures, October 31, 1977, and Supplement 1, July 1980."

These limits are reflected into Specification 3.4.1.1 ACTION statement f. Surveillance 4.4.1.1.4 and Bases 3/4.4.1.

Thermal Power Limit

During normal operation core maneuvering is restricted to power/flow conditions as specified on the power flow map with maximum power of 2894 MWth. Operation in this region and adherence to operating limits ensures that the safety limits for River Bend Station are not violated. Operating limits have been determined using conditions representative of rated power/flow conditions.

The analyses supporting single loop operation have been performed in the same operating domain of the power flow map except power was limited to 70% of rated thermal power. As a result thermal power during single loop operation is restricted to a maximum of 70% rated thermal power.

This single loop operation thermal power limit is incorporated into the Limiting Conditions for Operation for Specification 3.4.1.1 and action statement c, and Surveillance 4.4.1.1.3(a)

Recirculation Flow Control Mode

The current operating license for River Bend Station permits operation in all modes of recirculation flow control from Loop Manual (position control) to Master Manual (flux control). The design is such that recirculation flow control may be optimized for all power/flow conditions.

During single loop operation there is an increase in drive flow and neutron "noise" versus two loop operation. This noise may cause unnecessary operation of the control valves in the flow control or flux control modes. Therefore the flow controller should be placed in the Loop Manual mode to avoid this condition.

This requirement is incorporated into the Limiting Conditions for Operation for Specification 3.4.1.1 and action statement b, Surveillance 4.4.1.1.3(b) and Bases 3/4.4.

Jet Pump Operability

During normal power operations all jet pumps (20) are to be operable. With one or more jet pumps inoperable hot shutdown must be achieved within 12 hours. While an inoperable jet pump is not in itself a reason to shutdown it may be indicative of a jet pump failure which may impact the reflood capability of the core.

Current surveillance requirements require all jet pumps to be demonstrated operable by comparison of several parameters to known performance characteristics. In the case of single loop operation these characteristics will be different than for two loop operation.

During single loop operation, the surveillances performed will only demonstrate the 10 jet pumps in the operating loop to be operable. Since the flow through the jet pumps in the non-operating loop is extremely low (less than 10% of rated jet pump flow), the loads on these jet pumps is therefore expected to be quite low compared to the loads during normal two loop operation. As a result, only the 10 operating jet pumps need be demonstrated operable during single loop operation.

The addition of single loop operation jet pump operability requirements are reflected in Specification 4.4.1.2.2 (two loop operation requirements will be in Specification 4.4.1.2.1 formerly Specification 4.4.1.2).

During initial operation in the single loop mode a test must be performed to determine the characteristics for each recirculation loop.

Recirculation Loop Flow Mismatch

Mismatch limits for recirculation loop flows are specified to comply with the ECCS-LOCA analysis for two loop operation. Early in a LOCA event the recirculation flow coast down is important in establishing the point in time when boiling transition occurs. Current specifications direct the operator to restore any recirculation flow mismatch to within limits in 2 hours or begin to place the unit in hot shutdown.

The proposed change directs the operator to shutdown one of the loops and take the actions required for single loop operation in Specification 3.4.1.1 (proposed). This places the unit in compliance with the ECCS-LOCA evaluation for single loop operation.

This change is reflected in Specification 3.4.1.3 (Action Statement b), and Bases 3/4.4.1.

Single-Loop Operation Analysis Reference

A reference to the single loop operation analysis entitled "Single-Loop Operation Analysis for River Bend Station, Unit 1", NEDO-31441, May 1987 (Enclosure 3) has been included in Bases 3/4.4.

This change involves the addition of a reference to the Bases, the analysis provided has been incorporated into the respective sections of this amendment request and provide the basis for single loop operation. Therefore, no changes or modifications made to the River Bend Facility or Technical Specifications per 10CFR50.36 and no change to a Limiting Condition for Operation, surveillance requirement, or margin of safety. Therefore, this change does not: 1) increase the probability or consequence of an accident previously analyzed, 2) create the possibility of a new or different kind of accident from any previously evaluated, or 3) reduce a margin of safety.

NO SIGNIFICANT HAZARDS CONSIDERATION

The following discussions are provided to the NRC staff in support of "no significant hazards" per 10CFR50.92.

Safety Limit MCPR For Single Loop Operation

Safety limit MCPR is currently 1.07 and is increased by 0.01 for single loop operation to 1.08. This change is due to increased uncertainties in core flow and neutron flux (TIP) measurements. The basis for the current safety limit MCPR is found in "General Electric Standard Application For Reactor Fuel", May 1986 (NEDE-24011-P-A-8) also referred to as GESTAR. The basis for the proposed single loop operation safety limit MCPR is found in NEDO-31441, "Single Loop Operation Analysis for River Bend Station, Unit 1".

1) The safety limit MCPR is set such that no fuel damage is expected to occur if the limit is not violated. The method used to determine the safety limit MCPR is NRC approved ("General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application", January 1977 (NEDO-10958-A)). This method combines operating parameter uncertainties with uncertainties in the CPR calculation method to establish the safety limit MCPR. The safety limit for single loop operation increases due to increases in the operating parameter uncertainties. Because the safety limit MCPR is set such that 99.9% of the fuel rods in the core are expected to avoid boiling transition the single loop operation safety limit MCPR performs the same function as the two loop value, this change does not increase the probability or consequences of an event previously analysed.

2) Safety limit MCPR does not represent a limit that when exceeded causes an automatic action which would result in an initiating event causing an accident or transient. The Safety Limit MCPR is adjusted in the conservative direction to account for increased uncertainties associated with single loop operation. No changes are made to the River Bend facility, so this change does not create the possibility of a different type of event than previously analyzed.

3) The safety limit MCPR is a point at which 99.9% of the fuel rods in the core are expected to avoid boiling transition, hence avoid core damage. The safety limit MCPR is combined with the change in CPR from the worst case transient event to establish an operating limit MCPR. Operation at or above the operating limit MCPR ensures that the safety limit MCPR will not be violated during a worst case transient event. The methods for determining the safety limit and operating limit MCPR are described in the GETAB document. Such methods have received NRC approval. Analysis performed by General Electric in support of single loop operation indicates that the current two loop operating limit MCPR bounds the single loop operating limit MCPR, hence these limits will be left in place. Therefore, the proposed change does not reduce the margin of safety.

MAPLHGR Limits For Single Loop Operation

The 10CFR50.46 establishes acceptance criteria for Emergency Core Cooling System (ECCS) performance. In particular limits are placed upon the peak cladding temperature, maximum cladding oxidation, and maximum hydrogen generation during a design basis event. MAPLHGR limits are established such that if adhered to during steady state operation then the above limits (peak cladding temperature, etc.) will not be exceeded during a design basis event.

1) This change provides a multiplier for the current two loop operation MAPLHGR limits. The multiplier is calculated based on methods described in "General Electrical Company Analytical Model for Loss of Coolant Analysis in Accordance with 10CFR50 Appendix K", NEDO-20566A, September 1986. The MAPLHGR is reduced by the 0.84 multiplier to account for the earlier occurrence of boiling transition associated with a LOCA event during single loop operation, and therefore accomplishes the same purpose during single loop operation as the current MAPLHGR during two loop operation. Thus, the proposed change does not result in an increase in the probability of, or the consequences of an event previously analyzed.

2) The MAPLHGR limits are not setpoints from which automatic actions are initiated that may result in a transient or accident. The MAPLHGR limits are adjusted in the conservative direction to account for the earlier boiling transition during a LOCA from single loop operation, so this change does not create the possibility of an accident or transient different than that previously analyzed.

3) The MAPLHGR limit is the point at which during a design basis event the ECCS acceptance criteria (peak cladding temperature, etc.) of 10CFR50.46 are satisfied. The existing two loop operation MAPLHGR limits are adjusted in the conservative direction to ensure the same acceptance criteria are satisfied during single loop operation. Therefore, the proposed amendment does not reduce the margin of safety.

APRM Flow Biased Scram and Rod Block Setpoints for Single Loop Operation

The APRM flow biased scram setpoint is set, in combination with the operating limit MCPR, such that the fuel cladding integrity limit (safety limit MCPR) is not violated during a non-LOCA transient event. This value uses a flow input from the recirculation system to develop a signal which varies with loop flow. This allows the setpoint to perform its automatic function over the power flow map.

The APRM flow biased rod block setpoint is set such that control rods may not be maneuvered such that thermal limits may be exceeded, nor allow power to increase to the scram setpoints. Like the APRM flow biased scram setpoint, the APRM flow biased rod block setpoint is

dependent on recirculation loop flow and is allowed to adjust to provide automatic protective action over the range of the power/flow map.

Both the scram and rod block setpoints are adjusted for single loop operation to account for the portion of active loop flow which produces reverse flow through the inactive jet pumps.

1) The APRM flow biased scram setpoint is established such that if operating limit MCPR is being adhered to, then the safety limit MCPR will not be violated during the worst case, non-LOCA transient (including single failure). The setpoints will be adjusted in the conservative direction (relative to two loop operation) for single loop operation to account for reverse flow in the idle jet pumps. This change does not result in an increase in the probability or consequence of an accident previously analyzed.

2) While the APRM flow biased scram and rodblocks provide automatic action, the setpoints are only exceeded when the reactor power (neutron flux) increases to exceed the setpoints. Power increases of this type occur from transient events (generally associated with moderator density increases), or by operator misoperation of the control rods. Therefore, this amendment does not result in the possibility of an accident different than those previously analyzed.

3) These APRM flow biased setpoints provide initiation of protective action to maintain safety limits (scram) and operating limits (rod block). The method used to adjust those setpoints is described in the single loop operation report (NEDO-31441). The changes are in the conservative direction (relative to two loop operation) and are used to account for reverse flow in the idle jet pumps during single loop operation. As a result, this proposed amendment does not reduce the margin of safety.

Recirculation Pump Flow Limit

A recirculation pump drive flow limit of 33,000 gpm is established based upon startup and test results for Kuo-Sheng-1. The results obtained from in-vessel instrumentation recorded vibration levels within acceptable limits for single loop operation at this drive flow.

1) During two loop operation no drive flow limit exists because the loop flows are balanced so that little vibration occurs. Single loop operation requires that the drive flow limit be imposed. Operating at or below the drive flow limit ensures vibration levels to be acceptable. Above the drive flow limit represents an unanalyzed region. Therefore, operation in the region bounded by the drive flow limit does not increase the probability or consequences of an accident or transient previously analyzed.

2) Upon entering into the single loop operation mode the operator is instructed to reduce drive flow to less than or equal to 33,000 gpm, and place the recirculation flow control value for the active loop in the Loop Manual, and verify that these conditions are in effect every 12 hours. By using the Loop Manual mode the value requires manual action to open further. By maintaining these limits no accidents or transients different than those previously analyzed are expecte o occur.

3) The drive flow limit for single loop operation established for River Bend Station is based upon analyses and start-up tests for Kuo Sheng-1. This limit establishes a region in which vessel internal vibration is maintained within acceptable limits, and therefore no impact or margin of safety.

Thermal-Hydraulic Stability Limits

During normal operations at rated power and core flow, neutron noise is relatively low, indicative of a stable reactor system. However during operations in the high power/low core flow region of the power/flow map system response to random perturbations may be less stable. Therefore, the high power/low core flow region currently identified in the Technical Specifications (core flow less than 45% of rated core flow and power greater than the limit in the proposed Figure 3.4.1.1-1) has been divided into two regions. "Detect and suppress" is required in the region bounded by core flow less than 45% but greater than 39% just as the current Technical Specification allows. The region below 39% is to be avoided, and should it be entered the operator is instructed to decrease thermal power, or increase core flow to exit that region.

1) The proposed change proscribes more restrictive action be taken than current Technical Specifications (for operations in Region III of Technical Specification Figure 3.4.1.1-1 (Proposed) the operator would be instructed to exit this region by increasing core flow or decreasing power versus "detect and suppress" excessive neutron flux noise as currently allowed). This limit has been determined on a generic basis for BWRs. As this is a more limiting mode of operation this change does not increase the probability or consequences of an event previously analyzed.

2) This change, which is based upon generic BWR analysis, conservatively assumes that APRM and LPRM neutron flux noise limits will be exceeded in Region III of the proposed Figure 3.4.1.1-1, and the operator is instructed to exit this region should it be entered. No change is made to the River Bend facility, and as such no accident or transient is expected to occur different than those previously analyzed are expected to occur.

3) The additional limits imposed during high power/low core flow operations have been established generically for all BWRs as referenced in NEDO-31441 (General Electric Service Information Letter SIL-380, "BWR Core Thermal Hydraulic Stability", February 10, 1984). As these limits are more restrictive than those currently in place there is no reduction in the margin of safety.

Thermal Stress Limits

During two loop operation the forced coolant flow is adequate to avoid thermal stratification. However, low power or low flow conditions during single loop operation may result in thermal stratification in the bottom head. If core flow increases suddenly, then not water may sweep the colder water out of the bottom region which may result in high thermal stress conditions to the CRD housings and in-core housing welds. Repeated occurrences may exceed the design basis.

1) To avoid the high thermal stressing of the CRD and in-core housings surveillance requirements are imposed to ensure that differential temperatures between coolant in the bottom head and top head, the active and inactive loop and the inactive loop and the vessel are maintained below limits prior to an increase in power or flow. This surveillance is only performed during single loop operation with power less than or equal to 30% of rated thermal power, or 50% of rated core flow. These limits are conservatively set such that this change does not increase the probability or consequences of an event previously analyzed.

2) The proposed limits are provided to avoid the potential for repeated high thermal stressing of the CRD and in-core housing welds. These values are set conservatively to avoid occurrences which may lead to thermal overstress conditions in the welds mentioned above. Therefore, this change does not create the possibility of a different type of event than previously analyzed.

3) Maintaining the limits stated above during single loop operation will avoid conditions which may lead to high thermal stressing of the CRD and in-core housing welds. Therefore, stress levels experienced will not differ from those experienced during two loop operation, hence will not differ from those experienced during two loop operation, hence this change does not reduce the current margin of safety.

Thermal Power Limit

The current design of River Bend Station allows operation up to 2894 MWth which corresponds to 100% rated thermal power. Analysis performed for River Bend Station was performed at 70.2% of rated core thermal power.

1) This reduced power corresponds to that portion of total core flow lost when going from two loop operation at 100% rated thermal power to single loop operation. The single loop analyses performed in support of this change demonstrates that this limit is conservative and the probability or consequence of an accident of transient is less than previously analyzed due to the reduced initial power level.

2) The thermal power limit does not represent a point that when exceeded may lead to an accident or transient or a setpoint which initiates automatic action. This limit is in the conservative direction and is intended to account for the reduced core flow during single loop operation. No changes are made to the River Bend facility, therefore this change does not create the possibility of a transient or accident not previously analyzed.

3) The analyses in support of this change request were performed at 70.2% power. As a result, changes to limits and setpoints have been made based on the assumed conditions to provide the same level of protection in single loop operation as is currently in place for two loop operation. Therefore, this proposed change does not reduce the margin of safety.

Recirculation Flow Control Mode

The design of the recirculation flow control system allows operation in the Loop Manual (position control), Flux Manual (flow control), and Master Manual (flux control). However, during single loop operation only Loop Manual control will be allowed. During single loop operation there is an increase in core flow and neutron flux noise, this may lead to flow control valve "hunting" during single loop operation if the Flux Manual or Master Manual modes are used.

1) During two recirculation loop operation the loss of feedwater heating transient with the recirculation flow controller in the Loop Manual mode of operation is the most severe transient with regard to CPR. Because of the lower power level associated with single loop operation the loss of feedwater heating transient is less severe than the previously analyzed transient in the USAR for two loop operation. By placing the controller in the Loop Manual mode of operation potential oscillations leading to an increase in core flow and a possible decrease in MCPR are avoided. Therefore this change does not result in an increase in the probability or consequences of an accident or transient previously analyzed.

2) Operation of the recirculation flow control system in the Loop Manual Mode is bounded by the current design of River Bend Station. This mode of flow control is required during single loop operation,

however, to avoid flow oscillations associated the core flow and/or neutron flux noise. As a result the proposed change does not result in the possibility of a transient or accident different from those previously analyzed.

3) Operation with the recirculation flow controller in the Loop Manual Mode has been previously analyzed in the River Bend Station Updated Safety Analysis report. For single loop operation all transients analyzed were found to be less severe than two loop operation. Therefore operation with the recirculation flow controller in Loop Manual does not result in a reduction in the margin of safety.

Jet Pump Operability

During single loop operation the performance characteristics used to demonstrate jet pump operability are different than those characteristics used during two loop operation. This specification provides the direction to use single loop operation performance characteristics. The single loop operation characteristics will be determined prior to extended operation in this mode. In addition, only the jet pumps in operating recirculation loop will be demonstrated operable.

1) The current performance characteristics used to determine jet pump operability were determined during the startup test program for two loop operation. This change will include single loop operation characteristics for use in this mode of operation. An inoperable jet pump may impact the core flooding capability during reflood following a design basis accident. The proposed change will demonstrate operability of the jet pumps during single loop operation. There is no change in operability requirements, only the characteristics are added to account for single loop operation. Therefore, this change does not increase the probability or the consequences of an accident or transient previously analyzed.

2) This change maintains the requirement that all jet pumps be operable while accounting for different performance characteristics during single loop operation. No change is made to the plant design. Therefore, the proposed change does not result in the possibility of an event other than that previously analyzed.

3) All jet pumps in the operating recirculation loop are required to be operable per Specification 3.4.1.2. This proposed change adds surveillance requirements which contain performance characteristics consistent with single loop operation. During single loop operation, the surveillances performed demonstrate the 10 jet pumps in the operating loop to be operable. Since the flow through the jet pumps in the non-operating loop is extremely low (less than 10%

of rated jet pump flow), and the loads on the jet pumps are therefore minor when compared to the loads during normal operation. As a result, only the 10 operating jet pumps need be demonstrated operable during single loop operation. Therefore, jet pump operability is demonstrated in single and two loop operation, and the requirements of Specification 3.4.1.2 are maintained. As a result, there is no reduction in the margin of safety.

Recirculation Loop Flow Mismatch

During two loop operation recirculation loop flow mismatch must be maintained within limits to be consistent with the ECCS analysis. This change permits continued single loop operation when loop flows exceed specified limits, and cannot be restored within two hours.

1) This change allows single loop operation where mismatch limits cannot be maintained. The action required by Specification 3.4.1.1 is taken to place the plant into an analyzed configuration. Therefore, there is no increase in the probability or consequences of an accident or transient.

2) During single loop operation the only transient that is not possible during two loop operation, is idle loop startup. This transient has been previously analyzed in (USAR Section 15.4.4). Therefore allowing one loop to be shutdown does not represent a configuration or transient different than that previously analyzed.

3) When one of the recirculation loops is shutdown, the action in Specification 3.4.1.1, safety and operating limits, setpoints and other parameters will be adjusted to conservative values for single loop operation. Therefore, there is no reduction in the margin of safety.

REVISED TECHNICAL SPECIFICATIONS

The requested revisions are provided in Enclosure 2.

SCHEDULE FOR ATTAINING COMPLIANCE

River Bend Station is currently in compliance with the applicable Technical Specification. The proposed Technical Specification changes are requested as soon as practical. Prior to implementing the single loop operation mode for an extended period of time at River Bend Station the performance characteristics required to demonstrate jet pump operability (Specification 4.4.1.2.2) will be determined in accordance with the proposed Technical Specifications enclosed herein.

Enclosure 1

River Bend Technical Specification Changes Proposed
for
Single Loop Operation

Specification No./ Table/Figure	Title/Activity	Revised Page
2.1.2	Thermal Power, High Power and High Flow (Modify)	2-1
Table 2.2.1-1	Reactor Protection System Instrumentation Setpoints (Modify)	2-4
Bases 2.0	Introduction (Modify)	B2-1
3/4.2.1	Average Planar Linear Heat Generation Rate LCO (Modify)	3/4 2-1
3/4.2.2	APRM Setpoints - LCO (Modify)	3/4 2-7
Table 3.3.6-1	Control Rod Block Instrumentation Setpoints (Modify)	3/4 3-62
3/4.4.1	Recirculation System - LCOs, Action Statements and Surveillance requirements (Modify)	3/4 4-1 through 3/4 4-5
Bases 3/4.1.3	Control Rods (Modify)	B 3/4 1-2
Bases 3/4.2.1	Average Planar Linear Heat Generation Rate (Modify)	B 3/4 2-2
Bases Table B 3.2.1-1	Significant Input Parameters to the Loss of Coolant Accident Analysis (Modify)	B 3/4 2-3
Bases 3/4.2.3	Minimum Critical Power Ratio	B 3/4 2-4
Bases 3/4.4.1	Recirculation System	B 3/4 4-1 and B 3/4 4-2

Enclosure 2

Revised Technical Specifications