## LIMITING CONDITIONS FOR OPERATION

3.6 PRIMARY SYSTEM BOUNDARY (Cont)

D. Safety Relief Valves (Con't)

4. Any safety relief valve whose discharge pipe temperature exceeds 212°F for 24 hours or more shall be removed at the next cold shutdown of 72 hours or more, tested in the as-found condition, and recalibrated as necessary prior to reinstallation. Power operation shall not continue beyond 90 days from the initial discovery of discharge pipe temperatures in excess of 212°F for more than 24 hours without prior NRC approval of the engineering evaluation delineated in 3.6.D.3.

5. The limiting conditions of operation for the instrumentation that monitors tail pipe temperature are given in Table 3.2-F.

E. Jet Pumps

1. Whenever the reactor is in the startup or run modes, all jet pumps shall be operable. If it is determined that a jet pump is inoperable, an orderly shutdown shall be initiated and the reactor shall be in a Cold Shutdown Condition within 24 hours.

## SURVEILLANCE REQUIREMENTS

4.6 PRIMARY SYSTEM BOUNDARY (Cont)

E. Jet Pumps

NOTES

1. Not required to be performed until 4 hours after the associated recirculation loop is in operation.

2. Not required to be performed until 24 hours after >25% Rated Thermal Power.

Whenever there is recirculation flow with the reactor in the startup or run modes, jet pump operability shall be checked daily by verifying that no two of the following conditions occur simultaneously.

1. The two recirculation loops have a flow imbalance of 10% or more when the pumps are operated at the same speed.

2. The indicated value of core flow rate varies from the value derived from loop flow measurements by more than 10%.

3. The diffuser to lower plenum differential pressure reading on an individual jet pump varies from established jet pump delta P characteristics by more than 10%.

3.11 REACTOR FUEL ASSEMBLY (Cont)

B. Linear Heat Generation Rate (LHGR)

During reactor power operation, the LHGR shall not exceed the limits specified in the CORE OPERATING LIMITS REPORT.

If at any time during operation it is determined by normal surveillance that the limiting value for LHGR is being exceeded, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. If the LHGR is not returned to within the prescribed limits within two (2) hours, the reactor shall be brought to the Cold Shutdown condition within 36 hours. Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits.

C. Minimum Critical Power Ratio (MCPR)

1. During power operation MCPR shall be ≥ the MCPR operating limit specified in the Core Operating Limits Report. If at any time during operation it is determined by normal surveillance that the limiting value for MCPR is being exceeded, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. If the steady state MCPR is not returned to within the prescribed limits within two (2) hours, the reactor shall be brought to the Cold Shutdown condition within 36 hours. Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits.



4.11 REACTOR FUEL ASSEMBLY (Cont)

B. Linear Heat Generation Rate (LHGR)

The LHGR as a function of core height shall be checked daily during reactor operation at ≥25% rated thermal power.

C. Minimum Critical Power Ratio (MCPR)

1. MCPR shall be determined daily during reactor power operation at > 25% rated thermal power and following any change in power level or distribution that would cause operation with a limiting control rod pattern as specified in Table 3.2.C.1 Note 5.

2. The value of $\tau$ in Specification 3.11.C.2. shall be equal to 1.0 unless determined from the result of surveillance testing of Specification 4.3.C as follows:

a) $\tau$ is defined as

$$\tau = \frac{\tau_{ave} - \tau_B}{1.252 - \tau_B}$$

E. Jet Pumps

Failure of a jet pump nozzle assembly hold down mechanism, nozzle assembly and/or riser, would increase the cross-sectional flow area for blowdown following the design basis double-ended recirculation line break. Therefore, if a failure occurred, repairs must be made.

A nozzle riser failure could cause the coincident failure of a jet pump body; however, because of the lack of any substantial stress in the jet pump body, the converse is not possible. Therefore, failure of a jet pump body cannot occur without the failure of the nozzle riser.

The following factors form the basis for the surveillance requirements:

A break in a jet pump decreases the flow resistance characteristic of the external piping loop causing the recirculation pump to operate at a higher flow condition when compared to previous operation.

The change in flow rate of the failed jet pump produces a change in the indicated flow rate of that pump relative to the other jet pumps in that loop. Comparison of the data with a normal relationship or pattern provides the indication necessary to detect a failed jet pump.

The jet pump flow deviation pattern derived from the diffuser to lower plenum differential pressure readings will also be used to evaluate jet pump operability.

The surveillance is modified by two Notes. Note 1 allows the surveillance not to be performed until 4 hours after the associated recirculation loop is in operation, since these checks can only be performed during the jet pump operation. The 4 hours is an acceptable time to establish conditions appropriate for data collection and evaluation. Note 2 allows the surveillance not to be performed when thermal power is $\leq$ 25% of Rated Thermal Power. During low flow conditions, jet pump noise approaches the threshold response of the associated flow instrumentation and precludes the collection of repeatable and meaningful data. The 24-hour frequency has been shown by operating experience to be timely for detecting jet pump degradation and is consistent with the surveillance frequency for recirculation loop operability verification.

The surveillance requires verification of jet pump operability on a daily basis by verifying two of three following conditions do not occur simultaneously: 1) the recirculation loops have a flow imbalance of less than 10% when the pumps are operated at the same speed, 2) the variation in the indicated core flow rate and the loop flow rate is less than 10%, and 3) the diffuser to lower plenum differential pressure reading on an individual jet pump is less than 10%.

The jet pump operability detection technique is as follows. With the two recirculation pumps balanced in speed to within ± 5%, the flow rates in both recirculation loops will be verified by Control Room monitoring instruments. If the two flow rate values do not differ by more than 10%, riser and nozzle assembly integrity has been verified. If they do differ by 10% or more after correction for the difference in pump speeds, the diffuser to lower plenum differential pressure of all jet pumps will be compared to established jet pump $\Delta P$ characteristics. In the event of a failed jet pump nozzle (or riser), the affected jet pump diffuser differential pressure signal would be reduced because the backflow would be less than the normal forward flow. If the jet pump $\Delta P$ indications are within 10% of established jet pump $\Delta P$ characteristics, jet pump nozzle and riser integrity have been established. If the indicated jet pump $\Delta P$ varies from the established jet pump characteristics by more than 10%, indicated core flow will be compared to the core flow derived from loop flow measurements. If the difference between measured and

E. Jet Pumps

derived core flow rate is 10% or more, a failed jet pump nozzle (or riser) is indicated and the plant shall be shut down for repairs. If the potential blowdown flow area is increased, the system resistance to the recirculation pump is also reduced; hence, the affected drive pump will "run out" to a substantially higher flow rate (approximately 115% to 120% for a single nozzle failure). If the two loops are balanced in flow at the same pump speed, the resistance characteristics cannot have changed.